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AN OVERVIEW OF BUSHMEAT TRADE AND ITS IMPACTS ON WILDLIFE CONSERVATION IN NASARAWA STATE, NIGERIA: A SYSTEMATIC REVIEW

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ABSTRACT
Bushmeat trading practice is a main contributor to wildlife depletion in Nigeria, with Nasarawa State serving as an important center for this activity. This largely unregulated sector is driven by high consumer demand, widespread poverty, and limited access to other sources of protein, leading to significant pressure on wildlife. This review evaluates bush meat sales in Zimbabwe area, and their impacts on wildlife conservation in Nasarawa State. Data were gathered from existing literature involving sellers from the study area. Findings indicate that bush meat trading activities are concentrated in roadside markets and informal outlets ("joints") of Zimbabwe that cater to both local populations and travelers. The trade provides moderate economic opportunities, especially for women who make up about 93% of marketers. However, these traders often experience social inequalities, with most being married (90%), only half having secondary education, and a small proportion lacking formal education entirely. Ten frequently traded species include 7 mammals and 3 reptiles: African grass cutter, monkeys, duikers, and some reptiles. The persistence of this trade is largely influenced by poverty, dietary protein needs, and cultural traditions. Despite its economic importance, the bush meat trade has serious environmental and public health consequences, including declining wildlife populations, ecosystem disruption, biodiversity loss, and continued risk of zoonotic diseases such as Ebola Virus Disease (EVD). To address these challenges, this review recommends stricter enforcement of anti-poaching laws, the provision of alternative livelihoods for hunters, promotion of wildlife domestication (e.g., grass cutter farming), and improved conservation awareness and education.

Keywords: Hunting, bush meat, trade, wildlife, conservation, Nasarawa.

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Introduction

Nigeria is rich in biodiversity, hosting numerous species including primates, reptiles, amphibians, birds, and insects (Happold, 2010). Wildlife contributes significantly to protein consumption, especially in rural areas where it also serves as income source and protein supplement. Traditionally hunted for subsistence, wildlife is now increasingly exploited commercially due to rising demand (de Merode *et al.,* 2004; Fa *et al.,* 2002). However, increasing human population, habitat destruction, and over-exploitation have intensified pressure on wildlife resources. Studies conducted by Brashares *et al.,* (2001) and Oates *et al.,* (2000) have shown that hunting in West Africa has reached unsustainable levels, resulting in local extinction of some species. The trading activity of bushmeat represents an interconnection of socio-economic factors, market forces, and environmental concerns. Bush meat refers to meat obtained from wild animals through hunting activities (Olunusi *et al.,* 2022). Research has focused on the diversity of species traded and their economic value, with particular emphasis on commonly consumed species such as the grass cutter (greater cane rat) (Malik *et al.,* 2019). Market dynamics are strongly influenced by the availability and demand for specific wildlife species (Oduntan *et al.,* 2018). The idea of social opportunity is increasingly relevant in the context of wildlife trade in Nigeria. It emphasizes inclusive participation and fairness in environmental decision-making regardless of socio-economic status (IUCN, 1980). The review examined the relationship between trader vulnerability, sustainability of natural resources, and the socio-economic drivers of the bush meat trade.

The bush meat trade also raises issues of social and ecological justice in the areas. Social justice concerns arise from gender and economic inequalities, as women dominate marketing but are often excluded from more profitable roles such as hunting (Babalola, 2023). Ecological justice focuses on protecting species and ecosystems from over-exploitation. The excessive harvesting of species like pangolins (*Manis temminckii*) and chimpanzees (*Pan troglodytes*) threatens biodiversity and ecological balance (Gaubert *et al.,* 2023). Economically, sales of bush meat is profitable, particularly through the sale of mammals, which contribute significantly to traders' income (Oduntan *et al.,* 2017). Consumer preferences driven by taste, affordability, and perceived nutritional value continue to sustain demand despite conservation concerns (Olunusi *et al.,* 2023).

Bush meat trading in Nasarawa is concentrated in roadside markets and informal eateries. A notable location is the Zimbabwe bush meat joint along the Abuja–Keffi road, which attracts customers due to its proximity to Abuja. The state also serves as a transit hub for bush meat sourced from neighboring regions. The trade thrives due to its proximity to Abuja because many people work in the capital but live in or travel through Nasarawa frequenting these markets in the late afternoons and on weekends. Thus, Nasarawa has its own hunting grounds, it also serves as a destination for smoked bush meat supplied from neighboring regions of Southern Kaduna and Benue State. This is in line with the studies revealed by Fa *et al.,* (2003) which observed that urban centers are foci for the growing trade in wild animal meat within the geographical region of Central and West Africa (Fa *et al.,* 2003).

Although bush meat is often perceived as natural and healthy, it poses serious public health risks. This is supported by recent research conducted by Peros *et al.* (2021) which observed that "bush meat traders may not fully recognize or prioritize these health risks, as economic pressures and the need to support their families often overshadow the potential consequences" The study concludes that poor handling and lack of veterinary checks increase the likelihood of zoonotic disease transmission, such as Ebola and Monkey pox (Peros *et al.,* 2021). Pathogens such as Ebola virus and Nipah virus have been linked to wildlife consumption according to Jagadesh *et al.* (2023). They also concluded that despite these risks, economic necessity often outweighs health

concerns among traders in the trading areas. Consequently, Nasarawa state government has occasionally implemented bans on the sale of meat outside of designated abattoirs to control disease and improve public health.

This review examines the bush meat trade in Zimbabwe area in Nasarawa State, focusing on its socio-economic, environmental, and health implications, while identifying conservation challenges and policy gaps. It aim is to narrow the gaps between research findings, and practical policy implementation to improve biodiversity conservation and livelihoods.

Objectives and Themes of the Review:

This review's main objectives are:

1. To identify the trends in trade and consumption of bushmeat in the study area
2. To identify the affected species most commonly traded in the area
3. To identify ecosystems, and conservation challenges and gaps

Materials and Methodology

Study Design:

The Systematic Reviews of Literature technique was used in this review article, and a meta-analyses approach in order to ensure comprehensive, unbiased, and reproducible synthesis which is used to find, evaluate, and compile peer-reviewed literatures. This is to guarantee transparency and methodological rigor. In order to provide a comprehensive understanding of bush meat in trade areas, the evaluation process include classifying literature according to themes, methods, and results. With a primary focus on trade areas, the study sought to compile the body of information regarding the socio-economic trends in the bush meat trade and consumption, affected species, conservation challenges, and way forward.

Study Selection Criteria:

Database Searching Method:

Pre-titled phrases related to bush meat trade, impacts, and wildlife were searched in PubMed, Scopus, Web of Science, and Google Scholar for papers published between 1992 and 2026. Duplicated articles have been eliminated. Furthermore, after evaluating 20 full-text publications for eligibility, we eliminated 7 of them due to a lack of methodological detail, publishing in peer-reviewed sources, or an emphasis on non-African hunting species. 13 studies that satisfied every requirement were reviewed in the final synthesis as illustrated by PRISMA Flow diagram in Figure 1 below:

Inclusion and Exclusion Criteria:

Criteria such as wrong study design, studies not conducted in Nigeria as well as studies on non-Nigerian species as included in the review and metal-analysis were subjected to screening and eligibility assessment. This significant heterogeneity of methods among the included studies served as justification for the use of qualitative synthesis in line with the studies of Cooper *et al*. (2019) as seen in Figure 1.

Data extraction and analysis:

"The hunting of bush meat, their trade and pattern of consumption as well as affected species were the main themes that emerged from the data analysis utilizing thematic synthesis" (Cooper *et al.,* 2019). Literatures that address conservation challenges of bush meat trade received a lot of attention.

Limitations to the Review:

Limited study area in Nasarawa State is a limitation to this study, as substantial number of animal species traded in other parts of the State are not covered in this review.

Identification of Studies through Databases

Records identification from:
PubMed = 10
Scopus = 10
Web of Science = 5
Google Scholar = 25

Total Records identified: 50

Records Removed Before Screening: 50
Duplicate records removed: n=7
Records to screen: n= 43

Screening

Records Screened by title/Abstract: n= 43
Records Excluded at title/abstract: n=36

- Not conducted in Nigeria: n= 10
- Non-Bush meat: n= 20
- Uncommon species: n= 6

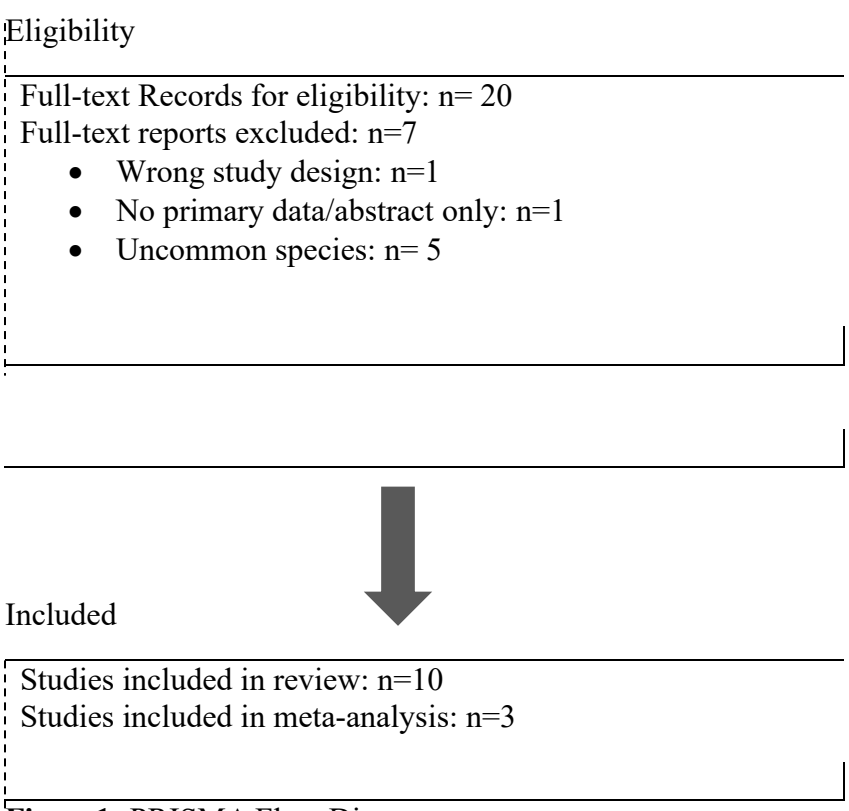


Figure1: PRISMA Flow Diagram

Results and Discussion

Findings regarding bush meat trade and its impacts on wildlife from earlier studies were considered in the review, which schemed the major themes that highlighted on the trade and consumption, conservation challenges, and policy gaps. High demand for certain species drives intense hunting pressure, contributing to population decline in the area. As larger animals become scarce, so hunters shift to smaller species—a process linked to ecosystem degradation ("empty forest syndrome"). Seasonal variation also affects hunting in Nasarawa state, with higher activity in the dry season. This is in line with studies conducted by Jyoti *et al.* (2025) which reported that while the trade remains profitable, it poses serious sustainability challenges. Providing alternative protein sources such as fish and poultry could reduce dependence on bush meat (Olunusi *et al.,* 2023).

A greater number of mammalian species such as African grass rat, grass cutter and the common gray duiker are particularly traded in the study area markets which could mean the preferences and high demand for these species. This is in line with the report of Parliamentary Office of Science and Technology, POST (2005) which reported that "the hunting of wildlife in West Africa in recent years has increased beyond sustainable limits. This perhaps is due to the uncontrolled development and population growth, habitat loss and access to the hitherto in-accessible areas, and improvement in hunting approach"

The study revealed key findings on Ten (10) bush meat species. A list of species was compiled from the information gathered from the respondents during a special visit to hunters market popularly called "Bushmeat Market" from the literature studies on the study area. Majority of the species mentioned are indigenous to the study area, where a total of 500 dry carcasses of the Ten (10) bush meat species, consisting of Seven (7) mammals and three reptiles were reported

across the literature we reviewed from the sales area during the review study. African grass rat (*Arvicanthus niloticus*), representing 24% of the total bushmeat encountered dominated the bush meat trade. Next to it were Grass cutter (*Thryonomis swiderianus*), 18%; and the Common gray duiker (*Sylvicapra grimmia*), 13%, respectively. The Patas Monkey (*Erythrocebus patas*), Rabbit (*Oyctolagus cuniculus*) and Striped Ground squirrel (*Euxerus erythropus) [verified for Nigeria]* represented a decimated bushmeat trade in the study area.

•Socio-economic Dynamics of Bush meat Trade and Species Affected:

Results of this review reveal that bushmeat trade in Zimbabwe area of Nasarawa state is centered within popular roadside markets and "joints" that serve both local residents and travelers. Studies by Olunusi *et al.,* (2022) reveals that the trade provides moderate economic opportunities for bush meat marketers, especially for women who make up about 93% of marketers. However, these traders often experience social inequalities, with most being married (90%), only half having secondary education, and a small proportion lacking formal education entirely according to Babalola *et al.,* (2023). African grass rat, Monkeys, duikers, and other mammals are commonly traded (Peros *et al.,* 2021). Average selling price by the encountered sellers, and mode of selling in a whole and part or pieces shows that the meat sellers make more gain on each species, with African grass rat as most patronized and profitable (**between ₦8,000-12,000**). The trade in the area is profitable, and largely influenced by poverty, dietary protein needs, and cultural traditions.

Despite its socio-economic importance, the bushmeat trade has serious environmental and public health consequences, including declining wildlife populations, ecosystem disruption, biodiversity loss, and increased risk of zoonotic diseases such as Ebola Virus Disease (EVD) in and around the study area (Babatunde *et al,* 2020). Similarly, Okiwelu *et al.,* (2009) observed in their reported studies that "although bushmeat trade is socio-economically important, researchers have condemned the unsustainable and illegal hunting and harvesting of wild animal meat for commercial purposes as a serious threat to the populations of these wild animals, including trade in them"

•Impacts of Bush meat Sales on Wildlife and Biodiversity in Nasarawa State:

Mammalian species obviously dominated the bushmeat traded in the study area which is in line with the work of Davies and Brown, 2007; Fa *et al.,* 2006; Robinson and Bennett, 2000). They independently observed that some taxonomic groups (reptiles and amphibians) were probably in lower rate in the sample studied because of a higher difficulty in species identification and the distinct focus on mammals in some studies (which poses some level of threats to the population of mammals in the area). Malik *et al.,* (2019) revealed in their studies that approximately 80% of hunters in the study areas conduct hunting specifically for income, not for sustenance.

The trade is driven by high demand in urban centers, with local markets and restaurants catering to a growing patronage, with peak activity often in the dry season when forest access is easier (Fa *et al.* 2006). Despite all this livelihood opportunity, there is overriding consequences on the wildlife and biodiversity. Halidu (2019) discusses the potential negative impact of unsustainable bushmeat trade on biodiversity conservation and recommends measures such as awareness programs and law enforcement. The depletion of wildlife in the areas due to unregulated trading activities is also of significant concern in Nasarawa state which are highlighted as follows:

•Declining Wildlife Population:

Research by Okiwelu *et al*., (2009) indicates that many species have been severely depleted or are facing local extinction in the area due to excessive exploitation of animal species through hunting. This is supported by the findings of Gaubert *et al.,* (2023) which reported in their

studies that over hunting have led to a rapid decline in the population of several wild animal species.

•Shifting Prey Composition and Habitat Fragmentation:

As larger mammals such as antelope, primates become scarce, so hunters are shifting pressure to smaller-sized species, a phenomenon known as "extinction filter" (Mathew *et al.* 2019) where only fast-reproducing species survive, ultimately leading to "empty forest syndrome" (Redford, 1992). This is supported by findings revealed by Oates *et al.* (2000) that, the commonly trapped or hunted animals in this ecological zone include rodents such as giant rat, grass cutters, and pangolins. Consequently, Nasarawa State, 41 natural forest reserves are reported unprotected and highly vulnerable to exploitation, and habitat fragmentation, through hunting of animal species (Fa *et al.* 2006).

•Ecological Imbalance:

Another negative impact of bushmeat trade and hunting on wildlife is the removal of key species, particularly seed-dispersing animals, which alters the forest structure and disrupts the natural ecosystem's regeneration, as revealed by the studies of Bowen- Jones *et al.* (2003). Generally, the review study reveals that there has been an increased hunting pressure, in different habitats, and on prey of different body size, due to a glut of factors such as relative availability of game animals, and changing attitudes of hunters. A major mitigating measure of the bushmeat trading activities in the areas as provided by this review will be the establishment of a living alternative reserve of small-sized prey and predators within the protected areas, as well as provision of livelihoods to the young men and women that participate in bush meat trade in the state.

Conclusion

The study highlights that Bushmeat remains widely consumed in Nasarawa State, placing significant pressure on wildlife populations, mostly mammals and some proportion of reptiles. This study has revealed that wildlife trading activities has significant impact in Nasarawa State, and if care is not taken, some of the species currently in existence today, may not be available for the unborn generation to see the species in question if the current trend in hunting continues and which are also causing imbalance in our ecosystem today. Malik *et al.,* (2019) revealed in their studies that approximately 80% of bush meat trade in the study areas engage in the bush meat sales specifically for income, not for sustenance. This is confirmed by this review study that the trade is driven by high demand in urban centers, with local markets and restaurants catering to a growing patronage, with peak activity often in the dry season when forest access is easier.

The review also reveals that the trade provides moderate economic opportunities for bushmeat marketers, especially for women who make up about 93% of marketers. However, these traders often experience social inequalities, with most being married (90%), only half having secondary education, and a small proportion lacking formal education entirely. The profitability of the trade encourages continued exploitation, threatening biodiversity and long-term sustainability.

While the state serves as its own hunting hub, it also serves as the destination grounds for smoked bush meat supplied from neighboring areas of Southern Kaduna and Benue state, through illegal hunting and other forest products' vendors. This has serious implications on the Wildlife in Nasarawa State which may lead to serious environmental and public health consequences, including declining wildlife populations, ecosystem disruption, biodiversity loss, and continued risk of zoonotic diseases such as Ebola Virus Disease (EVD). This is in line with the studies of Halidu (2019) which reported that despite all this livelihood opportunity, there are overriding consequences on the wildlife and biodiversity.

Recommendations

To reduce the sales of bushmeat and its implications on the wildlife in areas of Nasarawa state, the following actions are recommended:

1. There is a need to tighten existing wildlife conservation policies. This involves bolstering the legal framework and regulations governing wildlife protection and conservation in Nasarawa State to deter illicit activities and safeguard vulnerable species. This may include measures such as increasing patrols in protected areas, strengthening surveillance and monitoring mechanisms, and imposing stricter penalties for wildlife-related offenses.
2. Raising awareness about the effect of overexploitation of bushmeat and the zoonotic risks associated with its trade and consumption will reduce hunting activities. However, this increased awareness must be paired with efforts to empower communities to adopt sustainable alternatives. Empowering the people would reduce the high dependence of bushmeat marketers on bushmeat trade. Therefore, there is a need to provide alternative sources of income to these people, otherwise, combating wildlife trade will be useless as people will look for non-transparent means to continue with the bushmeat trade.

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