

## **Original Research Article**

### **ASSESSMENT OF QUANTITY OF SHEA NUT COLLECTED AND PROCESSED BY THE PROCESSORS OF IMPROVED SHEA NUT PROCESSING TECHNOLOGIES IN NIGER STATE, NIGERIA**

#### **ABSTRACT**

This study assessed the quantity of Shea nut collected and processed by the processors of improved Shea nut processing technologies in Niger State. The specific objectives of study were to; describe the socio economic characteristics of the Shea nut processors, determine the quantities of Shea nut/butter produced by the processors and income generated, and examine the constraints faced by the processors in adopting Shea nut processing technologies in the study area. A total of 150 Shea nut processors were selected randomly. Primary data were collected and analyzed. The result of socio-economic characteristics of the Shea nut processors shows that majority (60.00%) were between the age range of 41 – 50 years and the average of age Shea nut processors in the study area was 42.07. The result revealed that Shea nut processing activities is mainly women business and that the processors collected above 500,000kg of Shea nut from the wild plantation of Shea trees in their communities and processed above 800kg into Shea butter in a year which serves as sources of income. The result indicated that majority (54.00%) of the processors generated between ₦51, 000 – ₦100,000 per year from Shea butter processing as a business. The result also revealed that majority (99.33%) of the processors had the problem of insufficient Shea nut during the peak of the dry season for processing sufficient quantity of Shea butter for commercial purposes. The result also revealed that there was a relationship between the quantity of Shea nut collected and the level of adoption of improved Shea nut processing technologies. The study also indicated that age, processing experience and membership of association were related to adoption and statistically significant at 5% level of probability among the selected socio- economic characteristics. It was recommended that Shea stakeholders in processing and marketing should interact with Nigerian Institute for Oil palm Research (NIFOR) that has the national mandate on Shea tree research and development to produce sufficient quantity of hybrid/improved Shea tree seedling varieties for modern plantation establishments.

#### **INTRODUCTION**

Shea tree grows in a large part of sub-Sahara Africa .The tree is important for the livelihood of rural population for centuries. Almost every part of Shea trees is useful for example, the fruit is eaten and the leaves are used as fodder for livestock and serve as an ingredient for making alkaline and paint for industrial purposes (Lovett and Haq, 2000).

The butter that is either traditionally or mechanically extracted from Shea nut which are produced by Shea trees also have a lot of end-use applications which include: valuable oil for cooking, cosmetics and skincare, pharmaceutical and medicinal uses. The oil extracted from the seeds may have up to 50% oil content and when refined, Shea oil is used as a substitute for margarine and cocoa butter in the food industries (Suleiman, 2008).

Shea butter has great economic and nutritional potentials both locally and internationally and the demand for the commodity experiencing a steady increase yearly (Suleiman, 2008). Shea nut products command an important position in the diet of the rural people in Northern Nigeria, children, women and men eat the fruit while it is raw and the processed crude oil is also used as a food component. In most Northern villages, where cooking oil is scarce, Shea oil serves as a close substitute that is used for cooking all traditional foods (Lovett and Haq, 2000; Suleiman, 2008). Apart from the nutritional potentials of Shea butter, it generates income specifically for women as it is traditionally seen as women's business. Shea oil provides a major source of income to households engaged in its trade and has a higher gain when compared to other crops such as groundnut and maize (Elias and Carney, 2007; Lovett and Haq, 2000).

Presently Shea nut and butter are exported from African countries to France, Great Britain, the Netherlands, Denmark, North America, and Japan (Elias & Carney, 2007). In these countries, it is processed in a wide range of food products including chocolate and it is becoming more popular in the cosmetic industry (Schreckerberg, 2000). Niger state ranked top among the Sheanuts producing states in Nigeria which include Kwara, Nasarawa, Zamfara, Kaduna, Sokoto, Jigawa, Kano, Plateau, Taraba, Benue, Adamawa, Bauchi, Kebbi, Edo, Yobe and Federal Capital Territory (FCT), Abuja. Based on recent events, the interest on the Shea nut oil (Shea butter) produced from Shea nut for industrial application in food, cosmetics, pharmaceutical and traditional needs at national and international levels has increased (Suleiman, 2008).

Shea nut handling and marketing are the most challenging stages in the value chain process. There is lack of standard and quality control in the way and manner Shea nut are locally handled. The parboiling, drying, packaging and storage stages require modernization and control if high quality Shea butter/oil are to be obtained. The prices offered for Shea nut in wet and dry seasons tend to vary considerably and are usually determined by the middlemen. The established price for one tone of Shea butter varies from one season to another pending on the availability of the Shea nut during the season. Unfortunately, Shea nut production and export fall far below demand. Thus calling for an intervention to increase the supply and also improve the quality.

*Vitellaria paradoxa* is one of the most important sources of vegetable oil in rural areas of the savanna zone of West Africa. The bulk of the Shea nut produced are for home consumption and local trading (GIZ, 2010). Nigeria is the leading producer of Shea nut: 355,000MT produced in 1999, 58% of the African production, but 10,000MT lower than in 1996 and 414,000MT in 2005 (Food and Agricultural Organization, FAO 2005). Mali and Burkina Faso are other leading producers; at the end of 2005 they produced 85,000MT and 70,000MT respectively, followed by Ghana (65,000MT), Côte d'Ivoire (36,000MT), Benin (15,000MT) and Togo (8,000MT).

Up-to-date statistics on Shea nut production are not available for most countries. Reports on Burkina Faso show a remarkable increase in production to 222,000MT in 2005. Similar trends probably take place in other West African countries. In 1998, Africa exported 56,000MT Shea nut, valued at US\$ 10.5 million, of which 60% came from Ghana. Benin's exports decreased from 15,266MT in 1994 to 5,600MT in 1998, Togo had only a slight decrease from 6,562MT in 1994 to 5,100MT in 1998, whereas exports from Burkina Faso increased from 5000MT in 1994 to 7,632MT in 1997 and then to 26,600MT in 2003. The African total export for five years (1993-

1997) amounted to over 48,000MT, valued at over US\$ 10,000. However, no export data have been reported for Nigeria since 1995. Processed Shea butter exports in 1998 for the whole of Africa amounted to 1200MT, worth US\$ 571,000. African exports of Shea butter have increased to 3200MT in year 2000. A Major Shea nut importers in recent years were Belgium, Denmark, Japan, the Netherlands, Sweden and the United Kingdom (FAO, 2005)

The study is to assess the quantity of Shea nut collected and processed by the processors of improved Shea nut processing technologies in Niger State. The specific objectives of the study were to; describe the socio-economic characteristics of the Shea nut processors in the study area, Determine the quantities of Shea nut/butter produced by the processors and income generated in the study area and examine the constraints faced by the processor's in adopting Shea nut processing technologies in the study area.

## METHODOLOGY

### Area of study

The study was carried out in Niger state where there is a lot of wild Shea tree plantation for domestic and commercial purposes. The state falls in the guinea savannah zone and has a climate and ecological conditions that favored agricultural production. It has an annual rainfall of between 1100mm – 1600mm and has an average temperature of 35°C (Gbako, 1991). The state has abundant wild vegetation of Shea trees and is dominated by small-scale farmers. The major crops cultivated in the State are millet, rice, maize, guinea corn, beans, cassava, groundnuts and sweet potatoes. Majority of the farmers keep livestock like poultry, goats and sheep. Others engage in crafts such as sculptures, weaving and blacksmith (Publication of Projects and Programmes Documentation Unit, PPDU, (2009). Based on the 2006 National Population Census, the state has a total projected human population of 4,250,429 as at 2006.

### Materials and Methods

In order to get a representative sample and to facilitate the achievement of the objectives of this study multistage sampling technique was adopted for the study. The first stage was the purposive selection of the state for the study because of the abundance of wild vegetation of Shea trees in the state. The second stage also involves purposive selection of Zone I based on the predominance of Shea trees (Suleiman, 2008). Simple random sampling technique was then applied to select three (3) Local Government Areas in the zone, namely: Gbako, Katcha and Agaie. The third stage was the random selection of six (6) extension cells from each extension block making a total of eighteen (18) extension cells. From the cells a total of thirty one (31) registered Shea nut processing villages were purposively selected based on the frequency of Shea nut processing activities. Finally, from the existing list of 412 Shea nut processors with the state ADP, presently known and called Niger State Agricultural Mechanization and Development Agency (NAMDA), the state of Ministry Cooperatives and the Ministry Women Affairs and GIZ State Field Office in Minna, 37 percent of the processors were randomly selected. This percent of the total population was taken giving to obtain total sample size of 150 Shea nut processors as shown in Table 1. The sample size was selected at 5% precision level and at confidence level of 95% (Isreal, 1992).

**Table 1: Distribution of sampled Shea nut processors**

| Extension Block | Extension Cells | Number of Registered Shea nut | Number of Villages Selected | Numbers of Processors Selected |
|-----------------|-----------------|-------------------------------|-----------------------------|--------------------------------|
|-----------------|-----------------|-------------------------------|-----------------------------|--------------------------------|

| Processors |    |     |    |     |
|------------|----|-----|----|-----|
| Gbako      | 6  | 118 | 9  | 43  |
| Katcha     | 6  | 143 | 10 | 52  |
| Agaie      | 6  | 151 | 12 | 55  |
| Total      | 18 | 412 | 31 | 150 |

## Materials and Methods

The data for the study was mainly obtained from primary. Primary data was collected from a cross-sectional survey of registered Shea nut processorsthrough the use of an interview schedule with the assistance of trained enumerators that can communicate freely with the native language of the people in the study area.

### Data collection and instrument for Data Collection

Descriptive statistics which include measure of central tendency, such as percentages, means and measures of variation such as variance and standard deviation were used to achieve the objectives of the study.

### Analytical Techniques

In testing the hypotheses, the following statistical tools were employed:

Binomial logistic regression model was used to test for significant relationship between socio-economic characteristics and processors' level of adoption of improved Shea nut processing technologies in the study area. The model was used to determine the factors that influence the adoption of improved Shea nut processing technologies. The independent variable (adoption level) was categorized into two levels on the basis of the number of technologies adopted by the processors. The processors that adopted 1 to  $\leq 8$  of the technologies are classified as low adopters and scored 0 while processors that adopted 9 to  $\geq 17$  technologies are classified as high adopters and scored

The binomial logistic regression model for determination of significant relationship between adoption level of Shea nut processors and the processors socio-economic characteristics is expressed as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \dots \beta_n X_n \dots (1)$$

Where

Y = 1 if the adoption level of the specified improved Shea nut processing technology is high, 0 if the adoption level is low

Age( $X_1$ )

Sex( $X_2$ )

Education( $X_3$ )

Household size( $X_4$ )

Marital status( $X_5$ )

Processing experience( $X_6$ )

Training( $X_7$ )

Extension contact( $X_8$ )

Cooperative membership( $X_9$ )

Income ( $X_{10}$ )

Quantity( $X_{11}$ )

All these variables represent the vector of explanatory (independent) variables and  $\beta$ , are the coefficient of parameters to be estimated.

Pearson correlation coefficient was used to test the hypotheses while hypotheses three to five was tested using Pearson product moment correlation (PPMC).

## RESULTS AND DISCUSSIONS

**Table 2; Distribution of the Shea nut processors according to socio-economic characteristics (n=150)**

| Socio-Economic Characteristics | Frequency | Percentage |
|--------------------------------|-----------|------------|
| <b>Age</b>                     |           |            |
| 31 – 40                        | 55        | 36.67      |
| 41 – 50                        | 90        | 60.00      |
| 51-60                          | 5         | 3.33       |
| <b>Gender</b>                  |           |            |
| Female                         | 150       | 100.00     |
| <b>MaritalStatus</b>           |           |            |
| Married                        | 117       | 78.00      |
| Single                         | 33        | 22.00      |
| <b>Education</b>               |           |            |
| Primary                        | 14        | 9.33       |
| Secondary                      | 8         | 5.55       |
| Adult                          | 128       | 85.33      |
| <b>HouseholdSize</b>           |           |            |
| 1-5                            | 5         | 3.33       |
| 6-10                           | 61        | 40.67      |
| 11-15                          | 64        | 42.67      |
| Above 15                       | 20        | 13.33      |
| <b>Processingexperience</b>    |           |            |
| Less than 10                   | 2         | 1.34       |
| 10-20                          | 62        | 41.34      |
| Above 20                       | 86        | 57.34      |
| <b>Extensioncontact</b>        |           |            |
| Yes                            | 129       | 86.00      |
| No                             | 21        | 24.00      |
| <b>Processingcentre</b>        |           |            |
| Yes                            | 93        | 62.00      |
| No                             | 57        | 38.00      |
| <b>Membershipofassociation</b> |           |            |
| Yes                            | 123       | 82.00      |
| No                             | 27        | 18.00      |

**Source: Field survey, 2012**

Table 2 shows the percentage distributions of the Shea nut processors by age. The results revealed that majority (60.00%) of the processors fall within the age range of 41 – 50 years while 36.6% were 31-40 years old. The mean ages of the processors were 42.07 years. This implies that the Shea nut processors in the study area are still in their active age due to the presence many young processors

Table 2 shows the percentage distribution of the Shea nut processors by gender. The results revealed that all (100%) of the processors were female. This implies that Shea nut processing is mainly undertaken by women

Table 2 shows the percentage distribution of Shea nut processors by marital status. The results shows that majority (78.00%) of the Shea nut processors were married. This implies that majority of the Shea nut processors in the study area have additional responsibilities of catering for their households.

Table 2 shows the percentage distribution of Shea nut processors by level of education. The results revealed that most of the processors had only attended adult literacy classes. This implies that processors had very low level of education. However, only educated farmers are reported to be analytical and to observe easily the obvious advantages of the technologies.

Table 2 shows the percentage distribution of Shea nut processors by household size. The results indicated that (42.67%) of the Shea nut processors had household size ranging from 11 – 15 people. Only few (3.33%) of the processors had a household size 1-5 people. This implies that majority of the Shea nut processors had large family sizes, which will provide family labour for processing.

Table 2 shows the percentage distribution of the Shea nut processors by processing experience. The results indicated that majority (57.34%) of the processors had more than 20 years of processing experience, and only 1.34% of the processors had less than 10 years of processing experience. This implies that the Shea nut processors in the study area had acquired enough processing experience that will encourage them to adopt improved Shea nut processing technologies.

Table 2 shows that majority (86.00%) of the processors had contact with extension workers on the improved Shea nut processing technologies.

Table 2 shows the percentage distribution of the Shea nut processors by processing centre. The results revealed that majority (63.00%) of the processors had processing centres. This implies that the Shea nut processors had avenues to interact and share ideas about improved Shea nut processing technologies which can facilitate the adoption of the technologies.

Table 2 revealed that majority (82.00%) of the processors were members of one cooperative or the other. This implies that the members stand a better chance of receiving assistance from government and nongovernmental organizations (NGOs) or donor agencies.

**Table 3: Distribution of the Shea nut processors according to number of training received (n=150)**

| Number of training received | Frequency | Percentage |
|-----------------------------|-----------|------------|
| 0                           | 61        | 40.67      |
| 1                           | 84        | 56.00      |
| 2                           | 5         | 3.33       |

**Source: Field survey, 2012**

Table 3 shows the percentage distribution of the Shea nut processors by training received. The results indicated that majority (56.00%) of the Shea nut processors had received training once, while 40.67% of the processors had no training. Only (3.33%) of the processors received the training twice. This implies that majority of the Shea nut processors had need for more training.

**Table 4: distribution of the Shea nut processors according to sources of credit and labour (n=150)**

| Source of credit       | Frequency | Percentage |
|------------------------|-----------|------------|
| Personal               | 44        | 29.33      |
| Family                 | 58        | 38.66      |
| Friends and neighbors  | 48        | 32.00      |
| <b>Labour</b>          |           |            |
| Family                 | 121       | 80.66      |
| Communal               | 27        | 18.00      |
| Hired                  | 1         | 0.66       |
| Friends and neighbours | 1         | 0.66       |

**Source: Field survey, 2012**

Table 4 reveals that 38.66% of the processors used personal savings while 32.60% and 29.33% of the processors obtained their credits from family and cooperative associations respectively. This implies that the processors did not patronize formal sources of credit such as commercial banks.

The result in Table 4 revealed that majority (80.66%) of the processors used family labour to process Shea nut while 18.00% used communal labour. Only 0.66% of the processors used hired labour. This implies that majority of the processors do not incurred extra expenses on labour.

**Table 5: Distribution of the Shea nut processors according to quantity of Shea nut collected and processed into Shea butter (n=150)**

| Quantity of Shea nut collected per processor in a year (kg)                    | Frequency | Percentage |
|--------------------------------------------------------------------------------|-----------|------------|
| 0 – 3000                                                                       | 41        | 27.33      |
| 3001 – 6000                                                                    | 103       | 61.66      |
| Above – 6000                                                                   | 6         | 4.00       |
| <b>Quantity of Shea nut collected by 150 people over two years</b>             |           |            |
| 0 –500,000                                                                     | 109       | 72.66      |
| 501,000 – 1,000,000                                                            | 40        | 26.67      |
| Above – 1,000,000                                                              | 1         | 0.67       |
| <b>Quantity of Shea nut Processed into Shea Butter per Processor in a Year</b> |           |            |
| 0 – 500                                                                        | 110       | 73.34      |
| 1501 – 3000                                                                    | 39        | 25.99      |
| Above – 3000                                                                   | 1         | 0.67       |
|                                                                                |           | 110        |
|                                                                                |           | 39         |
|                                                                                |           | 1          |

**Source: Field survey, 2012**

#### **Quantity of Shea nut collected by the Shea nut processors in the study area**

Table 5 shows the percentage distribution of the Shea nut processors by quantity of Shea nut collected. The results revealed that majority (68.67%) of the processors collected between 3001kg – 6000kg. Equally, 27.33% of the processors collected between 0-3000kg in a year per

processor and majority (72.66%) of the processors collected between 0-500,000 Shea nut in two years while 40% of the processors collected Shea nut of between 500,001-1,000,000 in the same number of years. The result also revealed that majority (73.34%) of the processors collected Shea nut and processed into Shea butter of between 0-1500 kg and 25.99% of the respondents processed Shea nut into Shea butter of between 1,501-3,000kg in a year. This implies that the processors collected reasonable quantity of Shea nut per year.

#### **Quantity of Shea butter processed by the Shea nut processors in a day, week, month and year.**

Table 5 shows the percentage distribution by quantity of Shea butter processed by the Shea nut processors. The results indicated that majority (66.00%) of the processors processed between 0-40 kg of Shea butter in a day, while minority (6.00%) of the processors processed above 80kg of Shea butter in a day. The results also revealed that majority (58.00%) of the processors processed between 0-100kg of Shea butter in a week while minority (6.67%) of the processors processed above 200kg in a week. The results also shows that majority (64.00%) of the processors processed Shea butter of between 0-200kg in a month followed by 31.34% of the processors that processed between 2001-400kg in a month and minority (4.67%) of the processors processed above 400kg in a month. The result also indicated that majority (90.66%) of the processors processed above 800kg in a year, and minority 1.3% of the processors processed between 0-400kg in a year. This implies that the Shea nut processors were busy throughout the season with the processing technologies in the study area.

#### **Income generated from the quantity of Shea nut processed into Shea Butter.**

Table 6 shows the percentage distribution of the Shea nut processors by income. The results indicated that majority (54.00%) of the processors generated between ₦51,000 – ₦100,000 per year from Shea butter processing as a business, 22.67% generated between ₦101,000 – ₦150,000 and 10.00% generated between ₦1,000 to ₦30,000 only. Equally, about 19.33% of the processors sold a kg of improved Shea butter between (₦401 – ₦500). 16.67% of the processors sold a kg at above ₦900 and other processors at different prices as shown in the table 6. This implies that the Shea nut processors generated large sum of money from sales of Shea nut and Shea butter and, also greatly depend on it as source of their livelihood.

**Table 6: Distribution of the Shea nut processors according to Quantity of Shea butter processed per kilogram. (n=150)**

| <b>Quantity of Shea nut processed in a day (kg)</b>       | <b>Frequency</b> | <b>Percentage</b> |
|-----------------------------------------------------------|------------------|-------------------|
| 0 – 40                                                    | 99               | 66.00             |
| 41 – 80                                                   | 42               | 28.00             |
| Above 80                                                  | 9                | 6.00              |
| <b>Quantity of Shea nut processed in a week per head</b>  |                  |                   |
| 0 – 100                                                   | 88               | 58.00             |
| 101 – 200                                                 | 88               | 35.33             |
| Above 200                                                 | 10               | 6.67              |
| <b>Quantity of Shea nut processed in a month per head</b> |                  |                   |

|                                                 |     |       |
|-------------------------------------------------|-----|-------|
| 0 – 200                                         | 96  | 64.00 |
| 201 – 400                                       | 47  | 31.34 |
| Above 400                                       | 7   | 4.67  |
| <b>Quantity of Shea nut processed in a year</b> |     |       |
| 0 –400                                          | 2   | 1.34  |
| 401 – 800                                       | 12  | 8.00  |
| Above 800                                       | 136 | 90.66 |

**Source: Field survey, 2012**

**Table 7: Distribution of the Shea nut processors according to ncome generated from quantity of Shea nut processed into Shea butter. (n=150)**

| <b>Income generated from Shea butter in naira</b> | <b>Frequency</b> | <b>Percentage</b> |
|---------------------------------------------------|------------------|-------------------|
| 1 – 50,000                                        | 15               | 10.00             |
| 51,000 – 100,000                                  | 81               | 54.00             |
| 101,000 – 150,000                                 | 34               | 22.67             |
| 151,000 – 200,000                                 | 34               | 8.67              |
| 201,000 – 250,000                                 | 15               | 10.00             |
| Above – 250,000                                   | 2                | 1.33              |
| <b>Price of Shea butter per kilogram in naira</b> |                  |                   |
| 1 – 400                                           | 17               | 11.33             |
| 401 – 500                                         | 29               | 19.33             |
| 501 – 600                                         | 15               | 10.00             |
| 601 – 700                                         | 19               | 12.67             |
| 701 – 800                                         | 23               | 15.33             |
| 801 – 900                                         | 22               | 14.67             |
| Above – 900                                       | 25               | 16.67             |

**Source: Field survey, 2012**

### **Constraints faced by the Shea nut processors in the study area.**

Table 8 shows the percentage distribution of the Shea nut processors based on the constraints faced. The results indicated that majority (99.33%) of the processors had the problem of insufficient Shea nut during the peak of the dry season for processing sufficient quantity of Shea butter for commercial purposes, 72.00% of the processors complained of lack of credit facilities, while, 80.67% were faced by the constraints of seasonality in supply of Shea nut. Similarly, majority (95.33%) of the processors were faced with the constraints of risk associated with picking/collection of Shea nut, 55.00% of the processors were faced with problems of price fluctuation of Shea butter. More so, 60.00% of the processors complained of poor processing equipment while 66.67% of the processors complained of the poor quality of the Shea butter produced. On the other hand, 63.33% of the processors were faced with the constraints of poor capacity building support. Also, 63.33% of the processors complained of lack of viability commercial practicing technologies. The results also indicated that all (100%) of the processors complained of the poor for organization of producers/marketers, while 43.33% of the processors were faced with the constraints of the absence of sustainable policy for promoting the industry. This implies that the Shea nut processors were faced with numerous problems ranging from socio-economic to institutional factors

**Table 8: distribution of the Shea nut processors according to constraints(n=150)**

| Constraints to technology adoption                      | Constraints |        |
|---------------------------------------------------------|-------------|--------|
|                                                         | No.         | %      |
| Insufficient Shea nut                                   | 149         | 99.33  |
| Lack of credit facilities                               | 108         | 72.00  |
| Seasonality in supply of Shea nut                       | 121         | 80.67  |
| Risk associated with picking and collection             | 143         | 95.33  |
| Problem of price fluctuation                            | 66          | 56.00  |
| Poor processing equipment                               | 60          | 40.00  |
| Poor quality of Shea butter producer                    | 50          | 33.33  |
| Poor capacity building support                          | 95          | 63.33  |
| Lack viability for commercial practicing technologies   | 98          | 65.33  |
| Poor for organization of producers                      | 150         | 100.00 |
| Absence of sustainable policy of promoting the industry | 65          | 43.33  |

**Source: Field Survey, 2012**

### **Relationship between socio-economic characteristics and processors level of adoption of improved Shea nut processing technologies**

The hypothesis was tested using binomial logistic regression analysis at 0.05% probability level. Table 9 below shows the result of the analysis. The results revealed that membership of cooperative( $X_9$ ) marital status( $X_5$ ) and extension contact ( $X_8$ ) were significant at 1% level of significance and had positive relationship with the level of adoption of improved Shea nut processing technologies. This implies that apart from easiness of access to production resources, processors that were members of cooperative organizations interact and share ideas on the advantages associated with adoption of improved Shea nut processing technologies. Similarly, marital status is a proxy of source of large household size which can serve as source of labour for the processors. Hence, Shea nut processors that are married are most likely to have more helping hands in the processing of Shea butter.

The results also show that age ( $X_1$ ) was negatively significant at 0.05% probability levels with adoption of improved Shea nut processing technologies. This implies that younger Shea nut processors adopt improved Shea nut processing technologies more than older processors as old age is associated with weakness and skepticism, while youth hood is associated with virility and venture-someness

The results revealed that quantity ( $X_{11}$ ) of Shea nut/Shea butter processed and constraints faced by the processors were positively significant at 0.05% probability levels with the level of adoption of improved Shea nut processing technologies. This implies that the quantity of Shea nut collected and processed had significant impact in their income and livelihood in terms of improving the living standard of the processors.

Furthermore, education( $X_3$ ), household size( $X_4$ ) and experience processing( $X_6$ ) were not significant even at 0.10% probability levels.

**Table 9: Binomial logistic regression result of adoption level and some socio-economic characteristics**

| Adoption level    | Coefficients | Standard error | Z values | P> Z     |
|-------------------|--------------|----------------|----------|----------|
| Age               | -.0669801**  | .0367528       | -1.82    | 0.068    |
| Household size    | -.106529     | .1474022       | -0.72    | 0.470 NS |
| Educational level | .0949456     | .0699154       | 1.36     | 0.174 NS |
| Cooperative mem.  | 2.26534***   | .6837582       | 3.31     | 0.001    |
| Marital status    | 2.26534      | .6837582       | 3.31     | 0.001    |
| Processing exp.   | .0315767***  | .05135 4       | 0.61     | 0.539    |
| Ext. contact      | 2.43678***   | .4206358       | 5.79     | 0.000    |
| Quantity proc.    | -.0009725**  | .0005503       | -1.77    | 0.077    |
| Constraints       | -3.247832**  | 1.954347       | -1.66    | 0.097    |

**Source; Field survey, 2012**

N.B      \*= Significant at 0.10% level

    \*\* = Significant at 0.05% level,   \*\*\*Significant at 0.01%,NS=Non Significant

### **Relationship between the quantity of Shea nut collected and the level of adoption of the improved Shea nut processing technologies.**

The results of Pearson analysis in table 10 revealed that there was a relationship between the quantity of Shea nut collected and the level of adoption of improved Shea nut processing technologies. This implies that if the quantity of Shea nut collected increases, the income will also increase.

**Table 10 :      Pearson relationship between the quantity of Shea nut collected and the level of adoption of the improved Shea nut processing technologies.**

| Variable                       | R     | Df | P-value            |
|--------------------------------|-------|----|--------------------|
| Quantity of Shea nut collected | 0.617 | 1  | 0.01** significant |
| Income realized                | 0.617 | 1  | 0.01** significant |

**Source: Field survey, 2012**

N.B    \*\* = Significant at 0.05 level

### **Conclusion and Recommendations**

From the study,Shea nut processing activities were mainly women business and the result revealed that the processors collected above 500,000kg of Shea nut from the wild plantation of Shea trees in their communities and processed above 800kg into Shea butter in a year which serves as sources of income. The study also indicated that age, processing experience and membership of association were related to adoption and statistically significant at 5% level of probability among the selected socio- economic characteristics.

Based on the findings of this study, it is recommended that Shea stakeholders in processing and marketing should interact with Nigerian Institute for Oil palm Research (NIFOR) that has the

national mandate on Shea tree research and development to produce sufficient quantity of hybrid/improved Shea tree seedling varieties for modern plantation establishments.

Also, enforcement of the legislation on indiscriminate cutting down of Shea tree should be enhanced as a way of protecting the Shea trees for economic purposes.

Furthermore, organized big term marketers in the Shea industry should form and organize more associations and trainings of pickers/collectors, processors and marketers' of Shea nut/butter at the grassroots for optimal utilization of its value chains and income generation.

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