Micro-business of grasshopper processing in Sokoto metropolis, Nigeria

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ABSTRACT

Grasshopper processing, particularly frying, is a traditional and culturally significant economic activity in Sokoto Metropolis, Nigeria. It provides livelihoods for many residents, especially women and youth. However, despite its importance, the income generation potential and factors influencing profitability in this micro-agribusiness sector remain underexplored. This study employed a mixed-method approach to investigate the income levels, determinants of profitability, and socio-economic characteristics of grasshopper processors in Sokoto Metropolis. A two-stage sampling technique was used to select a sample of 100 respondents from three Local Government Areas (LGAs) known for high grasshopper processing activity. Primary data were collected using structured questionnaire. Descriptive statistics, gross margin analysis, and multiple regression models were employed to analyze the data. The study revealed that grasshopper processors are predominantly young females with a high level of education (secondary or higher). Family emerged as the primary source of capital for these microbusinesses. The average weekly revenue was ₦6,920, with an average gross margin of ₦4,613. Age and household size were identified as significant positive determinants of profitability. Grasshopper processing contributes to the economic landscape of Sokoto Metropolis, particularly for young women. The findings suggest this activity has the potential to generate income and serve as a viable source of livelihood. Understanding the factors influencing profitability can inform interventions to support and empower grasshopper processors.

Keywords: Grasshopper processing; profitability; women and youth empowerment

INTRODUCTION

Grasshopper is any of a group of jumping insects (suborder *Caelifera*) that are found in a variety of habitats. Grasshoppers occur in greatest numbers in lowland tropical forests, semi-arid regions, and grasslands. They range in colour from green to olive or brown and may have yellow or red markings. Although most grasshoppers are herbivorous, only a few species are important economically as crop pests. In certain parts of the world, grasshoppers are eaten as food. They are often dried, jellied, roasted and dipped in honey or ground into a meal (Encyclopaedia Britannica, 2020). Most of the grasshopper species in the world are edible (Ramos-Elorduy *et al*., 2012).

In addition to minerals, grasshoppers contain several vitamins. *Zonocerus variegatus* (adult) fulfills the daily requirement for vitamin A (retinol) in the human body (Ademolu *et al*., 2010). On the other hand, *R. differens* (brown and green) fulfills the daily requirement for vitamin B2 (riboflavin) and vitamin B9 (folic acid) (Kinyuru *et al*., 2011). The presence of all these vitamins, which play an important role in proper body functioning also makes grasshoppers an interesting source of food (van Huis, 2013). By contrast, some scientists suggest that insects are taxonomically more distant than livestock from humans, and that they therefore exhibit a lesser chance of posing health risks to humans (van Huis, 2013).

The global edible insects market size was valued at over $500 million and is expected to surpass $1.8 billion by 2028 (Amuge, 2022). In some areas of the world the sale of grasshoppers brings in more money than base crops (van Huis, 2013). While according to Kelemu *et al*., (2015), in some African communities, harvesting edible insects provides cash to cover basic expenses such as daily food, buying agricultural inputs and even paying for educational fees.

However, Amuge (2022) noted that the acceptance of insect consumption in Nigeria is not yet widespread, and that only a few feed industries in Nigeria use insects in livestock feed formulation compared to developed countries. Despite the high nutritional content and environmental sustainability of insects, only a few entrepreneurs currently engage in insect farming in Nigeria (Amuge, 2022). Although a recent report by Bello (2023) observed that grasshoppers are considered a delicacy in northern Nigeria and the business of selling it is booming. Insect processing is seen as a profitable investment that supports income generation, local food security, and provides economic opportunities, especially for youth entrepreneurship (Amuge, 2022; Bello, 2023).

The income of grasshopper processors (frying) in Sokoto Metropolis, Sokoto State, Nigeria, remains underexplored despite the significant cultural and economic role of grasshoppers in the region's culinary landscape. While grasshoppers represent a traditional delicacy and source of livelihood for many in Sokoto, there is limited empirical evidence on the economic dynamics and income generation potential within the grasshopper processing sector. Therefore, there is a pressing need to investigate the income levels, determinants, and socio-economic impact of grasshopper processing activities, specifically focusing on frying, to inform policy interventions and support sustainable livelihoods in the region.

Therefore, the general objective of this study was to comprehensively analyze the grasshopper processing micro-agribusiness in Sokoto Metropolis, Nigeria, with a focus on income generation and empowerment for women and youth.

METHODOLOGY

Study Area

Sokoto is a major city located in extreme north-western Nigeria, near the confluence of the Sokoto River and the Rima River. The coordinates for Sokoto are approximately 13°03′44″N latitude and 5°14′02″E longitude. It is the modern-day capital of Sokoto State and was previously the capital of the north-western states and that of the Sokoto Caliphate. The projected population of Sokoto Metropolis in 2023 was approximately 709,000 people (Population Stat, 2024). The Metropolis comprises of Five Local Government Areas either wholly (Sokoto North and Sokoto South) and partly (Dange-Shuni, Kware and Wamakko

LGAs). Sokoto Metropolis is characterized by its rich cultural heritage and diverse economy, where grasshopper processing holds significant importance.

Sampling Procedure and Sample Size

Two-stage sampling technique was used to sample the population. The first stage involved the purposive selection of two (2) wards each from Sokoto North and Sokoto South Local Government Areas and one (1) ward from Wamakko Local Government Area. The wards selected were Gagi 'A' and Gagi 'C' from Sokoto South LGA, Waziri 'B' and Waziri 'C' from Sokoto North LGA and Arkilla from Wamakko LGA. The reason for the purposive selection was due to the high number of grasshopper processors as compared to other places within the Metropolis (Preliminary survey). The second stage involved a random selection of twenty (20) respondents from each of the wards to arrive at a total sample size of one hundred (100) respondents. In arriving at a sample size, especially for a multivariate research, Roscoe (1973) advised that the sample size should be ten times or more as large as the number of variables in the study.

Data Collection

Primary data and secondary information were used in this study. The primary data was obtained by administering interview schedule whereas the secondary information was obtained from journals, articles, relevant literatures, and internet materials.

Data Analysis

Descriptive Statistics, Gross margin analysis and multiple regression model were used to analyze the data collected.

Model Specification

The functional form used in this study is the linear model:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \mu _____ (1)$$

Where:
Y_i = Income level (₦)
β_1 __ β_7 = coefficients
X_1 __ X_7 = independent variables
X_1 = Age (years)
X_2 = Household size (numbers)
X_3 = Highest level of education (1-Qur'anic only, 2- Secondary, 3- Tertiary)
X_4 = Marital status (1- Single, 2- Married, 3- widowed)
X_5 = Experience (years)
X_6 = Primary Occupation (Grasshopper Frying =1; Petty Trading = 2; Civil Service =3; Civil service = 4)
μ = error term

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Respondents

The socio-economic characteristics of grasshopper processors during the study period were as reported in Table 1. The results show the mean age to be 24, all of whom are females, mostly single (77%) and relatively well educated with 98% having Secondary education or higher. Meanwhile, 2 years was the average years of experience into the business, with 35% of the respondents considering Grasshopper frying as their primary occupation, while the main source of capital is family (64%).

Table 1: Socioeconomic characteristics of the respondents

Attributes	Frequency	%	Min	Max	Mean
Age Distribution (years)					
15—20	16	16			
21—26	63	63			
27—32	16	16	16	56	24
33 – 56	5	5			
Total	100	100			
Marital status					
Single	77	77			
Married	22	22			
Widow	1	1			
Totals	100	100			
Level of Education					
Qur'anic only	2	2			
Secondary	53	53			
Tertiary	45	45			
Total	100	100			
Years of Experience					
1 – 5	96	96			
6 – 10	3	3	1	22	2
11 – 22	1	1			
Total	100	100			
Household Sizes					
1 – 5	68	68	1	11	4
6 – 10	29	29			
11-20	3	3			
Total	100	100			
Primary Occupation					
Grasshopper Frying	35	35			
Petty Trading	29	29			
Civil Service	13	13			
Others	23	23			
Total	100	100			
Source of Capital					
Family and Friends	64	64			
Personal savings	33	33			
Borrowing	3	3			
Total	100	100			

From the result it can be seen that the average grasshopper processor is young (24 years old) and female. This aligns with the prevalence of young people, particularly women, engaging in microbusinesses in Nigeria due to the limited wage employment opportunities available to them. Islam *et al.* (2017) noted that small-scale agro-processing is particularly suited to the young females and thus it has a central role to play in poverty elimination. The high percentage (98%) with secondary education or higher can be attributed to the fact that most young girls in urban Nigeria attend at least secondary education. With an average of 2 years of experience and 35% considering grasshopper processing as their primary source of income, this suggests the activity is relatively new for many but holds promise as a viable source of income. Microbusinesses in Nigeria are often characterized by a mix of full-time and part-time operators, with many starting small and aiming to grow. It has been reported that many micro entrepreneurs in Nigeria rely on personal savings, family support, or informal lenders due to difficulties accessing traditional bank loans (Adebiyi and Oni, 2016). Therefore, it is not surprising that Family source account for 64% of the capital for the respondents.

Profitability Analysis for Grasshopper Processing in Sokoto Metropolis

The findings of this study (Table 2) provide valuable insights into the profitability of grasshopper processing as a microbusiness in the study area. It shows that the grasshopper processors generated average weekly revenue of ₦6,920 while incurring an average variable cost of ₦2,307, thereby earning an average gross margin of ₦4,613.

Table 2: Weekly average cost and returns per respondent

S/N	Descriptions	Amount (₦)	%
A	Cost Items		
	Grasshopper insect	1,500	65.01
	Vegetable Oil	389	16.86
	Vegetables (Pepper, onion, garlic)	107	4.68
	Salt and Seasonings	110	4.79
	Energy (fuel)	100	4.33
	Packaging (nylon)	100	4.34
	Total Variable Cost	2,307	100
B	Total Revenue	6,920	
C	Gross Margin (B – A)	4,613	

The ₦6,920 average weekly revenue indicates the potential for grasshopper processing to generate income. This aligns with the concept of microbusinesses, which typically generate modest but steady income for owner-operators (Beck and Demirgüç-Kunt 2006). The average variable cost of ₦2,307 represents expenses directly tied to processing, such as the cost of grasshoppers (65%), processing ingredients (30.66%), and packaging (4.34%). Understanding these variable costs is crucial for microbusinesses to optimize pricing and maximize profit margins. The ₦4,613 average gross margin, which is the difference between revenue and variable costs, indicates the level of profitability of the business. This suggests that after covering variable expenses, the processors have some income left to cover fixed costs and generate a profit. Noteworthy is the percentage return on

investment, which is about 66.66%, implying that Grasshopper processing business is lucrative.

Determinants of Profitability of Grasshopper Processors in Sokoto Metropolis

The result obtained indicated that age and household size (both significant at 1%) are the factors that significantly and positively affect the level of profitability of the grasshopper processors in the study area. Meaning that changing any of these two variables will affect the profit level of the respondent by the respective coefficient values. The adjusted R^2 was 43% indicating which implied that only 43% of income patterns of the grasshopper processors was explained by the independent variables used in the model. The low R^2 may be attributed to the fact some key variables that may affect the dependent variable are missing from the model. These include revenue, cost of goods sold, pricing strategy and operating expenses (Montgomery *et al*. 2012). This may also explain why many of the predictor variables are not significant.

Table 4: Factors affecting the gross margin earned by the respondents

Variables	Coefficient	Standard error	t-value	P>t
Age	114.6616	41.94929	2.73	0.008***
Marital status	341.807	481.7106	0.71	0.480
Highest level of education	188.2635	306.3717	0.61	0.540
Household size	109.1518	23.37121	4.67	0.000***
Years of experience	-87.44	72.50433	-1.21	0.231
Primary occupation	9.00059	59.07075	0.15	0.879
Constant	-2406.507	1213.087	-1.98	0.050
Adjusted R^2	0.4380			

The positivity of the age variable could be attributed to the fact that with age comes experience which leads to more knowledge and potentially better processing techniques. This can be surmised from the fact that 63% of the respondents are between the ages of 21-26, which are relatively young adults. As such they might have developed more efficient methods for processing grasshoppers, leading to reduced waste and higher quality products, ultimately resulting in higher profits. Meanwhile, it can be deduced that larger households might benefit from economies of scale. As such more family members can contribute to the processing activities, reducing labor costs and potentially allowing for larger processing volumes. This could lead to increased sales and profitability. Many authors have reported positive relationship between Age, household sizes and agribusiness processing (Chibanda and Cletus, 2021).

CONCLUSION

Grasshopper processing contributes to the economic landscape of Sokoto Metropolis, particularly for young women. The findings suggest this activity has the potential to generate income and serve as a viable source of livelihood. Understanding the factors influencing profitability, such as age and household size, can inform interventions to support and empower grasshopper processors. Future research could explore additional factors affecting profitability and investigate strategies to enhance market access and product quality.

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