Assessment of the Profitability of Gum Arabic Collection among Collectors in Pre and Post insurgency periods in North-eastern Nigeria

[1] Ibrahim, Y., & [2] Ibrahim, M.A.

[1] Department of Forestry and Wildlife Management, Federal University Gashua, Yobe State – Nigeria
[2] Agriculture and Natural Resources Department Bayo LGA, Borno State – Nigeria

Corresponding Author's E – mail: ibrahimyakubu350@gmail.com

Abstract

This study examined the profitability of Gum Arabic collection among Collectors during pre and post-insurgency periods in North-eastern Nigeria. Multistage, purposive and random sampling techniques were used to select Borno, Gombe, and Yobe States as well as sampled collectors involved in the study area. Both financial and statistical tools were used in analyzing the data including Marketing Margin (MM) and Profitability analyses. Socioeconomic data revealed the average age of respondents is 50 years, ranged from 29 to 60 years, and practiced by both men and women. The results showed that average experience of 25 years, and a mean family size of 4 people, majority (92.34%) had no formal education, and the average income was estimated ₦63,956.94 with a wide range of ₦16,000-120,000. Financial results revealed a marketing margin of ₦27,414 during pre-insurgency period while a higher marketing margin of ₦35,376.50, was recorded during the post-insurgency period. The study concluded that Gum Arabic collection was profitable before and after the insurgency periods. The study recommended that the government should establish secure trade corridors and provide specialized credit facilities to revitalize the region's position in the global market.
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Keywords: Gum Arabic, Insurgency, Marketing Margin, Profitability, Socio-economic data, North-eastern Nigeria

JEL Classification:

1.0   Introduction

Gum Arabic, a natural gum derived from the sap of acacia trees, is predominantly used in food, pharmaceuticals, and cosmetics due to its emulsifying and stabilizing properties. In Nigeria, it is mainly sourced from the North-eastern region, where acacia species are abundant. Its production and trade represent a critical component of the local economy for communities reliant on its harvesting (Awoyemi et al., 2020). Gum Arabic provides a valuable source of income for many smallholders or wandering labourers. Tens of thousands of people worldwide living in semi-arid lands depend on the collection of gums, resins and latexes as a means of their livelihood (Chikamai, 2001; Adindu et al., 2019).

Before the rise of insurgency in northeast Nigeria, the gum Arabic market flourished due to favourable climatic condition and established trade routes. The sector provided livelihood for thousands of households, contributing significantly to the local economies. Farmers harvested gum Arabic and sold it in both local and international markets, with strong demand from industries in Europe and North America (Audu, 2019). However, Akinbi et al. (2015) observed that insurgency, since 2009, has constituted a major security threat to the nation and have made North-eastern Nigeria the epicentre the most dangerous region in the country. Majorly affected states in the region include, Borno, Yobe, and Adamawa. Boko Haram violence heated up in

2014 with about 7,711 deaths occurring in 2014, with a number of towns taken over by the group (Assessment, Capacity Project (ACAPS) 2014a). In Borno state alone, Boko Haram insurgents controlled between 40 – 70% of the state during the period (ACAPS, 2014b).

In Nigeria, the main actors along the marketing of gum Arabic industry in Nigerian are the gum collectors who collect gum from the wild naturally occurring trees from different Acacia species. Even the cultivated gum Arabic from government owned plantations or private holdings are also tapped. The other important groups of actors are the buying agents, the wholesalers and the exporters. The buying agents/dealers are generally native people who knew the farmers and have technical knowhow of sorting gum according to species type and quality. Therefore, they carry out post-harvest cleaning, sorting and grading of gum. Accordingly, they buy gum on behalf of wholesalers on commission basis. Then, the wholesalers' role is to sell the gum to the local processor and exporters who are based in big towns. The wholesalers are businessmen who have enough financial power to finance the buying of gum. Wholesalers are financially responsible for cleaning, sorting, grading and packaging to the required standards and weights. They maintain close contacts with local processors, exporters and their agents.

The third groups of actors are the exporters who are the international businessmen that have the capacity to maintain the supply of gum Arabic to foreign companies in Asia and Lebanon (UNCTAD, 2018). The objective of the study is to describe the socioeconomic characteristics of gum arabic collectors during pre and post-insurgency period, to estimate the cost and return associated with gum Arabic among collectors during the periods and identify the constraints associated with gum Arabic marketing.

2.0   Literature Review

Giroh et al. (2010) conducted a study on Non-wood Forest Products (NWFPs) for enhancing rural livelihood: the case of Gum Arabic collection in Adamawa State, Nigeria. and the findings revealed that, gum collection was a profitable venture. Umar and Mesike (2009) analysed a study on Marketing of Acacia Species (Gum Arabic) in Borno State, Nigeria, and result revealed that, there was high inequality in the income distribution among the gum Arabic marketers and discovered that gum Arabic market in Borno State is dominated by cooperative marketers. Similarly, Muneer et al. (2023), assessed Efficiency Estimation of Gum Arabic Production Cost in North and West Kordofan States, Sudan and found significant at 1% level of significance indicating the profitability of gum Arabic production. Moreover, Umar, et al. (2011), study Costs and Returns Analysis of Gum Arabic and Some Selected Tree Crops Production in Adamawa and Yobe States, Nigeria: An Implication For Poverty Alleviation and discovered that, N2,725,000.00 and N 2,263,700.00 were realized as total revenue from gum Arabic and the other tree crops respectively. This gave gross margins/kg of N 27.65 and N 18. 87 respectively for gum arabic and the other tree crops. Furthermore, marketing efficiencies (ME) calculated were 57.87% and 48.80% respectively for gum arabic and the other tree crops. This implies that gum arabic was more profitable than the other tree crops, hence promoting gum arabic production will aids in poverty alleviation in the study area (Umar, 2011).

Before the insurgency packaging and transportation were the major cost drivers in agricultural value chains, especially in less mechanized systems (Afolayan and Oni, 2019). Moreover, insecurity increases labour demand due to disruptions in workflow, restricted movement and reduced efficiency (Oluwatayo and Ojo, 2022).

### 3.0   Materials and Methods

3.1   The Study Area

The study was conducted in Borno, Gombe, and Yobe States, purposively selected due to the high density of Acacia species in Northeast Nigeria. These states represent the core of the country's Gum Arabic production belt.

Gombe State

The state has the following coordinates: longitude 10° 15'N to 10° 19'N and latitude 11° 6'E to 11° 13'E. Estimated projected population is 3.97 million. (Xplorer, 2025) The state is ethnically diverse, including Fulani, Tangale, and Tera groups. It is situated in the West Sudanian savanna and vegetation includes Adansonia digitata and Azadirachta indica. Temperatures in the state range from 14°C to 38°C, with the hottest period between February and April. The state's economy is Heavily reliant on agriculture (sorghum, maize, groundnuts) and livestock herding (Ishaku et al., 2020).

Figure 3.1 Map of Gombe State Showing the study area location
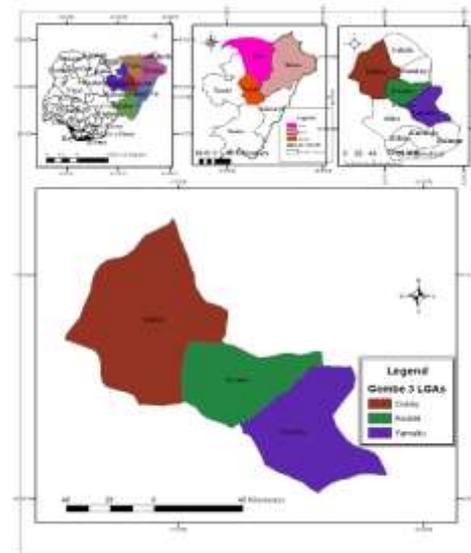
Source: (Ishaku et al., 2020)
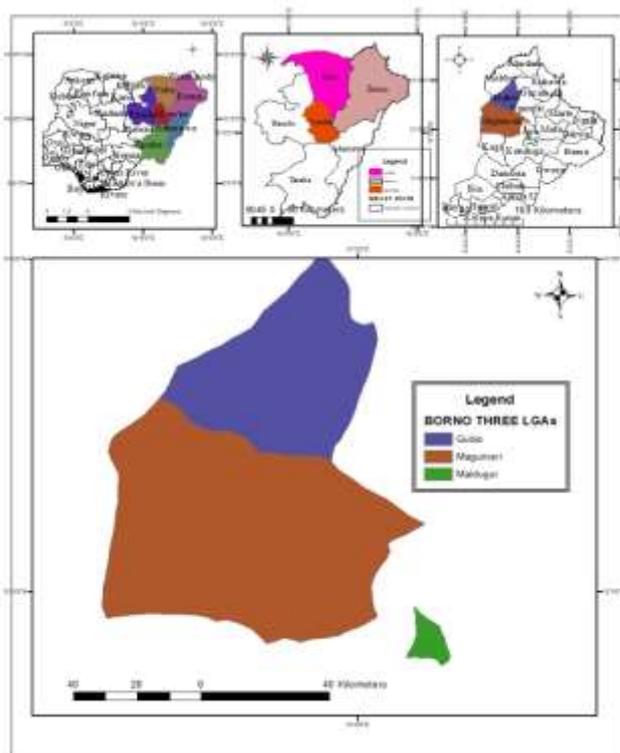
Borno State

Borno is the second-largest state in Nigeria, uniquely bordering Niger, Chad, and Cameroon. with a Coordinates: longitude 11°30′N and latitude 13°00′E (Fig. 3.2). It is the only Nigerian state to border up to three countries. Projected population is 6.65 million, (Xplorer, 2025) predominantly Kanuri and Shuwa Arab. Ecology & Climate: Features a transition from Sahelian savanna in the north to Sudanian savanna in the south. The climate is semi-arid with a short rainy season (June–September) and a peak hot period in May (avg. 34°C). Economy: A major regional trade hub for livestock, fish, and Gum Arabic (Ishaku et al., 2020).

Figure 3.2 Map of Borno state showing the Study areas

Source: (Ishaku et al., 2020).

Yobe State

The state has the following coordinates longitude 12o 00'N to 110 30'E and latitude 12.0000N to 11.5000E, (Fig. 3.3) sharing an international border with the Republic of Niger. Projected population is 3.98 million (Xplorer, 2025). Major tribes include Kanuri, Fulani, and Karai-karai. Ecology & Climate: Predominantly Sudano-Sahelian vegetation consisting of grasslands and hardy shrubs. It experiences a long dry season (7 months) and low annual rainfall (180 mm – 240 mm). Economy: Known for the Potiskum cattle market and significant deposits of gypsum and kaolin (Ishaku et al., 2020).
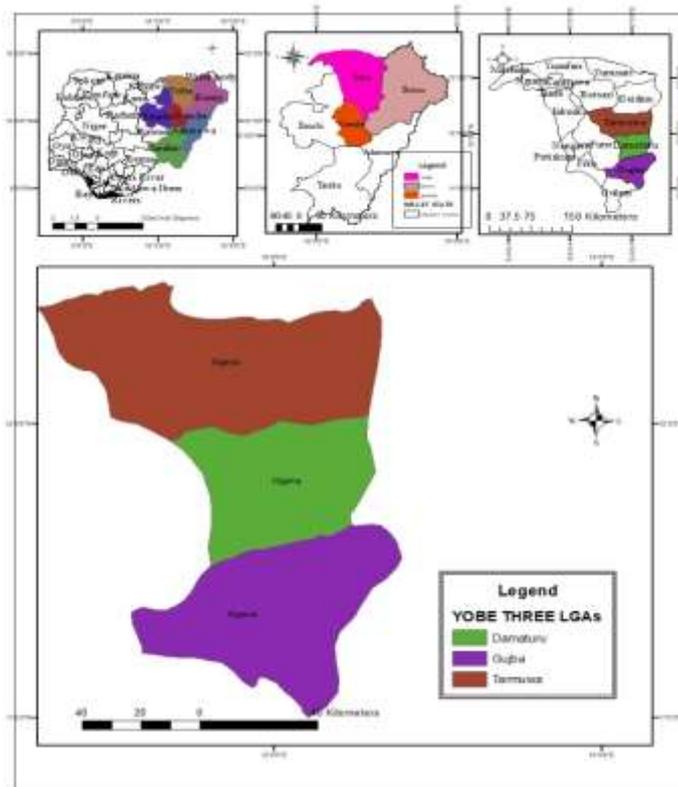

Figure 3.3 Map of Yobe State showing the Study area

Source: (Ishaku et al., 2020).

3.2 Sources and Methods of Data Collection

Data for this study were obtained from primary source, and collected through the use of structured questionnaire administered to randomly selected actors in the study areas. Data were collected on relevant parameters such as socio-economic characteristics, cost and return and constraints activities among respondents.

3.3   Sampling Procedure and Sample Size

Multistage, purposive and random sampling techniques were adopted for the study. Borno, Yobe and Gombe states were purposively selected for the study being among the major gum Arabic producing and trading markets, states in Nigeria, as identified by UNCTAD (2018). The study sampled three (3) Local Government Areas (LGAs) and one community each of the selected LGAs due to security challenges and prominence of gum Arabic collectors. A total list of 218 were obtained from the Ministries of Agriculture and Environment of respective states. A total of 218 questionnaires were produced for data collection out of which 209 copies were correctly filled, returned and used in data analysis Respondents were randomly selected in proportion to their population, totaling 106, = Borno, 33 = Gombe and Yobe = 79 which is the sampling frame of this study. It is from this sampling frame that the sample size was drawn taking cognizance of the collectors from the selected Local Governments.

3.4   Methods of Data Analysis

The data collected were analyzed using descriptive statistics and inferential statistics. Descriptive statistics as means, standard deviation, percentage and frequency tables were used to analyze the socioeconomic characteristics of the respondents.

Actors' constraints were achieved using a five-point Likert scale, which employs an ordinal level of measurement. The responses to various answers were scored in such a way that, the respondents will indicate the most serious among the highest scores (i.e. 5). As a point scale the responses were grouped into five as follows; Very Serious (VS) = 5; Serious (S) = 4; Moderately Serious (MS) = 3; Least Serious (LS) = 2; Not Serious (NS) = 1. (Adindu, 2019).

4.0   Results and Discussion

Socio-economic Characteristics of Respondents

The data presented in Table 4.1 and 4.2, provides detailed overview of socio-economic characteristics of Collectors in the gum Arabic business in the study area.

Table 4.1 depicts the average mean age of respondents of 50 years, which a range from 29 to 60 years, indicating that, gum Arabic collection is dominated by matured, experienced individual, is practiced by both men and women, with 63.16% male, and 36.84% female (see Table 4.2).

Table 4.1: Summary statistics of Socio- economic characteristics of Collectors

Variable	Mean	Standard dev	Minimum	Maximum
Age	50.19617	6.767057	29	60
Household size	4	3.094831	1	13
Experience	26	5.107548	7	30
Annual income	63956.94	29686.23	16000	120000

Source: Field Survey, 2025

This pattern suggests that gum Arabic collection is relatively more gender-inclusive compared to gum Arabic production, which is often male dominated in many parts of sub-saharan Africa. Previous studies have indicated that forest product collection especially NTFPs tend to involve a higher proportion of women because it is often carried out near their homesteads or within accessible forest margins (Shackleton & Paumgarten, 2015). Women involvement in gum collection may therefore reflect its compatibility with household roles and flexible time use patterns.

Table 4.2: Socio - economic Characteristics of Collectors

Variable	Frequency	Percentage
Male	132	63.16
Female	77	36.84
Education		
Arabic	193	92.34
Primary	16	7.66
Post primary		
Marital status		
Married	112	53.59
Single	97	46.41
Use of Gum Arabic in household expenditure		
Yes	185	88.52
No	24	11.48
Debt services		
Yes	200	95.70
No	9	4.30

Source: Field Survey, 2025

However, the predominance of male collection also implies that physical demands, mobility challenges, or socio-cultural norms may still limit full female participation (Agarwal, 2018). However, the average mean experience of respondents was 25years, ranging from 7 to 30 years. This implies that, gum Arabic collection is a livelihood largely taken up by middle-aged to older adults, often with deep-root knowledge and experience in the practice. Adedayo et al., (2010), reported that, age and experience positively affect the efficiency and reliability of non-timber forest products (NTFPs) collection in Nigeria. Adewuyi and Badmus (2020), also highpoint that lengthier years of experience are associated with better understanding of forest resources, seasonal patterns, and quality differentiation are the key factors in effective collection and marketing. While experience contributes positively, the aging population could posture a sustainability challenges if younger people are not drawn into the value chain. Similarly, respondents had 1 and 13 people as minimum and maximum household sizes with a average mean family size of 4 people. Family size has been found to be a source of labour for many collection/marketing activities as well as a propelling factor for family heads to devise means of livelihood. This is relatively small compared to rural farming household in Nigeria, where family sizes often exceed 6 members (NBS, 2020). However, family sizes often correlate with economic motivation, head of smaller household may be more engaged in income generating activities to meet basic needs (Oluwatayo, 2014). However, Majority 92.34%, of the collectors had no formal education, only few 7.66%, had primary education. The high illiteracy level is consistent with general pattern of low education attainment among rural forest dependent populations in northern Nigeria (NBS, 2021).

Low literacy has implications for income diversification, access to market information and adoption of improved collection and grading techniques. This aligns with the result by Angelsen, (2014), who argue that households dependent on NTFPs often possess limited human capital, increasing their vulnerability to market shocks. Also, more than half of the respondents 53.59% were married men and women, indicating that gum Arabic collection is a household related livelihood activity often supported by shared labour and joint decision making. Marital status is known to influence access to forest resources, household labour allocation and participation in community-based resource management (Fenske, 2011). However, the average mean annual income of collectors was ₦63,956.94, which ranged from ₦16,000 to 120,000. This recommends that, gum Arabic collection serves as a modest but valuable source of supplementary income, especially during off-farming seasons. While not substantial compared to farming income can play critical role in seasonal levelling, helping households meet their expenditures during low agricultural productivity periods (Shackleton, 2014). Income variability also indicates differences in access to resources, physical ability to collect, and perhaps connections to more lucrative market channels. Value addition, improved market access and collective bargaining can help raise incomes from gum Arabic collection.

Before the insurgency, collectors faced no difficulties with market entry or exit, as indicated 100%, suggesting a stable market environment with unrestricted mobility and secure trading routes. However, this situation changed drastically after the insurgency, with 56.25% of collectors experienced difficulties, indicating disruptions in supply chains, restricted movement and increase market risk. Conflict induced market fragmentation is widely documented in dry land economies, where insecurity reduces trader's willingness travel, inflates transaction cost and weakens rural commodity markets (FAO, 2017; Idowu and Ayoola, 2022). Despite these challenges, gum Arabic collection remained an important livelihood source. However, majority of respondents 88.52% in pre-insurgency and 95.70%, in post insurgency period believed that gum Arabic collection helped them meet their household expenditure and to settle their outstanding loans/debts. These findings reinforce the role of NTFPs as economic safety nets, especially in conflict affected areas and economically

constrained environments. This aligns with studies by (Shackleton and pandey, 2014; Babiker, 2020) whose affirmed that gum arabic and similar forest products provide crucial fallback income during the periods of livelihood stress, market instability, or agricultural failures. However, Grade I (Acacia Senegal) gum Arabic remained the most common type collected. This grade accounted for 57.42% of collection during the pre-insurgency period and 55.03%, in post-insurgency period. This reflects the species natural abundance and high commercial value as documented where Acacia Senegal is globally recognized for producing premium quality gum Arabic (Ali, 2019). Grade II (Acacia Seyel) and Grade III (combretum nitricans) were collected in smaller proportions, confirming their supplementary role in gum value chain.

Cost and Return Analysis for gum Arabic Collectors in Pre and Post insurgency period

The results presented in Tables 4.3 and 4.4 provide important insights into the cost structure, profitability, and efficiency of Gum Arabic marketing by collectors before and after the insurgency period. However, in the pre-insurgency period, the total variable cost (TVC) of ₦2,724 accounted for all marketing expenses incurred by Gum Arabic collectors. Transportation emerged as the dominant cost component (32.45%), reflecting the spatial separation between collection points and markets. This is consistent with agricultural marketing theory, which emphasizes transportation as a major determinant of marketing costs, especially in rural commodity chains characterized by poor infrastructure (Adegeye & Dittoh, 1985; Kohls & Uhl, 2002). Similarly, Sorting and grading costs jointly accounted for a substantial proportion (46.98%) of total costs, underscoring the importance of quality control in Gum Arabic marketing. Since Gum Arabic is an export-oriented commodity with strict quality requirements, collectors must incur costs to meet market standards, which ultimately influence prices and competitiveness (Aklilu & Catley, 2009; ITC, 2016). However, the total revenue (₦30,138) far exceeded the TVC, resulting in a large marketing margin of ₦27,414. This wide margin indicates high profitability and suggests that collectors operated under relatively favorable market conditions with minimal constraints. According to Tomek and Robinson (2003), large marketing margins often reflect efficient market operations, stable supply chains, and low transaction risks. The relatively small contribution of taxes (4.70%) further suggests a limited regulatory burden during this period. In the post-insurgency period, the TVC increased sharply to ₦5,164, representing a substantial rise in marketing expenses.

Transportation costs escalated dramatically, accounting for over half of total costs (50.20%). This increase can be attributed to insecurity, longer and less direct trade routes, higher fuel prices, and increased transaction risks associated with moving goods in conflict-affected areas. Despite increased costs, traders maintained or even improved profitability, due to effective price adjustment (foreign exchange rate U.S dollar), scarcity or increase demand. Similar findings have been reported in studies examining the effects of conflict on agricultural value chains, where transportation costs rise due to insecurity and infrastructural damage (FAO, 2017; Porter et al., 2013). However, these challenges, sorting and grading costs remained significant (20.31% each), indicating that quality control continued to be essential for accessing profitable markets. This persistence suggests that collectors could not compromise on quality even under adverse conditions, reinforcing the idea that quality standards in Gum Arabic marketing are non-negotiable (ITC, 2016). Interestingly, total revenue increased to ₦40,540.50, leading to an even higher marketing margin of ₦35,376.50. This implies that higher output prices or increased demand compensated for the rising costs. According to Barrett (2008), post-shock or post-conflict periods may be associated with price increases due to supply shortages, higher risk premiums, or renewed demand, which can temporarily enhance traders' margins. However, the increased share of transportation costs suggests growing marketing inefficiencies and heightened vulnerability of collectors' profits to cost fluctuations.

While profitability remained positive, margins became more sensitive to external shocks such as fuel price increases or renewed insecurity. This aligns with Shepherd (2007), who argues that high transaction costs reduce market resilience and disproportionately affect small-scale market actors in fragile environments.

Table 4.3: Marketing Margin for Gum Arabic collectors in pre insurgency period

Cost Items	Amount (₦)	Percentage
Tax	128	4.70
Sorting	640	23.49
Grading	640	23.49
Bagging	192	7.05
Storage	240	8.81
Transportation	884	32.45
TVC	2724	100
TR	30138	
MM (TR-TVC)	27414	

Source: Field Survey, 2025

Table 4.4 : Marketing Margin for Gum Arabic collectors in Post- insurgency period

Cost Items	Amount (₦)	Percentage
Tax	192.00	2.70
Sorting	1140.00	20.31
Grading	1140.00	20.31
Bagging	428.00	6.48
Transportation	1300.00	50.2
TVC	5164.00	100
TR	40540.5	
MM (TR-TVC)	35376.50	

Source: Field Survey, 2025

Collectors Constraints

Table 4.5, indicates that, (100%) of the respondents agreed inadequate capital as their major problem. The overwhelmingly high proportion of collectors (88.04%), identified insecurity as their major constraints in the study areas. However, for gum Arabic collectors, insecurity directly affects their ability to access the forests where acacia trees grow, leading to reduced harvesting time, potential loss of life and assets, and forced them to abandonment of profitable areas. This reflects a study on non- timber forest product (NTFP) collection in conflict zones, where threats from armed groups or general instability severely disrupt livelihood activities (Shackleton, 2017). Furthermore, a significant number (77.51%), of the respondents shows dissatisfaction on government policies, indicating a major institutional constraint. This reflects a study on policy instability can prevent collectors from planning long term, thereby limiting their economic empowerment (Fajemirokun et al., 2018).

Also, a substantial proportion of collectors identified poor marketing outlets (69.38%), and poor storage facilities (67.94%) as major constraints which represent structural weaknesses in local infrastructure and socioeconomic disadvantages for the primary producers. This aligns with the studies on poor outlets often implies long distances to markets, reliance on opportunistic middle-men, and a lack of market information, which results in collectors receiving lower farm-gate prices (Coulter and Shepherd, 2004). Whereas, high cost of transportation (41.63%), labor costs (78.95 were the moderate and minor challenges.

Table 4.5 Constraints of Gum Arabic Collectors

Constraints	Frequency	Percentage
Inadequate capital	209	100.00
High cost of transportation	87	41.63
High cost of labor	165	78.95
Poor marketing outlet	145	69.38
Poor storage facility	142	67.94
Insecurity	184	88.04
Government policies	162	77.51

Source: Field Survey 2025

5.0   Summary

This study assesses the profitability and economic resilience of gum Arabic collection in Northeast Nigeria, comparing the periods before and after the rise of insurgency. Utilizing a survey of 209 collectors across Borno, Yobe, and Gombe states, the research reveals that while the industry remains highly profitable, the cost of operations has surged significantly due to conflict; specifically, Total Variable Costs rose from $₦2,724$ to $₦5,164$ per unit, with transportation now accounting for over 50% of expenses due to insecure trade routes and market fragmentation. Despite these rising costs and severe constraints including universal capital shortages (100%), pervasive insecurity (88%), and poor infrastructure total revenue and marketing margins actually increased in the post-insurgency period, likely driven by higher output prices and the continued global demand for high-quality Grade I (Acacia senegal). Ultimately, the findings highlight gum Arabic's role as a vital economic safety net for rural households, though its sustainability is threatened by an aging collector population, high illiteracy, and the volatile security situation in the region.

5.1   Conclusion

The study concludes that Gum Arabic collection remains a highly profitable venture in Northeast Nigeria, maintaining its economic viability across both pre- and post-insurgency periods. Despite the severe challenges posed by insecurity which significantly inflated transportation costs and restricted access to harvesting sites the business demonstrated remarkable resilience, with marketing margins actually increasing in the post-insurgency era. This profitability underscores the crop's importance as a vital livelihood safety net, suggesting that if capital constraints and security issues are addressed, the sector has the potential to significantly drive rural economic recovery in the region.

5.2   Recommendations

Based on findings, the following recommendations were made:

i.   Government authorities and local security agencies should prioritize improving security in the study area. Community-based security initiatives and conflict resolution mechanisms should be strengthened to ensure safe collection, transportation, and marketing activities.

ii.   Policymakers should reassess existing policies affecting collectors to ensure they are supportive and inclusive. Simplifying licensing procedures, reducing taxes, and providing institutional support can enhance collectors' operational efficiency and participation in formal markets.

iii.   Provision of affordable and improved storage facilities will help minimize post-harvest losses and maintain product quality. Government and non-governmental organizations

can support this through infrastructure development and training on proper storage practices

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