**Livelihood Status of Shea Nuts Processors of German International Corporation (GIZ) Technology Intervention in Niger State, Nigeria**

**Abstract**

The study investigate the influence of adoption of German International Corporation Technologies (GIZ) on the livelihood of the shea nuts processors (beneficiaries only) and identify constraints to the adoption of GIZ‘s processing technologies in Niger State. A two-stage sampling technique was adopted for the study. The first stage involved a purposive selection of 15 Local Government Areas (LGAs) of GIZ’s intervention. The second stage involved a proportionate random selection of 297 beneficiaries constituting 10% processors in the GIZ profile list. Also, in the same LGAs, snow-balling technique was used to randomly select 297 Shea nut processors that were GIZ non-beneficiaries, thereby making a total sample size of 594. Data were collected through interview schedule and analysed using percentages, mean, Cumulative Livelihood Status Score (CLSS) and F-test.The revealed that the productivity of GIZ’s beneficiaries before and after the adoption were found to be significant at 5%, i.e. shea nut processed (t=26.237), output (t=16.418), income t=22.634). Also, revealed that the adoption of GIZ’s technologies had improved the livelihood of the beneficiaries (CLSS = 64.9%). The indicated that the most severe constraints were inadequate fund (=1.875), poor market channels (=1.737) and inadequate extension contact (=1.542).The study established a benchmark that the majority of the respondents were faced some basic constraints lining from inadequate finance, poor marketing linkages and average illiteracy level of assimilating of the basic principles of adoption of the technologies.The study recommended frequent technology interventions to improve the shea nuts processors capacity and experience from the government organizations or non- governmental organisations (NGOs) across the value chains of the shea industry to enhance stakeholders’ productivity and livelihood activities as have been indicated in the positive outcome of adoption of GIZ technology intervention in Niger State.

**Keywords:** Livelihood, Beneficiaries; Shea Nuts; Processors; Processing; Technology; Constraints; German International Corporation (GIZ); Intervention.

**INTRODUCTION**

Shea tree (*Vitelleria paradoxa*)is an important and versatile tree crop that grows wild across sub-saharan Africa. It is also called a wonderful tree because of it versatilities. The tree crop is highly demanded from several World markets for fruits and other products. According to Maranz; Wiesman, *(*2003a) and Masters; Yidana; Lovett (2004), it extended up to about 5000 km wide belt of savanna including West African countries of Senegal, Mali, Côte d‟Ivoire, Burkina Faso, Togo, Ghana, Benin, Nigeria, Niger, Cameroon, and further east in Uganda, Sudan and Ethiopia (Chalfin, 2004 and Goreja, 2004). The shea belt is referred to shea tree population coverage among merchants **(**Ferris, Collinsom, Wanda, Jagwe, and Wright, 2001)**.**

Shea tree is a resourceful plant for income generating activities with significant cultural ties and features to the human existence and environmental benefits for protection of land management activities. Also, medicinal values, food, non-timber resources and income are derived from shea tree and its products. According to Lovett, 2004, that the world production of shea nut is between 1.5 and 2.5 million metric tones (MT); of this, roughly 80% are harvested for utilization. Shea butter plays s significant role in the nutritional supplement to African diets. For example in Nigeria and Ghana, it is widely being consumed by the farmers as desert crop during farming activities when the staple and cash cropsare under cultivation(Teklehaimoanot, 2004; Suleiman, 2008 and Pouliot, 2012). Shea tree produced quality, strong and resilient timber for making farming tools, and also being used as fuel for cooking. Shea butter is either manually or mechanically extracted from the shea nut which is produced by shea tree and it contains about 80-90% stearicacid and oleic acid. Shea butter also has a lot of end-use benefits which include oil for cooking, cosmetics and skincare, pharmaceutical and medicinal uses. The shea nut/seeds may contain up to 50% oil from the extraction process and when refined, it is also used as a substitute for margarine and cocoa butter in the food industries. According to Alander(2004); Moore(2008) and Suleiman(2008) that shea butter is next to oil palm in terms of valuable oil crop in Africa for its oil content in table oil, and it is also able to thrive in semi-arid environments that are unsuitable for improved and hybrid oil palm growth. In the 1970s, shea butter was identified as the only available vegetable oil that could be used as supplement as a cocoa butter equivalent, mainly for its uses in cosmetics and chocolate (Pouliot, 2012). Shea tree fruits produced a major by- product called shea butter which has high economic and nutritional potential both at the local and international domestic and industrial purposes, and the demand for the commodity is experiencing a constant annualincrease in price (Njoku,Eneh, Ononogbu and Adikwu, 2000; Chalfin, 2004; Olaniyan, 2007 and Suleiman, 2008).

Currently, Shea nut and butter are exported from Africa countries, including Nigeria, to France, Great Britain, the Netherlands, Denmark, North America, and Japan (Elias and Carney, 2007). In these countries, it is processed into extensive range of food products including chocolate and it is becoming more acceptable in the cosmetic industry (Schreckerberg, 2004).

In Nigeria, Niger state leads among the shea nut producing states, followed by Kwara, Nasarrawa, Zamfara, Kaduna, Sokoto, Jigawa, Kano, Plateau, Taraba, Benue, Adamawa, Bauchi, Kebbi, Edo,Yobe and Federal Capital Territory (FCT), Abuja. With recent investment exhibitions and potentials of agricultural products, the need for shea nut oil (shea butter) for industrial applications in food, cosmetics, pharmaceutical and traditional demand at national and international levels has tremendously improved and this calls for the attention of farmers and government at all levels to utilize available opportunities of the industry (Suleiman, 2008).

However, processing technologies of shea nut include among others parboiling, drying, kneading, packaging and storage stages which are critical and required improved technologies for the production ofhigh quality or premium shea butter oil to meet the market demand. The prices of shea nuts are also being determined by the middleman depending on the season of the availability of either wet or dry season, Awkwardly, shea nut production and export are not sufficient for the demand both locally and internationally.

The low productivity of the processors affect the outcome of shea nut processing due to the lack of adoption of available improved technology thereby affecting their livelihood assets and capabilities in human, physical, social, economic and political participation in the society. Also, lack of improved technologies decreased the outcome of rural processorswhich limits the production capacity of shea butter. Traditional extraction of shea butter improved artisanal processing technologies but the adoption of improved technologies may have substantial economic effect, including: enhancement of the most wearisome aspects of extraction, reduction of the time and labour input required at the production and increase in total productivity.

To address this effect of low productivity in the shea butter production, the Federal Government in collaboration with German International Corporation (GIZ), other NGOs and government organizations have developed and disseminated improved shea nut processing technologies to the traditional shea nut processors in Niger state. Moreover, there has been dearth of empirical study on the effect of adoption of GIZ processing technologies on the livelihood of processors in Niger State, Nigeria. This study therefore sought to analyse the effects of German International Corporation Technologies on the livelihood of Shea nut processors in Niger State, Nigeria.

The study is to analyse the effects of German International Corporation technologies on the livelihood of the shea nut processors in Niger state, Nigeria. This is to examine the level of adoption of GIZ shea nut processing technologies and evaluate the effectsof adoption of GIZ processing technologies on the livelihood of the processors (beneficiaries only)

**MATERIALS AND METHODS**

**The Study Area**

The study was carried out in Niger State which is located in the North Central Geo-political zone of Nigeria with her capital in Minna. It lies between latitude 3°–10°N and longitude 3°–8°E. It is bordered by Kebbi and Zamfara States to the North-West and to the South by Kwara and Kogi Stateswhile Kaduna State and the Federal Capital Territory (FCT) bordered the State to the East and South-East respectively. The State also shares a common international boundary with the Republic of Benin at Babanna in Borgu Local Government Area of Niger State. This gives way to common inter-border trade with the State. The State has a land mass of 76,363 Km2making it the largest State in Nigeria in terms of total land area and has twenty-five (25) local government areas. The State has the highest wild shea tree plantations in Nigeria with a substantial number of traditional rural processors of shea nut which cut across the agricultural zones of the State (Suleiman, 2008).It is divided by Niger State Agricultural Development Programme into three agricultural zones for better agricultural administrative activities, namely: zone, I, II, and III with headquarters at Minna, and the zones have their headquarters at Bida, Kuta, and Kontogora respectively.

**Sampling Procedureand Sample Size**

In order to have a wide coverage and full representation, all the three Agricultural Development Programmes (ADP) zones were used for the study. A 3-stage sampling technique was adopted for the study. In the first stage, a purposive selection of 15 Local Government Areas (LGAs) of German International Corporation (GIZ) intervention site was made (GIZ, 2011; 2014) across the three zones. The purposive selection was carried due to the fact that there was high population density of shea trees and high participation of shea value chain particularly shea processing activities. At the second stage, from the profile list of GIZ Shea groups comprising 2,970 processors of GIZ, 2011;2014 profile lists, a proportionate random selection, based on 10%, of Shea nut processors were made across the selected LGAs giving a total sample of 297. The third stage involved the use of snow-balling technique to randomly select equal number (297) of Shea nut processors who were non-beneficiaries (non-registered Shea nut processors) in the same 15 selected LGAs to have a genuine comparison effects, thereby making a total sample size of 594 that was used for the study (Table 1).

**Data Collection and Instrument for Data Collection**

The data for the study was obtained from both primary and secondary sources. The primary data was collected through interview schedule. The secondary data was sourced from published and unpublished documents of agricultural journals, internet and past studies. Trained enumerators of the State Agricultural Development Programme office and extension agents were engaged in the study area to collect information from the respondents.

**Analytical Techniques**

Descriptive such as frequency counts and percentages were used in the study**.**

**Model Specifications**

Consequences of Adoption of GIZ Processing Technologies on the Processors’ Livelihood:The following discussion illustrates the operational definitions and techniques that were used to measure the seven livelihood indicators of processors as developed by Sheheli (2014) in Bangladeshand modified by Omotesho, Akinrinade, and Ogunlade (2017) to determine the livelihood of processors through income generating activities. The livelihood indicator adopted for this study was to determine the influence of processors’ productivity on the livelihood of processors in the study area. The seven indicators included:

**i). Food Availability:**Food availability was measured on the basis of accessibility to basic food throughout the whole year for the family. Scoring for availability of food were ‘3’ for adequate, ‘2’ for inadequate and ‘1’ for shortage of food. The cumulative scores of twelve months indicate the food availability of a processor’s family. Therefore, the possible food availability scorevaried from 12 to 36, where 12 indicated the ‘lowest’ and 36 indicated the ‘highest’ level of food availability.

**ii). Housing Condition:**This indicator referred to the present situation of the house inhabited by processors. To determine the housing conditions, six characteristics of houses were considered, namely;1). Roof2). Walls 3). Floor 4). Kitchen position 5). Furniture and 6).General impression. The overall housing condition of each respondent was determined by summing the score obtained from these six characteristics of the house. The possible score varied from 6 to 21, where by 6 indicated a ‘very poor’ and 21 indicated a ‘very good’ housing condition.The total score of the six variables was 21 as allocated to the each variable while roof was 1 and general impression was 6. The summation numeralswas equal to 21scores.

**iii). Water Facilities:**The water facilities indicator was measured by three sub-dimensions, including 1). Water sources 2). Drinking water availability and 3). Quality of drinking water. The score of water facilities of each respondent was calculated by summing scores of the above three sub-dimensions.

**a. Source of Water:**The sources of water included 1). Stream 2). River 3). Rain 4). Table water and 5). Pipe borne. Total number of water sources was 5, whereby the most available source scored 5 and least available source scored 1. Therefore, the possible score for water sources varied from 1 to 5.

**b. Quality of Drinking Water:** The quality of drinking water included 1). Stream 2).River 3). Tube well 4). Rain and 5). Pipe borne. This was measured based on 5 items and the possible score varied from 1 to 5. Therefore, the possible score for water sources varied from 1 to 5.

**c. Different Purposes of Water;** The different purposes of water was measured based on 5 items, drinking for (5), cooking for (4), utensils for (3), bathing for (2) and washing cloth/clearing for (1). The possible score varied from 1 to 5. Therefore, the possible score for water sources varied from 1 to 5.

**d. Adequacy of Drinking Water:** The scoring of drinking water availability for each month of the year would be ‘3’ for adequate, ‘2’ for inadequate and ‘1’ for scarcity of drinking water multiplied by each month of the year which was twelve months. The scores of twelve months from each respondent was added to yield a drinking water availability score which varied from 12 to 36. Finally, the scores of four sub-dimensions of water facilities were summed which range from 12 to 36 whereby 12 indicated a poor and 36 indicated a very good water facility.

**iv. Health Condition:**

**a. Health Status:** This indicator was measured on the basis of 5 items. The possible score of health status ranged from 1 to 5. Good (5), disabled or incapacitated (4), short term illness (3), long term illness (2) and weak (1).

**b. Ability to get Health Treatment:** Total number of health treatment providers was five. Scoring for availability of health treatment providers were ‘3’ for visit regularly, ‘2’ for occasionally and ‘1’ for never visited. Health treatment ability was measured by summing scores of five items and the possible score varied from 5 to 15. Considering the health status and ability to get health treatment, the score of health situation varied from 5 to 15, whereby 5 indicated a ‘very bad’ and 15 indicated a ‘very good’ health situation.

**v. Sanitation:**

**a. Possession of a Toilet:**This indicator referred to the possession of a toilet in the household. Data was collected on three items with a score of 3, 2, and 1 for having own toilet, using other people’s toilet, and having no access to a toilet, respectively. The possible score for toilet possession ranged from 1 to 3.

**Type of Toilet:**This indicator refers to the type of a toilet in the household. Data was collected on three items with a score of 3 for sanitary or hygienic toilet, 2 for pit toilet and 1 for open space toilet respectively. The possible score for type of toilet ranged from 1 to 3.

***b.* Toilet Condition:**This indicator referred to the physical condition of the toilet possessed by processors. Roof for 3(iron sheet, straw, open), Wallsfor 2(bricks and tiled, iron sheet and jute stick), Floorfor 1(tiled, ordinary andcemented) while the position of toilet was considered to measure toilet condition indicatedinside, outside and open. The scores thus obtained were added to yield the toilet condition score. The ranged of a possible toilet condition score varied from 4 to 12; whereby 4 indicated a ‘very bad’ and 12 indicated a ‘very good’ toilet condition. After summing the score of three sub-dimensions, the sanitation score then was ranged from 4 to 20, whereby score 4 indicated processors had poor sanitation facilities and score 20 indicated they had very good sanitation facilities.

**vi. Participation in Social Activities:**Participation in social activities is defined as the degree to which processors attend different social events. It was measured by computing a ‘social participation score’ based on the participation in five selected social events. Scoring of participation was ‘3’ for always, ‘2’ for occasionally, and ‘1’for no participation. The scores of five social events were added to calculate the total score of participation in social activities. Therefore, the participation in social activities score varied from 5 to 15, whereby a score of 5 indicated ‘no participation’ and a score of 15 indicated ‘regular participation’.

**vii. Freedom in Cash Expenditure:**This indicator referred to the freedom of processors to spend money on various aspects of her family affairs. Eight aspects of expenditure was considered to measure the freedom in cash expenditure and 4 point Likert-type scale was used to define the freedom of cash expenditure where 4, 3, 2 and 1 indicated expenditure decision dependent on ‘processors’, (4) for ‘spouse (herself), (3) for ‘husband’ (2) for ‘together’’ and (1) for ‘other family members’, respectively. Finally, the total score was obtained by summation of score of all eight items of cash expenditure which included daily expenses, investment on land, household repair, child education, health, household assets, take loan and use, and loan servicing. Possible score varied from 8 to 32, where 8 indicated ‘low freedom in cash expenditure’, i.e., the respondent depends highly on other family members to take decisions, and a score of 32 indicated ‘high freedom in cash expenditure’, i.e. the respondent took all decisions by him/herself.

**Development of a Cumulative Livelihood Status Score (CLSS)**

To obtain valid and reliable data for the livelihood status of processors, the CLSS was determined in two steps. First, a cumulative percentage score for each of the seven livelihood indicators was determined. After that, the cumulative livelihood status was computed based on the scores of these seven indicators. The procedure of measuring the cumulative percentage score and cumulative livelihood status score of processors was summarized as follows:

**Computation of Cumulative Percentage Score**

The computation of ‘cumulative percentage score’ for each indicator was measured in two  
stages: (i) determination of an individual processors percentage score and (ii) determination of a cumulative percentage score.

(i) The individual processors’ field score was divided by the corresponding possible maximum score and expressed as a percentage.

The following formula was used to determine the individual processors percentage score:

Where, IWFPS = Individual processors percentage score

IWFFS= Individual processors field score

IWFPMS = Individual processors possible maximum score

(ii) The cumulative percentage score was obtained by dividing the sum of individual processors percentage score by the sample size. The following formula was used to determine  
the cumulative percentage score:

Where, CPS = Cumulative percentage score

ΣIWFPS = Sum of individual processors percentage score

N = Sample size

**Computation of Cumulative Livelihood Status Score**

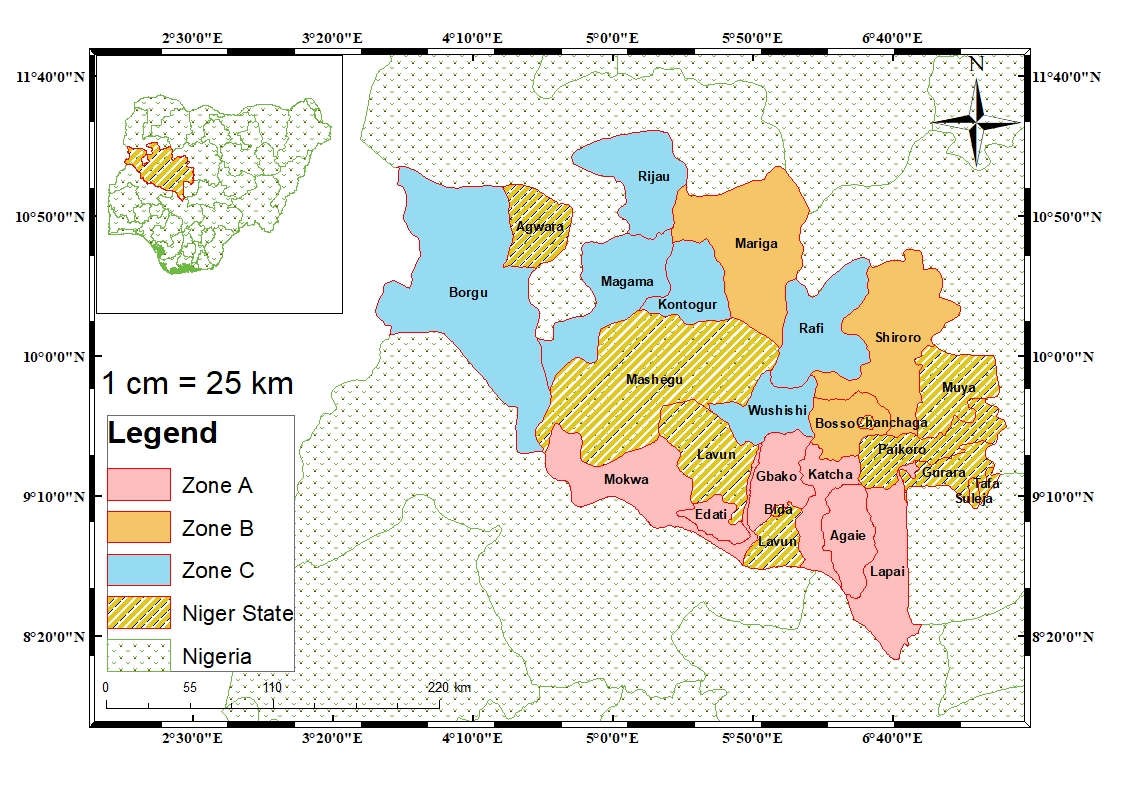
The cumulative livelihood status score of processors was measured by dividing the sum of cumulative percentage score of livelihood indicators by seven. The following formula was used to attain the cumulative livelihood status score:

Where, CLSS = Cumulative livelihood status score

ΣCPS = Sum of cumulative percentage score of seven livelihood indicators

LI = Livelihood indicators (7)

**6. Constraints to Processors Adoption of GIZ Shea Nut Processing Technologies**: This was measured using 3 point likert-type scale against list of factors/constraints as follows: Very Severe (VS) = 3, Severe ( S) = 2 , Not severe (NS)= 1



**Figure 1: Map of Niger State showing Local Governments of GIZ Intervention**

*Source: GIZ Shea processors profile list, 2011; 2014*

**Table 1: The Distribution of the Sample Shea Nut Processors (Beneficiaries and Non- Beneficiaries)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Local govern-ent areas** | **Sample frame(No of GIZ processors as contained in the profile listof GIZ Shea groups in Niger State)** | | **No of selected GIZ beneficiaries through proportionate sampling based on 10%** | **No of selected GIZ non-beneficiaries** | **Total sample ofGIZ beneficiaries and non-beneficiaries** |
| **Zone A**  Lapai  Gbako  Katcha  Mokwa  Agaie  Edati  **Zone B**  Shiroro  Bosso  Mariga  **Zone C**  Kontagora  Borgu  Wushishi  Magama  Rijau  Rafi  **TOTAL** | | 297  240  313  243  89  123  81  289  63  159  445  146  379  72  31  2,970 | 30  24  31  24  9  12  8  29  6  16  45  15  38  7  3  **297** | 30  24  31  24  9  12  8  29  6  16  45  15  38  7  3  **297** | 60  48  62  48  18  24  16  58  12  32  90  30  76  14  6  **594** |

*Source: Field Survey, 2018’*

**RESULTS AND DISCUSSIONS**

**Effect/ Consequences of Adoption of GIZ Processing Technologies on the Livelihood of the Processors**

**Table 2: Distribution of Respondents by Food Availability(Beneficiaries N=297)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Months |  | | | | | |  | | | | | |  | | | | | |
|  | | **Adequate** | |  | | **Inadequate** | |  | |  | | **Shortage** | |  | |  | |
|  | **Frq** |  | **%** |  |  | **Frq** |  |  | **%** |  |  | **Frq** |  | **%** |  |  |  |
| January |  | 247 |  | 83.2 |  |  | 48 |  |  | 16.2 |  |  | 2 |  | .7 |  |  |  |
| February |  | 238 |  | 80.1 |  |  | 57 |  |  | 19.2 |  |  | 2 |  | .7 |  |  |  |
| March |  | 219 |  | 73.7 |  |  | 30 |  |  | 10.1 |  |  | 48 |  | 16.2 |  |  |  |
| April |  | 167 |  | 56.2 |  |  | 78 |  |  | 26.3 |  |  | 52 |  | 17.5 |  |  |  |
| May |  | 118 |  | 39.7 |  |  | 117 |  |  | 39.4 |  |  | 62 |  | 20.9 |  |  |  |
| June |  | 105 |  | 35.4 |  |  | 173 |  |  | 58.2 |  |  | 19 |  | 6.4 |  |  |  |
| July |  | 153 |  | 51.5 |  |  | 124 |  |  | 41.8 |  |  | 20 |  | 6.7 |  |  |  |
| August |  | 173 |  | 58.2 |  |  | 101 |  |  | 34.0 |  |  | 23 |  | 7.7 |  |  |  |
| September |  | 221 |  | 74.4 |  |  | 65 |  |  | 21.9 |  |  | 11 |  | 3.7 |  |  |  |
| October |  | 249 |  | 83.8 |  |  | 38 |  |  | 12.8 |  |  | 10 |  | 3.4 |  |  |  |
| November |  | 280 |  | 94.3 |  |  | 17 |  |  | 5.7 |  |  | - |  | - |  |  |  |
| December |  | 237 |  | 79.8 |  |  | 60 |  |  | 20.2 |  |  | - |  | - |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

***S****ource: Field survey, 2018*

**2: Food Availability**

Table 2 reveals that there was adequate food availability right from January-April indicated by majority of the respondents with proportion of 83.2%, 81.1%, 73.7% and 56.2% respectively. Also, there was food availability from July to December as shown by the respondents in the proportion of 51.5%, 58.2%, 74.4%, 83.8%, 94.3% and 79.8% respectively. However, there was shortage of food only for two months of May and June as accounted by majority (75.1%) of the respondents. This therefore implies that in a whole year, for ten months, there was availability of food for the respondents, indicating that the benefits of adopting the GIZ technologies were derived. The only two months of food shortage might be lean periods for the respondents in the study area when farming activities is at its peak expecting the year bumper harvest. The finding further implies that the manifestation of GIZ benefits has enhanced their livelihood capabilities in the study area. The finding is in line with the report of Sultana (2011) that small holder farmers who adopted technology had sustainable access to different types of food in their houses for consumption.

**Table 3: Distribution of Respondents by Housing Condition(Beneficiaries N=297)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Housing Condition Indicator |  | |  | |  | |
|  | **Frequency** |  |  | **Percentage** |  |
| Roofing  Brick |  | 1 |  |  | .3 |  |
| Iron Sheet |  | 290 |  |  | 97.7 |  |
| Straw |  | 6 |  |  | 2.0 |  |
| Wall  Brick & Painted |  | 19 |  |  | 6.4 |  |
| Ordinary Brick |  | 144 |  |  | 48.5 |  |
| Mould |  | 134 |  |  | 45.1 |  |
| Floor  Tiled |  | 1 |  |  | .3 |  |
| Cemented |  | 280 |  |  | 94.3 |  |
| Ordinary |  | 16 |  |  | 5.4 |  |
| Kitchen  Inside |  | 78 |  |  | 26.3 |  |
| Outside |  | 219 |  |  | 73.7 |  |
| Furniture  Very good |  | 1 |  |  | .3 |  |
| Good |  | 65 |  |  | 21.9 |  |
| Simple |  | 212 |  |  | 71.4 |  |
| Very Old |  | 19 |  |  | 6.4 |  |
| Housing Outlook  Very good |  | 14 |  |  | 4.7 |  |
| Good |  | 156 |  |  | 52.5 |  |
| Simple |  | 114 |  |  | 38.4 |  |
| Very Old |  | 13 |  |  | 4.4 |  |

*Source: Field Survey, 2018*

**3: Housing Condition**

Data in Table 3 reveals that majority of the respondents (97.7 %)kitchen outside the houses, 94.3% used cemented floor, 73.7% used outside kitchen, 71.4% used simple furniture and above half(51.5 %) used housing outlook.The implication of this is thatmajority of the respondents used available human, natural, physical and financial capital assets for their housing conditions. This therefore indicates that majority of the respondents were able to afford good housing conditionsdue to the positive outcome from the adoption of intervention technologies.The finding is in line with the report of Muzari et al. (2012) that adoption of technology intervention enhanced the financial capabilities, ownership of equipment of rural households and increased the risk-taking ability of the rural farmers.

**Table 4: Distribution of Respondents by Water Facilities(Beneficiaries N=297)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Water Facilities (Indicators)** | **Very Clean**  **Frq.** | **%** | **Fair**  **Frq.** | **%** | **Bad Smell**  **Frq.** | **%** |
| Stream | 204 | 68.7 | 77 | 25.9 | 16 | 5.4 |
| River | 230 | 77.4 | 57 | 19.2 | 10 | 3.4 |
| Tube Well | 244 | 82.2 | 46 | 16.5 | 7 | 2.4 |
| Rain | 238 | 80.2 | 53 | 17.8 | 6 | 2.0 |
| Pipe Borne | 296 | 99.7 | 1 | .3 | - | - |

*Source: Field Survey, 2018*

**4: Water Facilities**

From Table 4, it is shown that majority of the respondents; 99.7%, 82.2%, 80.2%, 77.4% and 68.7% had very clean pipe borne water, tube well, rain, rivers and stream respectively. With the GIZ intervention, the respondents’ water facilities were seen to have improved and this may encourage the beneficiaries and even non-beneficiariesto account and continue with the adoption of GIZ technologies. It therefore follows that few had bad water facilities. They might not effectively adopt the technologies due to some challenges that may be limiting them.The finding is in support of FAO (2009) that the most important physical assets of the adopters of the technology intervention include roads, electricity and water supply for their livelihood sustenance.

**Table 5: Distribution of Respondents by Different Water Purposes (Beneficiaries N=297)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Water Sources |  | | | | | | | | | | | |
| **Drinking** | | **Cooking** | | **Utensils** | | **Bathing** | | **Washing Cloth** | | **Suitable for all Purposes** | |
| **Frq.** | **%** | **Frq.** | **%** | **Frq.** | **%** | **Frq.** | **%** | **Frq.** | **%** | **Frq.** | **%** |
| Stream | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | 297 | 100.0 |
| River | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | 297 | 100.0 |
| Rain | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | 297 | 100.0 |
| Table Water | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | 297 | 100.0 |
| Pipe Borne | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | 297 | 100.0 |

*Source: Field Survey, 2018*

**5: Different Water Purposes**

Result in Table 5 reveals that all the respondents (100.0%) used different water sources for all purposes. This implies that the respondents were not selective of different water sources and usage, but depended on the available water supply in their communities within a given period of the season.This coincides with the report of Tango (2006) that 94% of the rural population on similar studies in Bangladesh used different sources of drinking water in t

**Table 6: Distribution of Respondents by Monthly Distribution of Drinking Water Availability**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Months** |  | | | | | |  | | | | | |
| **Adequate** | |  | | **Inadequate** | |  | | **Scarcity** | |  | |
| **Frq.** |  | **%** |  | **Frq.** |  | **%** |  | **Frq.** |  | **%** |  |
| January | 155 |  | 52.2 |  | 110 |  | 37.0 |  | 32 |  | 10.8 |  |
| February | 127 |  | 42.8 |  | 131 |  | 44.1 |  | 39 |  | 13.1 |  |
| March | 112 |  | 37.7 |  | 97 |  | 32.7 |  | 88 |  | 13.1 |  |
| April | 105 |  | 35.4 |  | 102 |  | 34.3 |  | 90 |  | 30.3 |  |
| May | 133 |  | 44.8 |  | 133 |  | 44.8 |  | 31 |  | 10.4 |  |
| June | 188 |  | 66.7 |  | 93 |  | 31.3 |  | 6 |  | 2.0 |  |
| July | 277 |  | 93.3 |  | 12 |  | 4.0 |  | 8 |  | 2.7 |  |
| August | 286 |  | 96.3 |  | 4 |  | 1.3 |  | 7 |  | 2.4 |  |
| September | 286 |  | 96.3 |  | 4 |  | 1.3 |  | 7 |  | 2.4 |  |
| October | 269 |  | 90.6 |  | 16 |  | 5.4 |  | 12 |  | 4.0 |  |
| November | 244 |  | 82.2 |  | 38 |  | 12.8 |  | 15 |  | 5.1 |  |
| December | 189 |  | 63.6 |  | 97 |  | 32.7 |  | 11 |  | 3.7 |  |

*Sources: Field Survey, 2018*

**6: Monthly Distribution of Drinking Water Availability**

The results in Table 6 shows that majority of the respondents; 66.7 %, 96.3%,96.3%, 90.6%, 82.2%, 63.6% and 52.2% had adequate drinking water availability starting from June to January respectively. From the month of February to May there was inadequate drinking water availability to 42.8%, 37.7%, 35.4% and 44.8% respectively. A few respondents had drinking waterscarcity throughout the year as indicated by lower proportions, all of which were lower than 30.3%. This implies that majority of the respondents had adequate drinking water availability for eight months of the year and inadequate drinking water availability for four months of the year. It could therefore be seen that water availability was evenly distributed throughout the year for the respondents in the study area except for the month of April**.**In supporting this finding, Ellis (2000) reported that water is one of the crucial and indispensable assets to poor household whose survival depends on them for their livelihood activities.

**Table 7 :Distribution of Respondents by Health Status**

|  |  |  |
| --- | --- | --- |
| Category | Freq | % |
| Good | 258 | 86.9 |
| Disabled | 1 | 0.3 |
| Short time illness | 21 | 7.1 |
| Long time illness | 10 | 3.4 |
| Weak | 7 | 2.4 |
| Total | 297 | 100.0 |

*Source: Field Survey, 2018*

**7: Health Status**

Data in Table 7 shows that majority of the respondents (83.8%) claimed good health status while very few (0.67%) were disabled, 7.7%had short term illness, 3.4%had long term illness and 2.4% were weak. This there implies that with the adoption of GIZ technology, majority had good health status which could be attributed to increase they have had both in terms of processing output and income. With increase in income after adopting GIZ technologies, the processors were able to afford the heath care facilities, thereby improving generally their welfare condition.In line with this result, World Bank (2014) justified the important of good health status of farmers/processors as a bedrock to the rapid responses to the adoption of technology intervention which is associated with the income generation activities of the adopters

**Table 8: Distribution of Respondents by Ability to afford Health Treatment (Beneficiaries)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Health Treatment  Providers | Visit Regularly Occasionally Never Visited | | | | | | | | | | | | ted | | | | | |
|  | |  | |  | |  | |  | |  | |  | |  | |  | |
|  | **Frq.** |  | **%** |  | **Frq.** |  | **%** |  | **Frq.** |  | **%** |  |  |  |  |  |  |
| Self- Treatment |  | 71 |  | 23.9 |  | 193 |  | 65.0 |  | 33 |  | 11.1 |  |  |  |  |  |  |
| Village Pharmacy |  | 53 |  | 17.8 |  | 141 |  | 47.5 |  | 103 |  | 34.7 |  |  |  |  |  |  |
| Village Doctor |  | 40 |  | 13.5 |  | 158 |  | 53.2 |  | 99 |  | 33.3 |  |  |  |  |  |  |
| General Hospital |  | 86 |  | 29.0 |  | 184 |  | 62.0 |  | 86 |  | 29.0 |  |  |  |  |  |  |
| Private Hospital  Total |  | 49  297 |  | 16.3  100.0 |  | 166  297 |  | 56.9  100.0 |  | 82  297 |  | 27.5  100.0 |  |  |  |  |  |  |

*Source: Field Survey, 2018*

**8: Ability to afford Health Treatment**

Table 8 shows that majority of the respondents (65.0 %)occasionally carried out self-treatment, while few (23.9 %) regularly carried out self-treatment and few (11.1 **%)**  never participated in self-treatment for health treatment. Also, about 47.5 % of the respondents occasionally visited village pharmacy while 34.7 % never visited village pharmacy and only few (17.8 %) visited regularly the village pharmacy for health treatment. However, more than half,majority (53.2 %) of the respondents occasionally visited village doctor, while few (33.3 %) and (13.5 %)never visited village doctor and regularly visited village doctor for health treatment respectively. Table 9 shows further that majority of the respondents (62.0 %) occasionally visited general hospital while few 29.0 % visited regularly and (29%) never visited general hospital for health treatment. Also, more than halfof the respondents (56.9 %)occasionally visited private hospital, while a few of the respondents (27.5 %) never visited private hospital and only 16.3 % visited regularly for health treatment. The implication of these findings is that majority of the respondents occasionally visitedall the available health providers for treatments. This could be adduced to the low educational level or illiteracy level of the respondents and or inadequate health care advocacy on the challenges of delay and incomplete disease treatments as well as drug abuse.

**Table 9: Distribution of Respondents by Type of Toilet Possession (Beneficiaries=297)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Toilet Possession  Indicators |  | |  | |
|  | **Frq.** |  | **%** |
| Own Latrine |  | 216 |  | 72.7 |
| Use Other`s Latrine |  | 24 |  | 8.1 |
|  |  |  |  |  |
| No Latrine & Use Other`s Toilet  No Latrine at all but using available bush  Total |  | 16  41  297 |  | 5.4  13.8  100.0 |

*Source: Field Survey, 2018*

**4.6.8: Type of Toilet Possession**

Table 10 reveals that majority of the respondents (72.7 %) had their own latrines, a few (8.1%) used other’s latrine, whereas a few of them had no latrine but used others toilet and the rest 13.8% of the respondents had no latrineat all but confessed using available places in the bush. It is worth noting that majority owned their latrine and this indicates that the living condition of the respondents had improved after the adoption of the GIZ intervention technologies. This could be attributed to the increment in the level of production and income that may give opportunity for getting their own latrine. The findings are in consistent with the report of Sheheli (2014) in his study area, that 73% of women had owned their toilets.

**Table 10: Distribution of Respondents by Toilet Positions (Beneficiaries=297)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Toilet Position  Indicators |  | |  | |
|  | **Frq.** |  | **%** |
| Outside |  | 183 |  | 61.6 |
| Inside |  | 114 |  | 38.4 |
| Total |  | 297 |  | 100.0 |

*Source: Field Survey, 2018*

**29: Toilet Positions**

From Table 10 It is shown that majority of the respondents(61.6%) had their toilet positions outside their houses while the rest (38.4%) had their toilet positions inside their houses**.** This shows that the respondents did not spend their income from shea nut processing activities on having toilets inside their houses but having up to about 39% with toilet position inside the house considering the rural set up and other decision making factors in such rural areas. This is similar to the findings of Sheheli (2014) who found in Bangladesh that the majority of the respondents’ toilets (62%) were situated outside of the houses, while 38% of the toilets were attached.

**Table 11: Distribution of Respondents by Type of Toilet Used (Beneficiaries)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Used Toilet  Indicators |  | |  | |
|  | **Frq.** |  | **%** |
| Pit Toilet |  | 178 |  | 59.9 |
| Open Space Toilet |  | 90 |  | 30.3 |
| Sanitary Toilet & Pit Toilet |  | 10 |  | 3.4 |
| Sanitary Toilet &Open Toilet |  | 4 |  | 1.3 |
| Pit Toilet & Open Space Toilet |  | 15 |  | 5.1 |
| Total |  | 297 |  | 100.0 |

*Source: Field survey 2018*

**30: Type of Toilet Used**

Table 11 reveals that more than half of the respondents (59.9%) used pit toilet while few (0.7%) used open toilet and 30.3% used open space toilet. Others (9.0%) used sanitary toilet and pit toilet, sanitary toilet and open space toilet, pit toilet and open space toilet.The finding implies thatthe beneficiaries haveearnedmore income from the adoption of the GIZ technologiesto cope with different types of toilets. This is related to the position of World Bank (2010a) that among the rural households, few used sanitary latrines while(30%) used home-made pit latrines.

**Table 12: Distribution of Respondents by Toilet Construction/Condition (Beneficiaries)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Toilet Construction  Indicators |  | |  | |  | |
|  | **Frq.** |  | **%** |  |  |
| Roof  Iron Sheet |  | 187 |  | 63.0 |  |  |
| Straw |  | 23 |  | 7.7 |  |  |
| Open  Total |  | 87  297 |  | 29.3  100.0 |  |  |
| Wall  Brick& Painted |  | 57 |  | 19.2 |  |  |
| Ordinary |  | 145 |  | 48.8 |  |  |
| Mould  Total |  | 95  297 |  | 32.0  100.0 |  |  |
| Floor  Tiled |  | 15 |  | 5.1 |  |  |
| Rugged/Tiles |  | - |  | - |  |  |
| Cemented  Total |  | 282  297 |  | 94.9  100.0 |  |  |

*Source: Field survey 2018*

**31: Toilet Construction/Condition**

Table 12 shows thatmajority of the respondents (63.0 %) used iron sheet construction while few (29.3%) used open roof and just 7.1%used roof straw for toilet construction. Also, a little below the average of the respondents(48.8%) used ordinary wall while 32.0% used mould wall and a few (19.2%) used construction. The Table also shows that majority of the respondents, majority (94.9%) used cemented floor, few (5.1%) used tiled floor and none of the respondents used rug/carpet floor for toilet construction. The findings imply that the respondents used simple and available materials for their toilet construction.

**Table 13: Distribution of Respondents by Participation in Social Activities (Beneficiaries)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Indicators |  | | Always | |  | | Occasionally | | Never | | Participated | |
|  | **Frq.** |  | **%** |  |  | **Frq.** | **%** |  | **Frq.** |  | **%** |
| Family Event |  | 240 |  | 80.8 |  |  | 57 | 19.2 |  | - |  | - |
| Cultural Program |  | 46 |  | 15.5 |  |  | 234 | 88.8 |  | 17 |  | 5.7 |
| Village Meeting |  | 109 |  | 36.7 |  |  | 164 | 55.2 |  | 24 |  | 8.1 |
| Voluntary Help |  | 94 |  | 31.6 |  |  | 201 | 67.7 |  | 2 |  | .7 |
| Mediation |  | 89 |  | 30.0 |  |  | 170 | 57.2 |  | 38 |  | 12.8 |

Source: Field Survey, 2018

**32: Participation in Social Activities**

Table 13 shows thatmajority of the respondents (80.8%)always participate in family event, while a few (19.2%) occasionally participated in family events and none for never participated in family events. In cultural programmes, majority of the respondents (88.8%)occasionally participated,while 15.5% always participate, whereas few (5.7%) never participated. Further result shows that above average of the respondents (55.2%) occasionally participate in village meetings while 36.7% always participated in village meetings whereas a few (8.1%) never participated in village meetings.In voluntary help, majority (67.7%) claimed occasional participate, while 31.6% always participated in voluntary self-help and a few (0.7%) never participated in voluntary self-help. Also revealed on the Table 13 is occasional participation in mediation, while 30.0% always participated in mediation and a few (12.8%) never participated in mediation. The implication is that respondents were full participants of social activities and it could be observed from the Table 13 that the proportions of occasional participants in the selected social activities were more but the percentage of the beneficiaries that participated in the family events were more than other events**.**The rural women participation in social activities were predominately associated with family programmes such as marriage ceremonies, invitation and other related ceremonies offered by other families.The findings supported the report of Shaermin (2005) and Aktaruzzamman (2006) found that 71% of rural women in Bangladesh have low participation in social activities, while Nazeneen (2004), Naved (2000)and Rahaman (2006) reported that majority of rural women have medium participation.

**Table 14: Distribution of Respondents by Freedom in Cash Expenditure (Beneficiaries)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Freedom in Cash Expenditure  Indicators |  | | | | | | | |  | | | | | | | |
| **Other Members** | |  | |  | | **Together** | |  | | **Husband** | |  | | **Herself** | |
|  | **Frq.** |  | **%** |  | **Frq.** |  | **%** |  | **Frq** |  | **%** |  | **Frq.** |  | **%** |
| Daily |  | 3 |  | 1.0 |  | 179 |  | 60.3 |  | 115 |  | 38.7 |  | - |  | - |
| On Land |  | 3 |  | 10.8 |  | 264 |  | 88.9 |  | 1 |  | .3 |  | - |  | - |
| On Household Repairs |  | 1 |  | .3 |  | 97 |  | 31.6 |  | 202 |  | 68.0 |  | - |  | - |
| On Child Education |  | 1 |  | .3 |  | 187 |  | 63.0 |  | 1 |  | .3 |  | - |  | - |
| On Health Care |  | 1 |  | .3 |  | 208 |  | 70.0 |  | 88 |  | 29.6 |  | - |  | - |
| On Household Assets |  | 2 |  | .7 |  | 197 |  | 66.3 |  | 98 |  | 33.0 |  | - |  | - |
| On Take Loan and Use |  | 3 |  | 1.0 |  | 125 |  | 42.1 |  | 120 |  | 40.4 |  | 49 |  | 16.5 |
| On Loan Servicing |  | 3 |  | 1.0 |  | 120 |  | 40.4 |  | 127 |  | 42.8 |  | 47 |  | 15.8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

*Source: Field Survey, 2018*

**33: Freedom in Cash Expenditure**

From Table 14, it is shown that majority of the respondents(63.3%) together make their cash expenditure on daily basis, while the rest (38.7%) had husband make cash expenditure and very few (1.1%) of the respondents had other members and none by herself make expenditure. The Table shows further that majority of the respondents (88.9%) together make cash expenditure and a few (11.1%) others make cash expenditure. On land, majority of the respondents (68.0%) together make their cash expenditure on house repair and few (31.9%) had others make cash expenditure. Also, majority of the respondents (63.0%) together make their cash expenditure on child education, while a few (37%) had others make expenditure on child education. On health care, majority of the respondents (70.0%) together make cash expenditure and the remaining 30.0% had make expenditure. On households’ assets, majority of the respondents (66.3%) had together cash expenditure and the remaining 36.7% had others make expenditure. Also, on taking loan and use, about 42.1% make cash expenditure made together and the remaining (57.9%) had others make expenditure. However, on loan servicing, 42.8% had husband make expenditure, while the remaining proportion (57.2%) had others make cash expenditure. From the analysis, it could be deduced that the cash expenditure is evenly distributed and the processors who were mainly women had to some extent freedom for cash expenditure. It follows therefore that with the benefits derived from GIZ technologies, processors having had their generated income increased, were able to actively involved in cash expenditure, thereby contributing to the family and children education expenses.The findingdisagrees with that of Hogue and Itohara (2008) that decisions are made by male members of the family and in most of the cases the man takes decisions alone rather than consulting with his wife.

**Table 15: Distribution of Respondents by the Seven Livelihood Indicators(Beneficiaries)**

|  |  |  |
| --- | --- | --- |
| Seven Livelihood Indicators | Cumulative percentage Score | Rank |
| Water Facilities  Health Condition  Housing Condition  Freedom in Cash Expenditure  Sanitation  Participation in Social Activities  Food Availiability  Cumulative Livelihood Status percentage score | 84.1  70.5  70.3  65.6  59.9  57.3  46.5  64.9 | 1  2  3  4  5  6  7  - |

*Source: Field Survey, 2018 CPS=64.9%*

**34: Seven Livelihood Indicators**

As revealed in Table 15,adoption of GIZ technologies has enhanced the livelihood conditions of the respondents and the water facilities had highest cumulative percentage score (84.1%) and highest cumulative percentage score ranking, indicating that the water condition of the respondents is better than all indicators for the beneficiaries of GIZ technologies. Next,in decending order of livelihood cumulative ranking, as shown in the Table, were health condition (70.5%), housing condition (70.3%), freedom in cash expenditures (65.6%), sanitation(59.9%), participation in social activities (57.3%) and food availability (46.5%) being the least. However, on the general note, the cumulative livelihood status score of 64.9% obtained ascertained good performance of livelihood indicators,thereby implying that adoption of GIZ technologies is highly reflected in the welfare of beneficiaries in the study area**.**The findings is in agreement with the report of Sheheli (2014) that majority of the rural women (60%) indicated that their livelihood improved through participation in income generating activities of technology intervention.

**Effect of the adoption of GIZ Technologies on the Livelihood of Shea nutProcessors**

**Table 16: Regression Analysis of Adoption of GIZ Technologies on the Livelihood of Shea nut Processors**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Livelihood indicators | R2 | Adjusted  R2 | F- ratio | t- cal | Significant(2-tailed) |
| 1.Food Availability | 0.100 | .098 | 65.770 | 8.110 | .000\*\* |
| 2. Housing condition | 0.028 | .027 | 7.207 | 4.148 | .000\*\* |
| 3.Water Facility | 0.075 | .073 | 47.942 | 6.924 | .000\*\* |
| 4. Health condition | 0.031 | .029 | 18.909 | 4.348 | .000\*\* |
| 5.Sanitation | 0.018 | .016 | 10.739 | 3.277 | .000\*\* |
| 6. participation insocial activities | 0.017 | .016 | 10.475 | 3.246 | .000\*\* |
| 7. Freedom in cash expenditures | 0.021 | .020 | 13.007 | 3.606 | .000\*\* |

*Source:Field Survey, 2018*;Dependent Variable-adoption of GIZ technologies

NB = \*\* at 1% Significant Level,

**41; Effects of the adoption of GIZ Technologies on the Livelihood of Shea nutProcessors.**

The effects on each of the livelihood indicators were marginal with the exception of water

Table 16 shows that adoption of GIZ technologies had significant effects on the livelihood assets and capabilities of the respondents and were significant at 1% level of probabilities. Water facilities was significant (t=6.924, p< .000) and has the highest R square of 0.075 that is explained at 75%. Others were housing condition (t=4.148, p<.000), health condition (t=4.348, p< .000), sanitation (t=3.277, p<.000), participation in social activities (t=3.246, p<.000) and food availability (t=8.110, p<.000). The effects on each of the livelihood indicators were generally on marginalbasis except the case of water facilities with R-square value explained at high value of 75%. The finding implies that there were other factors that affectedthe respondents’ adoption/implementation decisions of technologies and their contributions to the enhancement of the respondents’ livelihood activities shows increase.The results is in agreement with the report of Jain *et al.* (2009)that non-adopters of improved technologies can hardly maintain their marginal livelihood activities due to low income generating of traditional technologies that is associated with socio-economic stagnation leading to inadequate livelihood assets.

**42: Constraints to the Adoption of GIZ processing technologies**

**Table 17: Distribution of Respondents by the Factors Constraining Adoption of Shea Nut Processing**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Constraints to GIZ adoption** | **%** | **Mean** | **Std. Deviation** | **Rank** |
| 1.Inadequate finance | 100.00 | 1.875 | 0.727 | 1 |
| 2. Poor market linkages/channels | 92.30 | 1.737 | 0.711 | 2 |
| 3.Inability to understand due to illiteracy | 84.60 | 1.630 | 0.705 | 3 |
| 4.Lack of credit facilities | 76.90 | 1.576 | 0.689 | 4 |
| 5.Inadequate extension agents | 69.20 | 1.542 | 0.512 | 5 |
| 6.Poor processors groups for annexin opportunities | 61.50 | 1.451 | 0.687 | 6 |
| 7.Inadequate capacity building and follow-up | 63.08 | 1.389 | 0.632 | 7 |
| 8.Less cooperation from the husband /families | 46.10 | 1.387 | 0.626 | 8 |
| 9.Natural calamities (heavy rain storms | 38.40 | 1.380 | 0.534 | 9 |
| 10.Religious values | 15.30 | 1.22 | 0.424 | 10 |
| 11.Social insecurity | 15.30 | 1.22 | 0.424 | 10 |

*Source: Field Survey, 2018*

**42: Factors Constraining Adoption of Shea Nut Processing**

Table 17 shows the array of constraints to adoption of GIZ technologies by the respondents. The most severe of these constraints were inadequate finance (x̄=1.875), poor market linkage/channel(x̄=1.737) and inability to understand due to illiteracy (x̄=1.630) as conceived by majority of the respondents in proportion of 100.0%, 92.3% and 84.6% respectively. Others found to be severe were credit facilities (x̄=1.576), inadequate extension agents to go round the populace of respondents regularly (x̄=1.542), poor processors’ groups for annexing opportunities (x̄=1.451) and inadequate capacity building (x̄=1.576) and follow up(x̄=1.387). However, the less severe constraints conceived by few of the respondents were (46.1%)for less cooperation from husband/families (x̄= 1.387), 38.4% for natural calamities such as heavy rain storms (x̄=1.380), 15.3% for religious values (1.22) and 15.3% forsocial insecurity (x̄=1.22).

**43; Conclusion and Recommendation**

Findings from the study revealed that the major of the respondents that adopted GIZ Shea nut processing technologies have their livelihood conditions enhanced in all the livelihood indicators namely; water facilities, health condition, housing condition, freedom in cash expenditures, sanitation, participation in social activities and food availability. However, on the general note, the cumulative livelihood status score was above average which ascertained good performance of livelihood indicators, indicating that GIZ technology is highly reflected in the welfare of beneficiaries in the study area.

The findings also indicated that the majority of the respondents were faced some constraints ranging from inadequate finance, poor marketing channels and illiteracy level of understanding of the basic principles of adoption of the technologies,The study recommended frequent technology interventions to improve the shea nuts processors capacity and experience from the government organizations or non- governmental organisations (NGOs) across the value chains of the shea industry to enhance stakeholders’ productivity and livelihood activities as have been indicated in the positive adoption of GIZ technology intervention in Niger State.

**REFERENCES**

Aktaruzzaman, M. {2006). Functional Participation of Lendless Women in Income  
Generating Activities (IGAs) under SAIP of DAE. MS Thesis. Department of  
Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh,  
Bangladesh.Pp. 1- 89.

Alander, J. (2004)**.** Shea Butter- a Multi- Functional Ingredient for Food and Cosmetics. Lipid Technol. 16:202-205.

Chalfin, B. (2004). Shea Butter Republic. Routledge. New York, NY. Intro, Ch1.

Ellis, F. (2000). Rural Livelihoods and Diversity in Developing Countries. New York: Oxford Uni. Press Inc. Pp. 34-234.

Elias, M. and Carney, J. (2007). .African Shea Butter: a Feminized Subsidy from Nature. A Case Study of Africa.P. 77.

Ferris, R.S.B., Collinsom C., Wanda, K., Jagwe, J. and Wright, P. (2001)**.** Evaluating the Market Opportunities for Shea Nut and Shea Nut Processed Products in Uganda. Submitted to USAID. The United States Agency for International Development (available at http://www.foodnet.cgiar.org/Projects/Sheanut\_Rep.pdf, accessed on 02/08/10)

Food and Agricultural Organization, FAO, (2009): http;//www.fao.org/fileadmin/templates/te/tee/pdf/LAT-Brochure-LoRes.pdf.

German International Corporations, GIZ, (2010). A Manual on Best Practice on Shea nut Collection and Shea Butter Processing in Nigeria. .Produced for Employment Oriented Private Sector Development Programme, (EoPSD), Abuja, Nigeria.Pp.1-15.

German International Corporations, GIZ, (2011). Employment Oriented Private Sector Development Programme (EoPSD), Profile Shea Nut Groups in Niger State .Presented at Abuja, February, 2011.

German International Corporations, GIZ, (2012). A Final Report on the Analysis of the Shea Value Chain in Nigeria and Elaboration of a Shea Sector Country Study for Nigeria. GIZ, Pro-Poor Growth and Promotion of Employment (SEDIN), The SEDIN Programme, Abuja, Nigeria, June, 2012..

German International Corporations, GIZ, (2014). Employment Oriented Private Sector Development Programme (EoPSD), Profile Shea Nut Groups in Niger State. GIZ, Minna Field Office.

Hoque, M. and Itohara, Y. (2008). Participation and Decision Making Role of Rural Women  
in Economic Activities: A Comparative Study for Members and Non-Members of the  
Micro-Credit Organizations in Bangladesh, *Journal of Social Sciences 4(3): 229-236.*

Jain, R., Arora, A. and Raju, S. (2009). A Novel Adoption Index of Selected Agricultural Technologies: Linkages with Infrastructure and Productivity: *Agricultural Economics Research Review* 22; Pp 109-120

Lovett, P. (2004).The Shea Butter Value Chain. WATH Technical Report No. 2. Publication Produced for Review by the United States Agency for International Development (USAID) (available at http://felmart.com/valuechain.pdf, accessed on 03/09/11)

Maranz, S. and Wiesman, Z. (2003a)**.** Evidence for Indigenous Selection and Distribution of the Shea Tree, *Vitellaria paradoxa*, and its Potential Significance to Prevailing Parkland Savanna Tree Patterns in Sub-Saharan Africa North of the Equator. J. Biogeogr. 30: 1505-1516.

Masters, E.T., Yidana, J. A. and Lovett, P. N. (2004)**.** Reinforcing Sound Management through Trade: Shea Tree Products in Africa. Unasylva. 210: 46-52.

Moore, S. (2008). The role of *Vitellaria paradoxa* in Poverty Reduction and Food Security in the Upper East Region of Ghana Earth & Environment 3: 209-245

Muzari, W. Gatsi, W and Muvhunzi, S. (2012). The Impacts of Technology Adoption on Smallholder Agricultural Productivity in Sub-Saharan Africa: A Review, *Journal of Sustainable Development*; 5 (8)

Naved, T. R. (2000). Intra-Household Impact of the Transfer of Modern Agricultural Technology: A Gender Perspective. International Food Policy Research Washington, DC.

Nazeen, T. (2004). Role of Rural Women in Utilization of Indigenous Farming Resources towards Sustainable Farm Management. MS Thesis. Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh, Bangladesh

Njoku, O. U., Eneh, F. U., Ononogbu, I. C. and Adikwu, M.U. (2000).Compositional and Toxicological Studies on Shea Butter. *Journal of Nutraceut Function Medical Foods (Currently J Diet Suppl.) 2: 33-39.*

Olaniya, A. M. and Oje, K. (2007).Quality Characteristics of Shea Butter Recovered from Shea Kernel through Dry Extraction Process. *Journal of. Food Science. Technol. 44: 404-407.*

Omotesho, K.F., Akinrinde, A.F and Ogunlade, L.(2017). Determinant of Livelihood Status of Rural Farming Households in Kwara State, Nigeria. Paper Presented at the 27th Annual Conference of Rural Sociology Association of Nigeria (RUSAN) Held at Ahmadu Bello University, Zaria, Michael Okpara University of Agriculture, and Umaduke from 16th to 19th October, 2017.

Pouliot, M. (2012). Contribution of “Woman’s Gold” to West Africa Livelihoods: the Case of Shea (*Vitellaria paradoxa*) In Burkina Faso. Economic Botany. 669: 237-248. (<http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp> Productivity.” *Paper prepared for Vodaphone,* Indian Council for Research on International Economic Relations (ICRIER), New Delhi.

Rahman, M.M. (2006). Empowerment of Lendless Rural Women through Income Generating Activities under SAIP of DAE. MS Thesis. Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh, Bangladesh.

Schreckenberg, K. (2004). The Contribution of Shea Butter (Vitellaria paradoxa C.F. Gaertner) to local livehoods in Benin, Chapter 6 of Forest Products, livelihoods and Conservation. Africa Volume 2. Pp. 132-139.

Sharmin, H. (2005). Rural Women’s Perception of Benefits of Involvement in Income Generating Activities of Non-Government Organization. MS Thesis. Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh, Bangladesh

Sheheli, S. (2014). Improving Livelihood of Rural Women through Income Generating Activities in Bangladesh. Ph.d Thesis, Division of Agricultural Economics Humboldt University of Berlin. Germany,

Sulieman, M.A.T. (2008). Assessment of Potentials for Shea nut in Selected Local Government Areas in Niger State. Report for Employment Oriented Private Sector Development Programme (EOPSD), Abuja, Nigeria, .Pp. 3-28.

Sultana, A.M. (2011). Factors Effect on Women Autonomy and Decision-Making Power  
within the Household in Rural Communities. *Journal of Applied Sciences Research,  
7(1): 18-22.*

Tango (2006). Rural Bangladesh. Socio-Economic Profiles of WEP Operational Areas &  
Beneficiaries. World food program. United Nations World Food Programme,  
Bangladesh and TANGO International, USA. Pp.10-11.

Teklehaimanot, Z. (2004). Exploiting the Potential of Indigenous Agroforestry Trees: *Parkia biglabosa* and *Vitellaria paradoxa* in Sub-Saharan Africa. Agroforestry Systems. 61: 207-220.

World Bank (2010a). Bangladesh Country Assistance Strategy 2006-2009. Updated October  
2010. Available at http://worldbank.org.bd/.../BANGLADESHEXTN/0,,contenMDK   
(searched date: 10 February 2011).

World Bank. (2011). Missing food: The Case of Post-Harvest Grain Losses in Sub-Saharan Africa, Report No. 60371-AFR, Economic and Sector Work, Washington (DC), the World Bank.