Assessing the contributions of non-timber forest products on the livelihood of the rural farmers in the selected local government areas of Kebbi state

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Abstract
This research work assessed the contributions of non-timber forest products on the livelihood of the rural farmers in the selected local government areas of Kebbi State with specific objectives of describing the socio-economic characteristics of the respondents, identify the most valuable non-timber forest products in the study area, examine the forms in which non-timber forest products are being used by the rural farmers, investigate how non-timber forest products improve the livelihood of the rural farmers, determine the level of exploitation of non-timber forest products by the rural farmers and find out the factors hindering full utilization of non-timber forest products by rural farmers in the study area. A multistage-sampling sampling technique was used for the study. The first stage involved the selection of two local government areas in the state. The second stage involved the selection of six districts from the selected local government areas. The third stage involved the selection of two villages from each district at random. Respondents were selected using simple random sampling from a sampling frame obtained from the village heads. A sampling frame of two thousand (2000) respondents was used and ten percent (10.0%) of the respondents constitute the sample size of the study. The basic instrument used for data collection of this research work was structured questionnaire containing both open and closed ended questions. While secondary data was obtained from text books, journals and so on. The data collected from administered questionnaire was analyzed using SPSS (version twenty). Both descriptive and inferential statistics were used for the study. Descriptive statistics was used to achieve objective 1,2,3,4 and 5, while logistic regression analysis was used to achieve objective 6. The result revealed that a good number of respondents (48.0%) were within the age range of 40-49years. Majority (72.0%) of the respondents were males. The results equally revealed that all the respondents had one form of education or the other, implying that respondents could accept innovation easily. The result also shows that majority (68.0%) of the respondents were married. The same results also revealed that majority (64.0%) of the respondents had family size between 6-10 members. The result equally reveled that majority (64.0%) of the respondents had farming and forest as their major source of food. The same result also indicates that majority (64.0%) of respondents were averagely food secured with good number of them (52.0%) sourcing their agricultural information from friends and relatives. The result also revealed that a good number (40.0%) of the respondents had fuel and fence wood as the most valuable non-timber forest products in the area. The result shows that a good number of respondents (56.0%) having non-timber forest products available throughout the year. The result revealed that majority (60.0%) of the respondents had harvesting as the method they used in the exploitation of non-timber forest products. Majority (64.0%) of the respondents utilizes non-timber forest products in both raw and processed farm. The findings indicate the majority (67.0%) of the respondents had an improvement in their quality of life as an impact derived from using non-timber forest products. Also a good number (48.0%) of the respondents had food and income as a major way in which non-timber forest products improve their livelihood with majority (64.0%) of them exploiting NTFPs at both subsistence and commercial levels. The result indicates 56.0% of the respondents exploiting NTFPs at both farming and non-farming seasons. Result of logistic regression analysis from SPSS (Version twenty) indicated Pseudo - R^2 - Value of 0.742 implying 74.0% change in rural farmer's livelihood (y) was explained by cultural(X_1), social(X_2) and technological factors(X_3) included in the equation. Both cultural and social factors were negative, but technological factors were positive. Results of the odd ratios indicated no chances of probability of occurrence under cultural factors, but increased chances of probability of occurrence under social and technological factors. From the findings of the study, it could be concluded that non-timber forest products contribute immensely on the livelihood of the rural farmers in the study area by improving their quality of lives through the provision of food, incomes, shelter and medicine. Social and technological factors were the major factors hindering full-utilization of non-timber forest products by the rural farmers in the study area. The research work recommended that rural farmers in the study area should be educated technologically on the efficient use of NTFPs in the area by the government and NGOs, Rural farmers in the study area should be made to reduce over exploitation of non-timber forest products, so as to ensure the continuity of some extinction products, Alternative source of fuel should be provided in the rural areas in order to reduce over exploitation of forest plants as fuel wood by the rural farmers, Technical and financial support programs should be provided in the rural areas by the government and NGOs so as to promote farm income generating activities like value addition for farm produce in order to reduce over reliance on NTFPs by the rural farmer's livelihood.

Keywords: assessing, contributions, non-timber forest products, livelihood, rural farmers

1. Introduction

1.1 Background to the study

Since time immemorial, non-timber forest products (NTPs) have been in used by humans for variety of purposes. Many of them are associated with culture, customs and traditions (Kumar, 2015) [4]. The needs to identify the value of non-timber forest products in rural household livelihood are gaining popularity particularly in the developing nations (Welford, 2011) [8]. Non-timber forest products are reported to significantly contribute to the livelihood of the rural farmers by providing domestic subsistence and consumption requirements for increase incomes of the rural poor, serving as a safety net against experienced climate change adverse effects, constituting an important part of the adaptive capacity and finally contributing to direct monetary benefits through trade (Ahenkan, 2011) [1]. Sustainable collection of non-timber forest products for trade is expected to increase the adaptive capacity of households of the rural communities. Recent research conducted in central Africa revealed that rural farmers experience or bear economic loss as they are denied of collection of non-timber forest products (Boon, 2011) [3]. Non-timber forest products are collected, traded and consumed outside the cash economy and therefore are not adequately captured in the national economic statistics. There is also evidence that local and wider-scale commercialization of non-timber forest products is increasing in many regions, providing cash incomes to the rural farmers (Welford, 2011) [8].

Non-timber forest products are among the most important products obtained from the forest. They are goods of biological origin other than the timber from natural, modified or managed forested landscapes (Pandey, 2016) [6]. They include, honey, fuel wood, fruits, and resins charcoal, bamboo, grasses, leaves, seeds, mushrooms, bush meat and so on (Trinpathi, 2016) [5]. Most of these products are vital source of nutrition and medicine as well as industrial raw materials (Kumar, 2015) [4]. They are usually staple for those living near forests or part of coping strategies especially when regular accesses to agricultural commodities are not possible (Pandey, 2016) [6]. Apart from being human food, non-timber forest products such as grasses and leaves are usually collected by rural communities for feeding livestock, housing as well as providing ground cover for sleeping (Ashwani, 2016) [2].

Indigenous people around the world have a long history of using non-timber forest products in everyday life. They also have great knowledge and tradition of the medical, cultural nutritional and spiritual uses of these products. Settler's population moving in to areas inhabited by the native people throughout history have learned of these diverse uses of these products and also developed their own traditions and culture of use (Emery, 2018). Non-timber forest products offer opportunities for communities in the forests of the world. (Pandey, 2016) [6]. Globally about 1.5 billion people use or trade these products with majority occurring at local and regional scales (Boon, 2011) [3]. Non-timber forest products cannot be measured by monetary estimations alone as they have significant subsistence and socio-cultural importance and are commonly one part of multifaceted adaptive livelihood strategies, in-spite of low-cost substitutes, both rural and urban people continue to select forest resources for medicine, crafts, rituals, and marginalized people depend upon these resources for survival (Ahenkan, 2011) [1].

Non-timber forest products can be more sustainable option than traditional timber harvest. In the United States non-timber forest products arising from creativity and entrepreneurial spirit of the people who not only want to develop a sustainable primary or secondary income from the land, but love the outdoors lifestyle or have an interest in permaculture and similar-highly sustainable environmental farming systems (Pandey, 2016) [6]. Non-timber forest products can be considerable value to impoverished rural communities and it is important for professionals and entrepreneurs to recognize the constraints that exist outside mere collecting and harvesting of these products. Many low-income rural populations have limited access or understanding of the markets, insufficient capital and generally lack the creative understanding of entrepreneurial business development (Ahenkan, 2011) [1]. Non-timber forest products may have a strong potential for seasonal employment, supplemental or part time income generation or small business opportunities (Ojera, *et al.,* 2016) [7].

2. Materials and Method

2.1 Description of the study area

Kebbi State is located at latitudes 10^0 $10'$to 13^0 $15'$N and longitudes 30^0 $30'$to 60^0 $35'$E covering an area of about 37, 699 Kilometers Square. The state is situated in the North-western part of Nigeria. It shared boundary with Sokoto State in the North, in the East, with Zamfara State, while in the south with Niger State. The state comprises four administrative Emirates (Gwandu, Argungu, Yauri and Zuru) with twenty-one (21) local government areas. The projected population of the area is 4,440,000 people (NPC, 2021). The dominant tribes found in the state are Hausa-Fulani, lelna (Dakkarkari), Kabawa and Kambari. Other non-indigenous cultural and linguistic groups are Yorubas, Igbos, Nupes, Tivis and Idomas e.t.c (Ahmed, 2021).
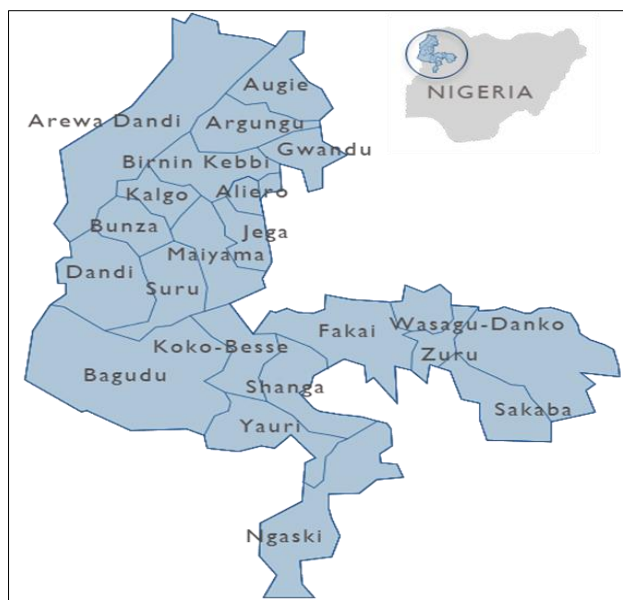
Fig 1: Map of Kebbi State

The vegetation of the area is savannah (Sudan, Sahel and Northern guinea savannah) agro-ecological zones. The area is characterized by tall scattered trees and shrubs usually deciduous in nature and grasses which are greenish in the rainy-season but dried and dumped in the dried season. The major products found in the vegetation include timber and non-timber products. The non-timber forest products are fuel wood, honey, tree gums, chew-stick, spiked, ropes, insects, mushrooms, bush meats, snail, herbs, fruit, fishes, and other bee products (Dudu, 2014).

The geology of Kebbi State is characterized by thick and vast sequences of sedimentary deposits, the rest being underlain by Precambrian basement complex rocks. The predominant soil types of the area are the ferruginous tropical soil. Their main features include a sandy surface horizon underlain by weakly developed clay mottled and sometimes concreting sub soil The sandy top soil is easily washed away by rain water and wind. The soil shows low water holding capacity and are therefore susceptible to drought (Ahmed, 2021).

The area is blessed with favorable climatic condition for vast agricultural production. The mean annual rainfall varies significantly from the Northern part to Southern part of the state, with 733mm and 1045mm respectively. Total number of rain days also varies from the north to the south by 50days and 80days respectively. The wet season start from May/June to September/October with heaviest rainfall mostly experience in August (Dudu, 2014).

Majority of the people in the area engaged in farming, fishing, gathering and trading within and outside the state, focusing for agricultural and other goods. Most farmers are peasant who engaged in the cultivation of various types of food and cash crops, ranging from rice, wheat, onion, sugarcane, cowpea, soybeans and other vegetables such as tomato, pepper, spinach, and soon. Farm animals such as cattle, sheep, and goat, donkey, camel, and poultry birds are equally managed in the area (Ahmed, 2021).

The cultural activities of the area include Argungu fishing and

cultural festival, Rigatta festival and Uhola festival. In addition, Kanta museumat Argungu, the tomb of sheik Abdullahi Fodiyo (Hubbare) at Gwandu, Girmache Shrine at Zuru provide important tourist attraction sites in the area (Sami, 2015).

2.2 Sampling procedure and sample size

The study covered both males and females because all were involved in the utilizations of non-timber forest products in the study area. A multistage sampling technique was used for the study. The first stage involved the selection of two local government areas in the state. The second stage involved the selection of six districts from the areas. This is because of the high concentration of non-timber forest products in the area. The third stage involved the selection of two villages from each district at random. Respondents were selected using simple random sampling from a sampling frame obtained from the village heads. Therefore, the sampling frame of two thousand respondents was used and ten percent (10%) of the respondents constitutes the sample size of the study.

Table 1: Sampling procedure and sample size selected

State	Local Gov't Area	Districts selected	Villages selected	No. of Respondents
Kebbi	Fakai	Fakai	Fakai	20
			Bakara	16
		BirninTudu	Matseri	18
			Tudu	14
		Bajida	Bajida	18
			Kuka	12
		Marafa	Marafa	17
			Maikende	15
	Sakaba	Sakaba	Dankolo	18
			Daura	14
		Dirin-daji	Dirin-daji	20
			Maganda	18
Total	2.0	6.0	12.0	200.0

Sources: Field Survey, 2021

2.3 Data collection procedure

The basic instrument used for data collection for this research was structured questionnaire. A structured questionnaire containing both open and close ended questions was employed for the collection of information from the rural farmers. The questionnaire was read for those who cannot read and write and equally interpreted to those who do not understand English. While secondary data was used from textbooks, Journals and so on.

2.4 Procedure for data analysis

The data collected from the administered questionnaire was analyzed using SPSS (version twenty). Both descriptive and inferential statistics was used for the study. Descriptive statistics was used to achieve objectives 1,2,3,4 and 5. While logistic regression analysis was used to achieve objective 6.

2.4.1 Logistic regression analysis

Logistic regression analysis is a statistical tool used to predict a data value based on prior observations of a set of data. It is presented as: $Yi = (Xi \, Ei)$.

The conceptual model based logistic function is given as:

$$Y_{ik} = f(X_i) = \frac{e^{ZiK}}{1 + e^{Zik}}$$

for $Zik = Xik \, \text{ß}ik$ and $-\infty < Zik < +\infty$

Where

Yi = dependent variable that takes a value of 1 for the i-th livelihood of the rural farmers which depends on non-timber forest products in the study area and 0 if otherwise.

Xi = Matrix of explanatory variables related to the collection and utilization of non-timber forest products.

Where

X_1 = cultural factors
X_2 = social factors
X_3 = technological factors
X_4 = other factors
$\text{ß}ik$ = is the vector of parameters to be estimated and
Ei = is the error term with a logistic distribution.

3. Result and Discussions

3.1 Socio economic-characteristics of the respondents

This presents information on age, gender, educational level, marital status, family size, major sources of food, level of food security and major sources of agricultural information of the respondents.

3.1.1 Age distribution of the respondents

Table 2 revealed that 48.0 % of the respondents were within the age range of 40-49 years; followed by 24.0% who fall within the age range of 30-39 years, 12.0% were within the age range of 60 and above years; 8.0% were within the age range of 50-59 years and also 8.0% fall within the age range of 20-29

years. This implies that majority of the respondents were within the age range of 30-49 years indicating that respondents were strong and agile and could be more efficient in the exploitation of NTFPs than the aged farmers. This finding was in-line with that of Ahenkan (2011) [1] who reported that majority of the active and most productive rural farmers in Sub-Saharan Africa were within the age range of 30-49 years, and it is within this age range that most people fall in to the productive sector of the economy.

3.1.2 Gender distribution of the respondents

Table 2 also revealed that majorities (72.0%) of the respondents were males and only 28.0% were females. This implies that majority of the respondents were males, this indicates the pre-dominant nature of the people of the area where values and believes of Islam restricts women from participating actively in some outdoor activities. This finding was in conformity with that of Ashwani (2016) [2] who reported that majority of the rural farmers in Africa were males.

3.1.3 Educational level of the respondents

The result revealed that 52.0% of the respondents had non-formal education, 20.0% of the respondents had Qur'anic education, 12. 0 % had secondary education, 8.0% had primary education and also 8.0% had tertiary education. This implies that all the respondents had one form of education or the other indicating that respondents can accept new innovation easier (Table 2). This finding agreed with that of Pandey (2016) [6] who reported that majority of the rural farmers in West Africa had one form of education or the other and therefore they can accept innovation easily.

3.1.4 Marital status of the respondents

The finding on marital status of the respondents revealed that majority (68.0%) of the respondents were married, 16.0% of the respondents were divorced, 8.0% of them were widow and also 8.0% were single (table 2). This implies that majority of the respondents had responsibilities of their households to meet. This finding coincides with that of Ahenkan (2011) [1] who reported that majority of the rural farmers in West Africa were married and also rural farmers highly considered and recognized married people, especially men, as fully grown and responsible people in the society.

3.1.5 Family size of the respondents

Table 2 also revealed that majority (64.0%) of the respondents had family size of 6 – 10, followed by 24.0% who had family size of 11 and above and only 4.0% of them had family size of 1 – 5. This implies that there is appreciable source of labour in the exploitation of NTFPs. This result agreed with that of Pandey (2016) [6] who reported that majority of the rural farmers in Sub-Saharan Africa were married with family size of six and above members as their main source of labour for farming.

3.1.6 Major sources of food of respondents

Table 2 revealed that majority (64.0%) of the respondents had

farming and forest as their major sources of food, followed by 20.0% of the respondents who had farming only as their major source of food and only 16.0% of the respondents had farming and trading as their major sources of food. This implies that majority of the rural farmers in the study area had farming and forest as their main sources of food. This finding was In-lined with that of Ashwani (2016) [2] who reported that generally African rural farmers had farming and forests as their primary and main sources of food.

Table 2: Socio economic-characteristics of the respondents

Characteristics	Frequency	Percentage (%)	Mean
Age-range (years)			
20 – 29	16	8.0	
30 – 39	48	24.0	
40 – 49	96	48.0	2.920
50 – 59	16	8.0	
60 years and above	24	12.0	
Gender/Sex			
Male	144	72.0	
Female	56	28.0	
Educational Level			
Non-formal education	104	52.0	
Primary education	16	8.0	
Secondary education	24	12.0	
Tertiary education	16	8.0	
Qur'anic education	40	20.0	
Marital Status			
Single	16	8.0	
Married	136	68.0	
Divorced	32	16.0	
Widow	16	8.0	
Family Size			
1 – 5	8	4.0	
6 – 10	128	64.0	2.217
11 and above	48	24.0	
Major source of feed			
Farming only	40	20.0	
Farming and Forest	128	64.0	
Farming and Trading	32	16.0	
Level of Food Security			
Highly food secured	40	20.0	
Averagely food secured	128	64.0	
Lowly food secured	32	16.0	
Source of Farming information			
Radio	56	28.0	
Television	15	8.0	
Social Media	8	4.0	
Extension Agents	16	8.0	
Friends & Relatives	104	52.0	
Total	200	100.0	

3.1.7 Level of food security of respondents
The result of the finding of this research work also revealed that majority (64.0%) of the respondents were averagely food secured, followed by 20.0% who were highly food secured and only 16.0% of them were lowly food secured. This implies that majority of rural famers in the study area were averagely food secured (Table 2). This finding disagreed with that of Ashwani (2016) [2] who reported that majority of the rural farmers in West Africa were lowly food secured. Moreover, the finding of this study equally disagreed with that of Wellford (2011) who revealed that majority of the West African rural farmers were food in-secured.

3.1.8 Major source of farming information of the respondents
Table 2 also revealed that 52.0% of the respondents had friends and relatives as their major source of farming information, followed by 28.0% of the respondents who source their farming information from radio, 8.0% From social media, also 8.0% of them from television and only 4.0% of the respondents received their farming information from extension agents. This implies that majority of the rural farmers in the study area had more than one source of farming information. This finding was In-lined with that of Emery (2018) who reported that in Sub-Saharan Africa majority of the rural farmers gain most of their farming information from friends and relatives due to lack of sufficient agricultural extension agents.

3.2 Most valuable NTFPs on the livelihood of the rural farmers
This presents information on the most valuable non-timber forest products on the livelihood of the rural farmers, most available season of non-timber forest product and as well as method use in the collections of non-timber forest products in the area.
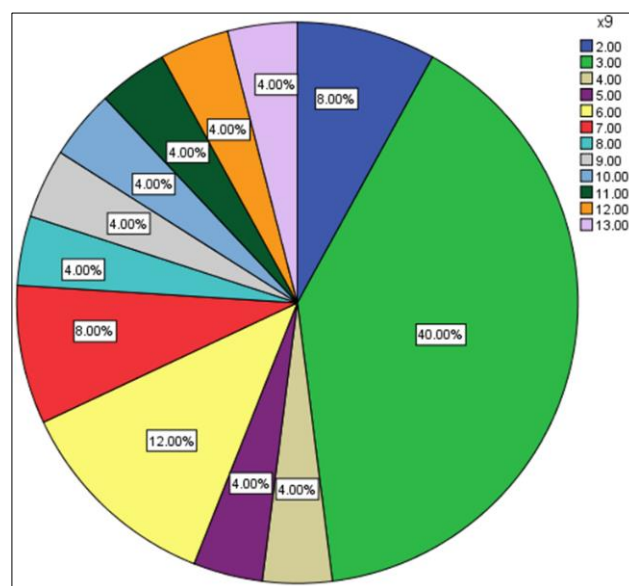

Fig 2: Most valuable NTFPs in the area

3.2.1 Most valuable NTFPs in the area
Fig 2 revealed that a good number (40.0%) of the respondents had fuel wood and fence wood as the most valuable non-timber forest products. Followed by 12.0% of the respondents who had leaves and forages as the most valuable non-timber forest products, 8.0% of them had herbs and medicinal plants as the most valuable NTFPs. Also, 8.0% of the respondents had fruits and vegetables as most valuable NTFPs, in the study area. 4.0% of the respondents had nuts and berries, 4.0% had charcoal, 4.0% had honey and have products, 4.0% had captured fishes, 4.0% had bush meat and insects, 4.0% had tree gums and ropes, also 4.0% had chew-stick and brooms and also 4.0% had mushrooms and spices as the most valuable non-timber forest product in the study area. This implies that the most valuable non-timber forest products on the livelihood of the rural

farmers in the study area are fuel wood and fence wood.

The findings of this study agreed with that of Agrawal *et al.,* (2013) who reported that, the values of non-timber forest products, varies from one place to another, depending on the economic and cultural contexts. In the developed countries NTFPs are usually valued for cultural and recreational purposes, bio-diversity conservation and rural economic development while in the developing countries especially Africa, NTFPs are valued for subsistence and income generations.

The findings of this study also coincide with that of Muir *et al.,* (2020) who reported that majority of the rural people in Africa considered fuel wood as their major source of energy and fence wood as their major means of making shelter and therefore considered fuel wood and fence wood as the most valuable product from the forest. This followed by leaves and forages, herbs and medicinal plants as well as fruits, nuts, vegetables and barriers. Moreover, the findings of this research work agreed with that of Jimoh *et al.*, (2013) who reported that 70% - 80% of the rural house – holds in Nigeria depend directly on fuel wood as their main energy source with daily consumption estimated at 27.5million kg/day.

3.2.2 Most available season of NTFPs in the area
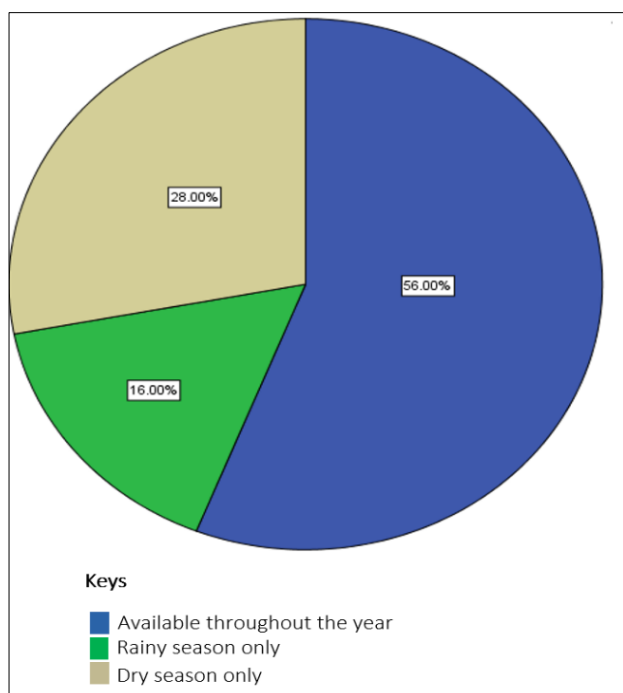

Fig 3: Most available season of NTFPs in the area

Fig 3 revealed that 56.0% of the respondents had NTFPs in their area available throughout the year followed by 28.0% who had NTFPs available during rainy season and 16.0% of the respondents had NTFPs available only during the dry season. This implies that non timber forest products are available throughout the year in the study area. The findings of this study were in line with that of Endamana (2016) who reported that non-timber forest products are mostly available throughout the year particularly in the developing nations. Rural people harvest them to meet up their daily requirements. He equally

added that, in the developing nations roughly more than 6000 NTFPs are harvested throughout the year from the wild lands. The findings of this study equally agreed with that of Pandey (2016) [6] who revealed that non-timber forest products are usually staple throughout the year for those living near forests as part of their coping strategies especially when regular accesses to agricultural commodities are not possible. He equally added that apart from being human food NTFPs are equally used throughout the year for feeding livestock and even housed them or provide ground cover for them to sleeps.

The findings of this study equally disagreed with Capta (2014) who reported that non-timber forest products are mostly available in the tropics during the raining season, and are exploited during raining season. He equally added that the commercial harvesting of non-timber forest products is done mostly in the rainy season except those of medicinal importance.

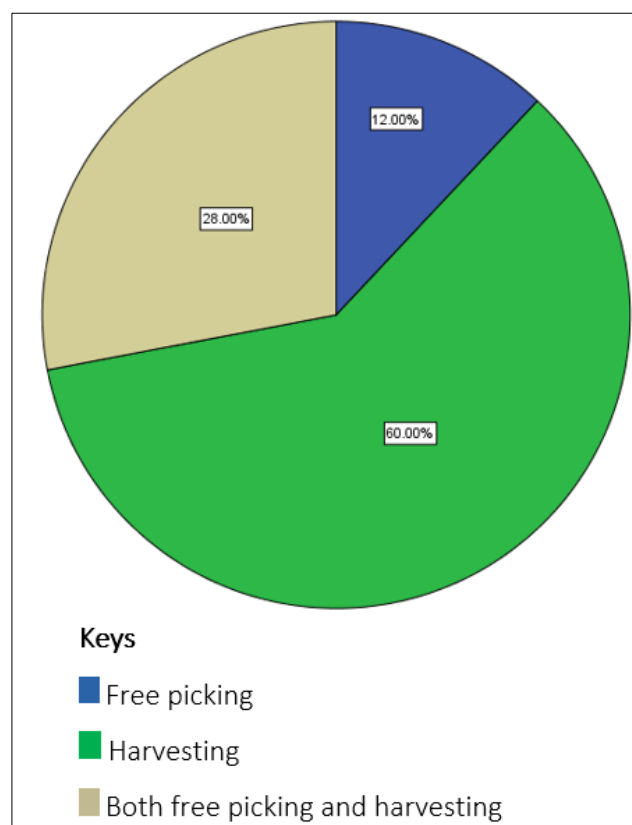### 3.2.3: Methods used in the collection of NTFPs

Fig 4: Methods used in collection of NTFPs in the area

Fig. 4 revealed that non-timber forest products (NTFPs) are collected by harvesting and this constitutes the majority (60.0%) of the respondents. This was followed by 28.0% of the respondents who collects non-timber forest products by both harvesting and free picking, 12.0% collects NTFPs are collected by harvesting.

This finding agreed with Endamana (2016) who reported that rural farming communities harvest NTFPs for food and for earning cash, He equally added that, the collection or exploitation method used for earning incomes is have sting method, free picking is mostly for subsistence used. However,

the results equally agreed with Boon (2011) [3] who revealed that most of the NTFPs are exploited by harvesting especially those to be use for commercial purposes.

3.3: Forms in which NTFPs are being used in the area

This presents information on various forms in which NTFPs are being utilized and its impacts on the livelihood of the rural farmers.
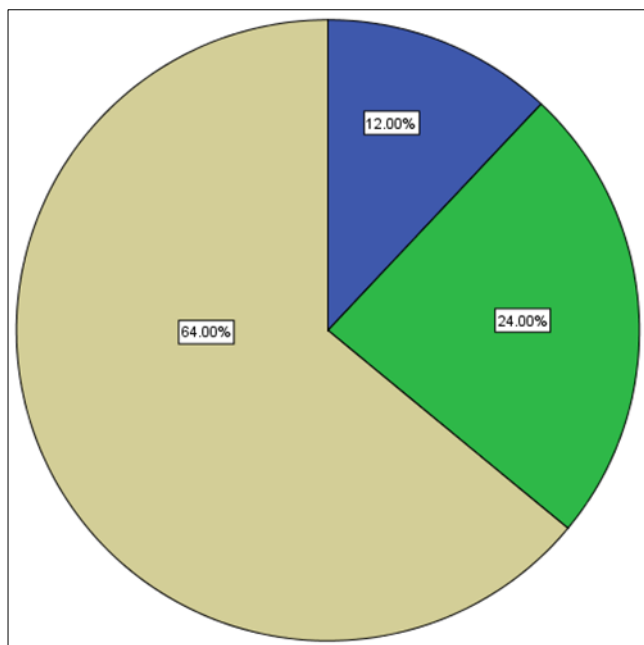
3.3.1: Forms in which NTFPs are being used

Fig 5

Fig. 5 revealed that majority (64.0%) of the respondents used non-timber forest products in their processed and unprocessed form (raw and processed form). Followed by 24.0% of the respondents who used only processed NTFPs, and 12.0% of the respondents used NTFPs in their raw form. This implies that majority of the respondents utilizes NTFPs both raw and processed form.

This finding therefore was inclined with that of Arigon (2012) who revealed that non-timber forest products are used in different forms, depending on the type. He also added that, some NTFPs required to be processed before they are utilize and there are those that do not need any further processing. They are utilized directly, immediately after harvesting. The findings of this study coincide with that of Antinio (2012) who reported that NTFPs are consumed directly as soon as they are collected without any processing, those includes fruits, vegetables, nuts and berries.

The findings of this research work equally agreed with that of Emery (2018) who reported that most of the NTFPs used by forest living communities of the tropics are being utilized in their fresh and raw forms particularly those vegetarian communities, they utilize NTFPs also to feed their livestock without any further processing, but they processed and sold NTFPs collected for generating incomes. The results equally agreed with that of Pandey (2016) [6] who also revealed that

non-timber forest products are being traded for income in Africa at both processed and raw form.

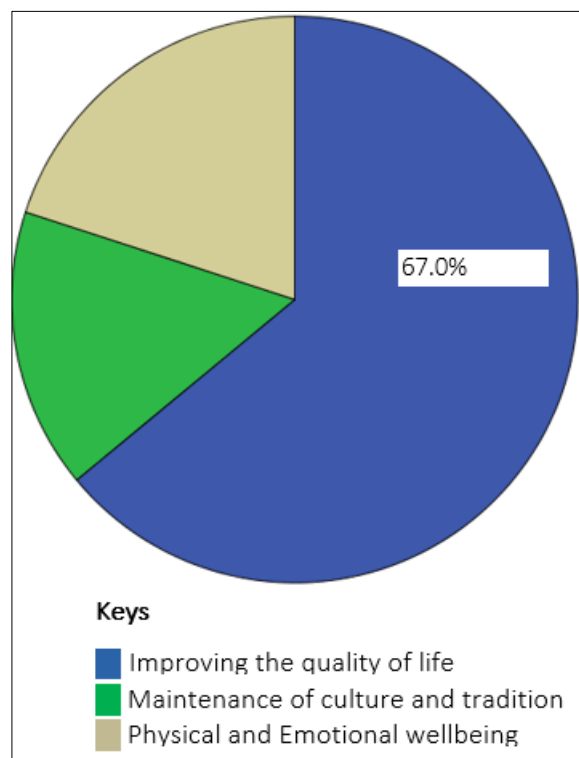### 3.3.2: Impact of using NTFPs on the livelihood of rural farmers

Fig 6: Impact of using NTFPs on the livelihood of rural farmers

Results on the impacts of using non-timber forest products on the livelihood of the rural farmers revealed that majority (67.0%) of the respondents had an improvement in the quality of their lives, followed by 20.0% of the respondents who had physical and emotional well-being by using NTFPs and 12.0% who revealed maintenance of culture and traditions. This implies that majority of the respondents had improved the quality of their lives as an impact of NTFPs (Fig. 6).

This finding was in conformity with that of Endamana (2016) who revealed that the impact of non-timber forest products on the livelihood of the rural farmers varies from one place to another one individual to another, depending on the economic and cultural context. He added that in the developed countries for instance, NTFPs are usually used for cultural and recreational purposes, biodiversity conservation and rural economic development, while in the developing countries, especially in Africa and Asia, NTFPs are mostly utilized for food and income generation. He also added that developing countries like Africa considered NTFPs as safety net that fills the gaps due to short fall in agricultural production or other forms of emergencies.

Moreover, the findings of this study agreed with that of Trimpathi (2016) who reported on the impact of using NTFPs by rural farmers of West Africa, according to him the impact of NTFPs on the livelihood of rural farmers cannot be measured by monetary estimations alone as they have significance and socio-cultural impact positively and are one

part of multifaceted adaptive livelihood strategies in spite of the their low-cost substitutes, rural farmers continues to select them for their well-being and survival. He also added that they contribute significantly as rural house-hold food and income source.

3.4: How NTFPs improved the Livelihood of Rural Farmers.

This presents information on the various ways in which non-timber forest products improve on the livelihood of the rural farmers as well as level of livelihood improvement.

Table 3: How NTFPs improve rural farmer's livelihood (n=200)

How NTFPs improve livelihood	Frequency	Percentage
Serving as food	32	16.0
Source of income	32	16.0
Source of medicine	8	4.0
Making shelter	16	8.6
Food and income	96	48.0
Food, Income and Shelter	18	8.0
Level of improvement		
High level improvement	48	24.0
Average level improvement	128	64.0
Low level improvement	24	12.0
Total	200	100.0

Source: Field Survey, 2021

3.4.1: How NTFPs Improved on Rural Livelihood

Table 3 revealed that 8.0% of the respondents had food and income as major way in which non-timber forest product improve on their livelihood, followed by 16.0% respondents who revealed that non-timber forest product provides food to them thereby improving their livelihood. Also, 16.0% revealed income, that NTFPs serve as their source of income and hence they are means of improving their livelihood, 8.0% of the respondents had non-timber forest products as their means of making shelter. Also, 8.0% of them said NTFPs provide them with both food, shelter and income and only 4.0% of the respondents had revealed herbal medicine as the only way NTFPs contributes on their livelihood. This implies that NTFPs contributes positively on the livelihood of the rural farmers by providing them with food, and incomes.

This finds agreed with that of Emery (2018) who revealed that indigenous people around the world have a long history of using non-timber forest products in their everyday life, they offers opportunity for rural communities and enterprises in the forests. He equally added that non-timber forest product plays an important role in sustaining the livelihoods of the rural farming communities, they contribute significantly on the rural house-hold food and incomes and as well as house-hold healthcare. The findings also were in conformity with Ojera *et al.*; (2016) [7] who reported that rural farming communities of Africa collects NTFPs just to earn a living, that rural farmers bear economic loss if they are denied of collecting non-timber forest products.

The results similarly, agreed with that of Jones (2018) who revealed that a non-timber forest product helps to improve the adaptive capacity of the rural farmers against the adverse effect

of climate change. The findings of this research work also inclined with Shackleton *et al.,* (2007) who revealed that the contributions of NTFPs in rural house hold food and incomes is significance in many developing countries, for example in the democratic republic of Congo, the shapes of the house-hold incomes from revenue are sometimes equal to or more than the school teachers minimum wages, so also in Central Africa.

3.4.2: Level of Improvement on Livelihood of Rural Farmers

The same table 3 equally revealed that majority (64.0%) of respondents had an average level improvement, followed by 24.0% of the respondents who had high level of improvement and only 12% of the respondents had low level improvement. This implies that majority of the rural farmers in the study area had improved positively on their livelihood by utilizing NTFPs. This could be due to the fact that farmers of the area exploit NTFPs both at commercial and subsistence level.

The result therefore agreed with Pandey (2016) [6] who revealed that NTFPs provides greater improvement in the living standard of the rural farmers in the developing nations especially in Africa.

3.5: Level of Exploitation of NTFPs by Rural Farmer

This presents information on what level do the rural farmers exploits NTFPs and seasons of most exploitation.
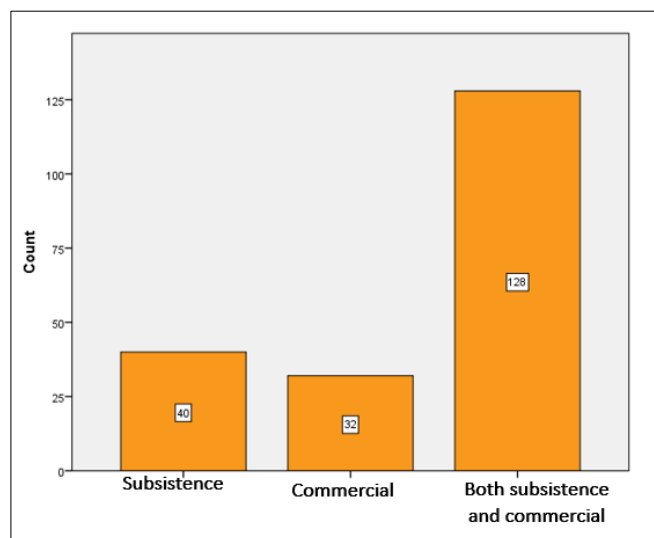

Fig 7: Level of exploitation of NTFPs by rural farmers

3.5.1: Level of exploitation of NTFPs by rural farmers

Fig 7 revealed that majority (64.0%) of the respondents exploits non-timber forest products at both subsistence and commercial level, followed by 20.0% of the respondents who harvest NTFPs at commercial level and 16.0% of the respondents harvest NTFPs at house-hold subsistence level. This implies that majority of the rural farmers in the study area harvest NTFPs at both subsistence and commercial level.

This study was in-line with that of Onuche (2011) who revealed that, the exploitation of non-timber forest products have been shifted from subsistence to commercial level, many rural farming communities today harvest NTFPs for home use and

trading. He equally added that non-timber forest products are vital for subsistence use by meeting the sources of daily nutrition and as well as reducing poverty rate of the rural farming communities of the developing nations.

The result of the findings of this research work equally agreed with that of Jones (2018) who revealed that in the drier areas of Africa rural farmers exploits non-timber forest products for house-hold utilization and incomes from trading. He also added that, in the tropical forests for example non-timber forest products could yield higher net revenue per hectare than the timber harvest of the same area. The results also was in conformity with that of Mohammed (2011) who reported that NTFPs are being harvested at both commercial and subsistence level throughout the world to complement the economy of the rural farmers.
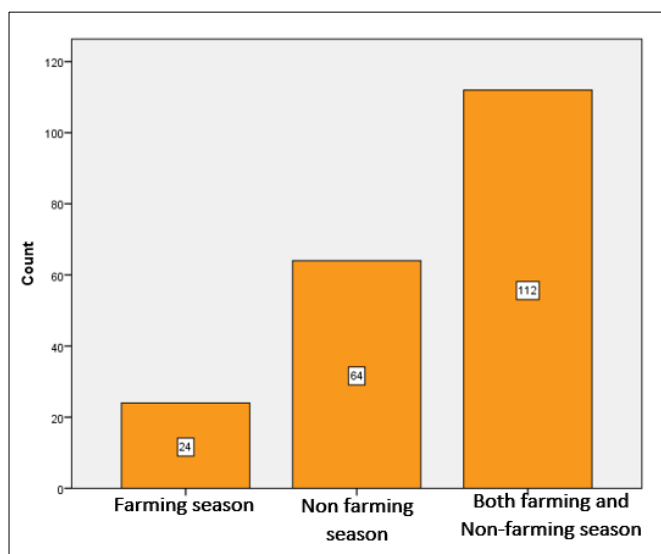

Fig 8: Season of most exploitation of NTFPs

3.5.2: Season of most exploitation of NTFPs in the area

Fig. 8 revealed that 56.0% of the respondents exploit non-timber forest products mostly during farming and non-farming season, followed by 32.0% who exploits non-timber forest products mostly on non-farming season and 12.0% of those who exploits non timber forest products only at farming season. This implies that rural farmers in the study area benefit from NTFPs in both farming and non-farming seasons.

This result was in-line with that of Pandey (2016) [6] who reported that rural farmers around the world depend on non-timber forest products throughout the years as an alternative source of livelihood. They harvest those products in both farming and non-farming season.

The findings also agreed with that of Arigon (2015) who reported that non-timber forest products are capable of providing sustainable incomes to the farmers throughout the year. They are capable of producing commodities for rural incomes and markets as an expression of traditional knowledge or as a livelihood option for rural house-hold needs as a key component for sustainable development, and their providing nutritious commodities and tools that can promote rural house-hold well-being.

3.6: Factors hindering full utilization of NTFPs in the area

This presents information on factors hindering full utilization of NTFPs by rural farmers in the study area as well as how to overcome those factors.

3.6.1 Factors hindering full utilization of NTFPs

Table 4: Logistic regression analysis result

Variables	Coefficients	Std Error.	P. Value	Wald-Test	Odd Ratios
Const. term	-21.203	0.270	0.0005	0.000	0.000
Cultural factors (X_1)	-20.311	40192970	0.0000	0.000	0.000
Social factors (X_2)	0.000	0.366	0.6590	0.000	0.851
Tech. factors (X_3)	7.068	14210.361	0.0080	0.000	1.000

Source: Field Survey, 2021

The Econometric method used in establishing relationship between dependent variable (rural farmer's livelihood) and independents variables (cultural(X_1), social(X_2) and technological factors(X_3)) in logistic regression (LR) equation is an ordinary least square method (OLS). OLS has advantages over other methods; its coefficients are linear, un-bias and have minimum variance error (Olayemi, 1997). LR equation had Pseudo R^2-value of 0.742 and Cox and Snail R^2-value of 0.019, implying that 74.0% change in Rural Farmer's Livelihood(Y) was explained by the independent variables cultural (X_1), social(X_2) and technological factors (X_3) included in the equation. However, 26.0% of the variation may be as a result of not including other variables in the equation or as a result of the estimation error. Also, regression co-efficient with respect to cultural factors (X_1) was negative but statistically significant at 1.0% level of significance, implying that increase in cultural factors (X_1) by one unit holding other inputs constant will lead to decrease in rural farmers livelihood (Y) by – 19.775 (Table 4).

The regression coefficient with respect to technological factors (X_3) was positive and statistically significant at 10.0% level of significance statistics, implying that one unit change in technological factors (X_3) holding other inputs constant will lead to increase in in rural farmer's livelihood (Y) by 0.0760.

Reporting odd ratios

From the logistic regression result on Table 4, revealed that the constant term with odd ratio of 0.339, indicates that there will be decreased probability chances of rural farmers livelihood occurrence because the odd ratio (0.339) was less than the cut up marks of 0.500. On cultural factors (X_1) (coefficient = -19.775 and odd ratio of 0.000), this implies that there was no chances of occurrence of rural famers livelihood. This is because the odd ratio of coefficient of the cultural factors (X_1) was 0.000.

Result of social factors (X_2), (Coefficient of -0.161 and odd ratio of 0.851) implying increased probability of rural livelihood occurrence, because the odd ratio was greater than the cut up marks of 0.500.

The same result equally indicates that technological factors (X_3), (Coefficient of 7.068 and odd ratio of 1.000), implying

increased probability of occurrence of rural farmers livelihood as the odd ratio was one (1), because the range of the odd ratio is between 0 and 1.

3.6.2: How to overcome those factors hindering full utilization of NTFPs

Table 5: How to overcome those factors hindering full utilization of NTFPs

How to overcome the factors	Frequency	Percentage
Educating rural farmers	60	30.0
Good government policies	20	10.0
Both educating and policies	120	60.0
Total	200	100.0

Source: Field Survey, 2021

Table 5 indicates that majority (60.0%) of the respondents revealed educating rural farmers and formulating good government policies on the use of non-timber forest products, followed by 30.0% of the respondents who revealed that government should only educate the rural farmers with modern technology about the exploitation and use of non-timber forest products and only 10.0% of the respondents considered formulation of good policies by the government. This implies that farmers in the rural area of the study utilize NTFPs in traditional forms due to lack of modern technology.

The finding of this research work therefore agreed with Ahenkan (2011) [1] who reported that educating farmers with up to date technological knowledge could help rural farmers to ensure efficient utilization of non-timber forest products and this can only be achieved by formulating policies regarding the exploitation of forest resources.

Statement of research problem

The contributions of non-timber forest products on the livelihood of the rural farmers have been grossly undervalued in most of the developing countries, because many people are of the view that timber is the only relevant product in the forest, ignoring the fact that there are other products other than the timber. This assertion was reported by different scholars such as Pandey (2016) [6]. In the light of this, there is need to update and assess the importance of this product and their influence on the livelihood of the rural farmers. It is against this background that this research work will answer the following research questions:

- What are the socio-economic characteristics of the respondents?
- What are the most valuable non-timber forest in the study area?
- What are the forms in which non-timber forest products are being used by the rural farmers in the study area?
- How the non-timber forest products does improved on the livelihood of the rural farmers in the study area?
- What are the levels of exploitation of non-timber forest products by the rural farmers in the study area?
- Is there any factor hindering full utilization of non-timber forest products by the rural farmers in the study area?

Objectives of the study

The general objective of this research work is to assess the contributions of non-timber forest products on the livelihood of the rural farmers in the selected local government areas of Kebbi state. The specific objectives are to:-

- Describe the socio-economic characteristics of the respondents,
- Identify the most valuable non-timber forest products on the livelihood of the rural farmers in the study area,
- Examine the forms in which non-timber forest products are been used by the rural farmers in the study area,
- Investigate how non-timber forest products improved on the livelihood of the rural farmers in the study area,
- Determine the level of exploitation of non-timber forest products by the rural farmers in the study area, and
- Find out the factors hindering full utilization of non-timber forest products by the rural farmers in the study area.

Justification of the study

This research work will be of benefit to the people particularly those who considered timber as the only useful products in the forests. The research work will provide them with information about the existence of non-timber forest products and their contributions on the livelihood of the rural farmers. Moreover, the research work will also be of use to scholars who wish to conduct research on the same or similar area. The research work will serve as a reference material to policy makers and other key players in the sector.

Scope and limitations of the study

This research work intends to assess the non-timber forest products (NTFPs) and their contributions on the livelihood of the rural farmers only in some selected local government areas of Kebbi state (namely Fakai and Sakaba).

The only limitation of this research work is the lingering insecurity such as banditry, kidnapping and cattle rustling that has bedeviled some parts of the research areas in recent times. This was minimized by selection of threat – free villages and areas.

Conclusion

From the findings of the study, it could be concluded that non-timber forest products contributes immensely on the livelihood of the rural farmers in the study area by improving their quality of lives through the provision of food, incomes, shelter and medicine. Social and technological factors were the major factors hindering full-utilization of non-timber forest products by the rural farmers in the study area.

Recommendations

This research work suggests the following recommendations:

- Rural farmers in the study area should be educated technologically on the efficient use of NTFPs in the area by the government and NGOs.
- Rural farmers in the study area should be made to reduce over exploitation of non – timber forest products, so as to ensure the continuity of some extinction products.

- Alternative source of fuel should be provided in the rural areas in order to reduce over exploitation of forest plants as fuel wood by the rural farmers.
- Technical and financial support programs should be provided in the rural areas by the government and NGOs so as to promote farm income generating activities like value addition for farm produce in order to reduce over reliance on NTFPs by the rural farmer's livelihood.

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