Assessment of Non-Timber Forest Products Utilization and its Contribution to Household Income among Farmers in Quan' Pan Local Government Area of Plateau State, Nigeria

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ABSTRACT: This study assessed non-timber forest products utilization and its contribution to household income among farmers in Quan' Pan Local Government Area of Plateau State, Nigeria. Multistage sampling technique was used in the selection of 150 respondents for the study. Descriptive statistics and multiple regression analysis were used to achieve the objectives of the study. Findings from the study revealed the mean age of the farmers to be 40years. About 71% of the respondents were males with greater number (89%) of them married. Majority (58%) of the respondents had primary education as their highest level of education. Findings from the study also revealed that 82% of the respondents had farming as their major occupation having average farm sizes of 1.6hectares. All (100%) interviewed farmers agreed that they collect variety of NTFPs throughout the year for their daily subsistence and income generation. Income from NTFPs contributed the second largest share of household income with a share of 27.0% after income from agriculture (51.0%). Firewood (100%), charcoal (39.0%), fruit nuts (37.0%), bush meat (27.0%), bamboo (26%), medicinal herbs (22%), honey (11%), fodder (67%), mushroom (7%) etc. were the major NTFPs extracted and utilized in the study area. The result of multiple regression revealed that gender (0.944), household size (0.432), educational status (-0.385), farmland size (-0.581) and non-farm income (-0.024) were significant determinant of income from NTFPs. The study recommended that, in recognition of substantial contribution of income from NTFPs to household income, stakeholders and policymakers should consider the NTFP sector in forest conservation measures that could meet the needs of forest-dependent communities.

Worldwide, forest resources are crucial to the livelihoods of people who live in proximity. Approximately 1.6 billion local people or more than 25% of the world's population depend on bio-diverse forest resources for their livelihoods, the value of which has been estimated to be as much as US $166–490 billion per year (Liang *et al.* 2016). The forests apart from providing timber also provide biological products called non-timber forest products (NTFPs). Non-timber forest products according to Center for International Forest Research, CIFOR (2013) refers to any produce or provision other than wood or timber that is gotten from the forest such as; nuts, vegetables, fruits, fish, medicinal plants, resins, essences, a range of bark and fibre, bamboo, rattans, honey, insects, animals, fodder, fertilizers, medicinal extracts, construction material, cosmetic and cultural products, natural dyes, latex, tannins, and gums. They also include essential oils, spices, edible oils, mushrooms, horns, tusks, bones, decorative articles, pelts, plumes, hides and skin, non-wood ligno-cellulosic products, phytochemical and aroma chemicals. They may be

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gathered from the wild, or produced in forest plantations, agro forestry schemes and from tree outside forests.

Non-timber Forest Products (NTFPs) cover a wide range of products with different uniqueness, which are utilized in a variety of context and play significant roles in a range of household livelihood strategies. This involves thousands of plant and tree species, most of which are consumed within the household of the gatherers and are not traded in markets (Sunday and Deekor, 2019). According to Loubelo (2012), NTFPs are goods of biological origin other than timber, derived from forests and agro-forestry areas. They are equally used as trophies, for making ethno-musical instruments, jewellery, for decoration, magico-religious issues and offer multipurpose services (Bobo *et al.* 2015). Bushmeat is the main NTFP of animal origin (Ngoye 2010), meanwhile those of plant origin include raffia palm, mushrooms, seeds, wild vegetables, medicinal plants and all plant related derived products (oils and silk). Globally, forest resources have significant economic contribution to rural livelihood, especially to forest dwellers. Non-timber forest products (NTFPs) are important source of livelihood to a large population across world, mostly for forest-fringe and rural people by providing food, remedy, employment, income, and reducing poverty (Endamana *et al.*, 2016; Pandey *et al.*, 2016; Suleiman *et al.*, 2017). In Africa, more than two-thirds of the population relies partly on forests products to satisfy their livelihood needs (CIFOR 2005, Endamana, *et al.*, 2016). Aside from timber, NTFPs play an important role in providing between 29–39% of food, medicine and income needs to about 80% of the local populations living in forest areas of Central Africa (Loubelo 2012; Levang *et al.* 2015). Dependency on forest resources and their contribution to incomes vary globally as their utilization depends on their socio-economic status. People with poor economy are found to be involved more in the utilization of forest resources. African's livelihood is largely affected by the forest resources. The African continent's people live on less than 1.25 US dollar a day and their subsistence is retained by forest resources that provide them some economic activities (Anderson *et al.*, 2006). Forest resources have been the sources for medicines, nutrition and other values as well along with income generation. More recently, there has been a growing interest in the economic potential of NTFPs as their prospects in poverty reduction raising their livelihood status and sustainable development have been recognized (Maharjan and Dangal, 2020). According to Chao (2012), one billion extreme poor depend partly on forest products and 300-350 million people are highly

dependent on those resources for subsistence as well as income. Collection and sale of NTFPs are a significant livelihood diversification for the marginalized family supporting remarkably in their household incomes (Melaku *et al.*, 2014). Their dependency on these products largely increases during the period of hardships as they act as safety net for them. Non-timber forest products (NTFPs) are crucial contributors to rural communities, and lower income households have been found to depend on them to support their livelihoods in many parts of the world (Heubach *et al.* 2011; Melaku *et al.*, 2014; Liu and Moe 2016; Saifullah *et al.*, 2018).

Rural farmers from a wide range of socio economic, geographical and cultural context harvest and utilize NTFPs for a number of reasons and the utilization pattern vary by ecological zones and socio economic areas. In other words some utilize it for household subsistence, maintenance of culture, spiritual fulfilment as well as physical and emotional well-being, house heating and cooking, self-employment, income generation and for medicinal purposes (CIFOR, 2013). However, the purpose for utilization is set by individual household and these depend on their needs. In Nigeria about 80% of the people utilize forest products for food and personal care (Anon, 2000). Most rural household utilizes NTFPs as food in the form of wild fruits, vegetables and nuts, edible roots, as bush meat, snails, edible insects and honey (Agbogidi, 2010). Okpachu *et al.* (2013) also pointed out that farmers differ in their level and pattern of utilization, such diversity among farmers could be related to various socio economic and educational level attained by the individual farmers. Many income generating activities in the rural areas are based specifically in the NTFPs. (Jonah *et al.*, 2013). Hence, the objective of this paper as to assess the non-timber forest products utilization and its contribution to household income among farmers in Quan' Pan Local Government Area of Plateau State, Nigeria

MATERIALS AND METHODS

This study was carried out in Qua'an Pan is a Local Government Area of Plateau State, Nigeria. It is located in the southern part of Plateau State with its headquarters in Ba'ap. The Local Government has coordinates 8°48′N 9°09′E, an area of 2,478 km² and a population of 196,929 based on the 2006 census (NPC, 2006; NBS, 2009). The projected population by 2022 stands at 291,430 people going by a population growth rate of 2.8% per annum. It shares boundaries with Shendam, Pankshin, Bokkos and Lafia Local Government Area of Nasarawa state. The local government has 8 districts namely; Deomak, Bwall, Kwalla, Kwa, Kwang, Kwande, Namu and Dokan-

Tofa. The major ethnic groups in the Local Government are Geomai and Pan. Agriculture is the mainstay of the economy of the local government area with production of major cash crops such as yam, rice, maize, millet and cassava, while the livestock reared include cattle, sheep, goat, pig and poultry. Fruit crops such as guava, cashew, citrus and mangoes are also grown in large and commercial quantities. The Local Government has the Pandam Game Reserve and Wildlife Park which is home to some rare animals and exotic birds, a natural animal habitat that has drawn tourists and researchers from both within and outside the country. It is considered to be Plateau's largest forest area containing animals and protects 224sq km of unspoiled savanna wetlands and forest (Ezealor, 2002; Akosim *et al.,* 2007). The data for this study was obtained through primary source. The primary data was generated through administration of structured questionnaire which was designed to elicit information on the socio-economic characteristics of the farmers, the NTFPs available in the communities, collection and utilization of NTFPs, Contribution of NTFPs to household income and the factors influencing income of farmers from NTFPs in the study area. Oral interviews were also conducted where respondents were not able to read or write.

Sampling Technique: A multi-stage sampling technique was adopted to select samples for this study. The first stage involved a purposive selection of Quan'Pan Local Government Area for the study. This selection was done due to the presence of natural forested areas and reserves in the Local Government. The second stage involved a purposive selection of Namu district which is home to Pandam Games Reserve and other forested communities. The third stage involved a purposive selection of ten communities for the study. The communities selected were; Namu, Pandam, Janta, Kwari, Kayarda, Lankaku, Shindai, Gunkaroghom, Monday and Gallo. A sample frame of all the farmers in these communities was obtained through enumeration with the help of the extension personnel attached to the area in conjunction with the leadership of the farmers' association. The final stage involved a random selection of 5% of the sample frame of each community to obtain the sample size of 150 respondents for the study.

Method of Data analysis: Descriptive statistics such as frequencies, percentages and mean were used to describe the socio-economic characteristic of the farmers (objective i), identify the respondents that utilize NTFPs in the study area (objective ii), identify the major NTFPs collected and utilized by the farmers (objective iii), examine the mode of utilization of non-timber forest products (objective iv) and estimate the contribution of NTFPs to household income (objective iv). Multiple linear regression was used to determine the factors that influence the farmer's income drive from NTFPs (objective vi).

Model Specification: Multiple Regression Model: Multiple regression was run in order to identify the socioeconomic variables that had significant influence on NTFPs income. The NTFPs income was considered as the dependent variable and household characteristics such as age, sex, marital status, education status, household size, experience in NTFPs collection, farm size, main occupation, distance to source of NTFP, off-farm income and agricultural income were considered as independent explanatory variables.

The model is specified below:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + b_4X_4 + \text{---------------} + \beta_{11}X_{11} + e.$$

Where: Y= NTFPs income (N); X_1 = Age of farmers (Years); X_2 = Sex (1 if male, 0 female); X_3 = Marital status (1= married, 0= otherwise); X_4 = Educational level of farmers (Years of formal education); X_5 = Household size (number of persons); X_6 = Experience in NTFPs collection (years); X_7 = Farm size (hectares); X_8 = Main occupation (farmer=1, civil servant=2, business=3); X_9 = Distance to source of NTFP (Km); X_{10} = Farm income (Naira); X_{11} = Off-farm income (Naira); b1 – b11 = Régression coefficients; a = constant; e = error term

RESULTS AND DISCUSSION

Socio-economic Characteristics of Farmers: The age distribution of the respondents in Table 1 shows that 52% of the respondents were within the age group of 31–40 years. This is followed by age group of 41–50 (27%). The average age of the respondents was 40 years. Younger household heads may be more involved than elderly people, since the former may be more active and stronger, hence can cope with intensive labor demand of NTFPs collection and can always violate the forest protection rules. On the other hand, the aged household heads may be risk-averse in violating the rules of forestry protection, thus, they are less expected to collect NTFPs from the forest reserves. This finding agrees with report by Anoh *et al.* (2019) that 68 percent of the respondents in Oban Hills Group Forest Reserve were within the age of 20-50. Gender of the respondents as presented in Table 1 reveals that both males and females were involved in NTFPs extraction. The result of the study shows that most 71% of those involved in NTFPs extraction

activities were males while the remaining 29% were males. This result shows that men are better positioned in terms of extracting products from the forest. Men and women engage in different NTFPs enterprises based on socio-cultural context and therefore, utilized different resources from the forest. This is particularly true in traditional societies where males and females have specific roles and activities (Davenport *et al*. 2012). For example, the collection of firewood and medicinal plants are jointly carried out in most part of Africa by both men and women while the collection of honey and gum arabic are exclusively done by men (Agrawal *et al*. 2013).

The result in Table 1 further showed that 89 % of rural household involved in extraction of NTFPs were married. This implies that married people were actively involved in NTFPs gathering because of the need to cater for the basic needs of their family members.

Table 1: Socio-economic Characteristics of the Farmers

Age	Frequency	Percentage	Mean
21-30	15	10.0	
31-40	78	52.0	
41-50	41	27.0	
>50	16	11.0	40
Sex			
Male	107	71.0	
Female	43	29.0	
Marital status			
Single	16	11.0	
Married	134	89.0	
Educational status			
Primary	87	58.0	
Secondary	29	19.0	
Tertiary	18	12.0	
Non formal	16	11.0	
Household size			
1-3	11	7.0	
4-6	105	70.0	
7-9	22	15.0	
>9	12	8.0	
Farm size			
0.5-10	27	18.0	
1.1-1.5	36	24.0	
1.6-2.0	56	37.0	
2.1-2.50	23	15.0	
>2.50	8	5.0	
Occupation			
Farming	123	82.0	
Civil servant	9	6.0	
Business	18	12	

Source: Field survey, 2023

This finding also agreed with that of Jonah *et al*. (2013) who in a study on economics of non-timber forest products (NTFPs) in Oyo state Nigeria noted that 88 percent of the respondents were married while 10 percent were single. Farmer's educational attainment shows that majority (58%) of the respondents had primary education, 19% had

secondary education, 12% had tertiary education while the remaining (11%) had no formal education. This indicates that majority of the respondents were not very knowledgeable of the usefulness of NTFPs to household economy considering their low level of formal education.

The level of education attained by the household head is expected to influence the nature of his/her economic activity and consequently the level of his/her income. This is because education would make it easier for household heads to comprehend negative externalities and passive user values of natural resources (Newton *et al*. 2016). It is assumed that the high level of education of respondents would lead to extraction of fewer forest products since education opens up alternative employment opportunities and diverts people from subsistence livelihoods activities such as the gathering of NTFPs from the forest reserve (Newton *et al*. 2016). The result in Table 1 also shows that most (70%) of the respondents had household sizes of 4-6 persons. This implied that majority of those who extract NTFPs have relative big house hold sizes. The mean household size of the farmers was nine (6) persons. Large families are more likely to face lower per capita, land availability and high dependency ratios for food requirements (Mujawamariya and Karimov, 2014). They may thus rely on forest resources around them because of the available family labor that can be utilized for NTFPs collection.

Concerning farm size, the result shows that 37% of the farmers had farm sizes of 1.6 - 2 hectares, 24% had farm sizes of 1.1- 1.5 hectares. The mean farm size of the farmers in the study area is 1.6 hectares. Farm size is defined as the total area of farmland owned by the household and is measured in hectares. Farm size plays an important role in crop production as it influences the quantity and availability of food in the household at any point in time. Households with limited farmland may not be able to produce adequate food for their families, hence, rely heavily on forest resources around them as their safety net to complement food shortage. Suleiman *et al*. (2017) stated that household heads with large farm size may not heavily depend on NTFPs collection as they may have enough food for their members and a surplus for sale.

Data presented in Table: 1 revealed that the major occupation of majority (82.0%) of respondents in the area was farming. About 12% had business as their major occupation aside from farming while the remaining 6% major occupation was civil service. The main occupation represents the major economic activity engaged by the household head for cash

income and subsistence. Because of the fewer number of livelihood options in rural areas that can supplement household income and food deficit, they are therefore expected to rely more on forest resources such as NTFPs. Households who are engaged in other sectors of the economy such as trading and formal employment are less likely to be dependent on NTFPs compared to their counterparts in the farming enterprise (Suleiman *et al.,* 2017; Daneji and Suleiman 2011).

Involvement in NTFP Extraction: Non timber forest products (NTFPs) contribute largely to the well-being of the rural inhabitants. From the result presented in Table 2, all (100%) interviewed households in the study area agreed that they collect variety of NTFPs throughout the year for their daily subsistence and income generation.

Table 2: Distribution of Farmers based on Involvement in NTFPs Extraction

Collect NTFPs	Frequency	Percentage
Yes	150	100.0
No	-	-
Total	**150**	**100**

Source: Field survey, 2023

Purpose of collecting NTFPs: Farmers were asked to indicate their main purpose of collecting NTFPs. The finding in Table 3 reveals that the farmers harvested NTFPs for various purposes. The relative importance and values of these products varies among households and individuals but often they are interrelated and complementary. The result shows that majority (67%) of the respondents extract NTFPs for both household consumption and income generation. About 26% of the respondents collect NTFPs mainly for home consumption purposes ranging from medicinal, food as well as house construction purposes (bamboo) while the remaining 7 percent collect NTFPs strictly for income generation.

Table 3: Distribution of Farmers based on Purpose for collecting NTFPs

Purpose for NTFP Collection	Frequency	Percentage
Home consumption only		
Income generation only		
Home consumption and income generation		
Total	**150**	**100**

Source: Field survey, 2023

Source of NTFPs: From Table 4, we can see that majority (68%) of the people involved in NTFPs activities gather them from forests while 71.3%, 19% gather them from farmlands while 13% gather theirs from free areas. The result indicates that NTFPs are mostly collected from state-owned forests where

anybody can collect NTFPs as there is medium to low enforcement of the rules. Therefore, villagers collect NTFPs from wherever they can, even if illegally, especially when they are in need of food for the households. The implication is that forests are very significant to the livelihood of the rural dwellers and urban dwellers. Government should encourage the effective management of forest resources for sustainability.

Table 4: Distribution of Farmers based on Sources of NTFPs

Source	Frequency	Percentage
Forests	103	68.0
Open fields	19	13.0
Farm lands	28	19.0
Total	**150**	**100**

Source: Field survey, 2023

Distance to Source of NTFPs: From Table 5, it can be observed that 38.0% of the individual involved in NTFPs activities got their products at a distance of between 0.1-1 km. The result revealed that about 33.0% got their products at a distance of between1.1-2 km. About 20.0% of the individual involved in NTFPs activities got their products at a distance of 2.1-3 km while the remaining 9.0% got their products at a distance above 3 km. On average, the respondents cover a distance of 1.55km to get their NTFPs. Proximity to the forests helps the respondents to reduce transportation cost and conserve their energy thereby increasing their efficiency and productivity. The NTFPs collection is expected to be influenced by the actual distance measured in kilometer(s) between the household heads' home and the source of the NTFPs. This implies that the longer the distance of household home from the source of the NTFPs, the less likely for it to collect NTFPs. This was confirmed by Suleiman *et al.,* (2017), Mujawamariya and Karimov (2014) who noted that people living closer to the forest had a higher dependency on forest resources compared to those living far from the reserve who would have more difficulties accessing NTFPs.

Table 5: Distribution of Farmers based on Distance to Source of NTFPs

Distance	Frequency	Percentage	Mean
0.1-1.0	57	38.0	
1.1-2.0	50	33.0	
2.1-3.0	30	20.0	
>3.0	13	9.0	
Total	**150**	**100**	**1.55**

Source: Field survey, 2023

Available NTFPs Extracted in the Study Area: The major NTFPs extracted in the study area are presented in Table 6. The respondents reported that the major NTFPs collected in the study area were; fuelwood (100%), charcoal (39.0%), fruit nuts (37.0%), bush meat (27.0%), bamboo (26%), medicinal herbs (22%),

honey (11%), fodder (67%), mushroom (7%) and others (6.0%). These were the most commonly collected NTFPs by households in the study area. From the result, it can be seen that all (100%) of the respondents reported that they extract firewood. This implies that firewood is the major source of energy and income for forest fringe dwellers. The probable reason could be that fuel wood is the only available and affordable primary source of energy in this area. Investigations revealed that most households in the study area have no access to power and they still use traditional biomass energy for cooking. This makes the use of firewood the most preferred choice by the locals of this study area. Ariyo *et al*. (2018) stated that firewood recorded the highest quantity of 9,967 kg of rural households use as their main cooking fuel. In the case of a study conducted at Yayo district, Western Ethiopia by Asfaw and Etefa (2017), firewood was recorded as main source (95.2%) of energy. The result in Table 6 further shows that about 39 % of respondents extracted charcoal from the forest. Charcoal is considered as cheap, easy to transport and store. Commercial charcoal production is encouraged by market condition in the study area as urban residents are the main users of charcoal in the study areas. Charcoal can be made all the year around, but production increases dramatically during dry season. Also, 22.0% of respondents reported that they collect medicinal plants from the forest. It is a common practice in rural areas that many ailments are treated at family level (self-medicate) than always searching for modern medicine. Moreover, lack of poor accessibility of hospital and other health facilities in the study area results in different interaction between lay people and healers.

Table 6: Distribution of Farmers based on NTFPs extracted in the Study Area

NTFP	Frequency	Percentage	Rank
Fuelwood	150	100	1st
Charcoal	59	39.0	2nd\
Fruits and nuts	55	37.0	3rd
Bush meat	43	27.0	4th
Bamboo	39	26.0	5th
Medicinal herbs	33	22.0	6th
Honey	21	14.0	7th
Fodder	21	14.0	7th
Mushroom	11	7.0	8th
Others	9	6.0	9th

Source: Field survey, 2023

Also, the need to cope daily with common mild diseases within the family of the villagers promotes the acquisition and maintenance of some knowledge about medicinal plants and their uses. About 14.0% of respondents said that grazing in the forest serves as a major source of fodder for their livestock. The study also revealed that few 14% of respondents collected honey from the forest. The older people engaged more in the production of honey in the forest. Much of the honey is produced by use of the traditional log hives which have low quality and quantities compared to the modern bee hives. As reported during the interview, households delivered the raw honey to the nearby market, without product processing or any other value adding activity.

The Contribution of NTFPs to Household Income of the Respondents: The major livelihood strategies in the study area are farming, non-farm activities and NTFPs collection. As shown in the Table 7, income from agriculture was the major and highest income source with 51.0% share of the total household income in the study area. Income from NTFPs has the second largest share with 27.0% and non-farm income has a share of 22.0%. This result suggests that NTFPs contribute significantly to household income and thus can act as a safety net during the period of hardship and other emergencies. This finding also implies that NTFPs constitutes an important component of the rural households' economy.

Similar conclusion have been reached by Dash *et al*. (2016) that agriculture considered as main source of livelihood for local people residing in and around Similipal Tiger Reserve of India where NTFPs accounted for the second largest share in total household income with an average income share of 29.34% next to crop production (39.1%). Melaku *et al*. (2014) reported in their study in Southwestern Ethiopia that the contribution of agricultural income to annual household income was 50%, the contribution of NTFPs to annual household income was 47% while the remaining 3% was from off-farm sources. This finding also agrees with studies conducted in Kano, Nigeria by Suleiman et al.(2017) where NTFPs contributing about 30% of the total annual household income as compared to crop production. The contribution of income from NTFPs to household total income is crucial in the achievement of livelihood outcomes. This makes the income from NTFPs an integral part of a livelihood strategy for households.

Income Share of Individual NTFPs: The major NTFPs that contributed to the overall income from NTFPs are shown in the table 8. The largest share in NTFPs income is from firewood (39.5%). This is followed by charcoal with an income share of 21%. Income share from bush meat, fruits and nuts, honey, mushroom and bamboo are 15%, 11%, 9%, 3% and 1.5% respectively. Some few NTFPs did not generate income showing that they were collected principally for consumption rather than for sales. This study empirically pointed out that firewood and charcoal are the most important NTFPs that contribute the highest share of NTFPs income in the study area.

Table 7: Distribution of Farmers based on their Annual Income

Income type (₦)	Mean annual income	Minimum	Maximum	Share (%)
Farm income	146059	78,000	300,000	51.0
Off farm income	63340.43	7500	167,000	22.0
NTFPs income	78615.32	21,000	105,000	27.0
Total	**288014.75**			

Source: Field survey, 2023

Factors Influencing Income derived from NTFPs by the Respondents: Multiple linear regression was used to analyze income from NTFPs against socioeconomic variables. The result is presented in Table 9. The F-ratio was statistically significant at 1%, implying that the sample data fit the model and the independent variables are important explanatory factors of the variation in the dependent variable. The R^2 was 51.96% meaning that about 51.96% of the total variation in the dependent variable was accounted for by the independent variable. Several socioeconomic factors influence the extent and pattern of the income from NTFPs of households. Among the variables considered, gender (0.944) and household size (0.432) had positive and significant relationships on income derived from NTFPs while educational status (-0.385), farmland size (-0.581) and non-farm income (-0.024) were negatively and significantly correlated with income derived from NTFPs.

Table 8: Distribution of Farmers based on Income generating NTFPs and their Proportion

NTFP	Mean income	Share of NTFP income (%)
Firewood	31,055	39.5
Charcoal	16,500	21.0
Bush meat	11,900	15.0
Honey	6,735	9.0
Fruits and nuts	8,800	11.0
Mushroom	2,369	3.0
Snail	-	
Fodder	-	
Medicinal herbs	-	
Spices	-	
Bamboo	1,256.32	1.5
Total	**78615.32**	

Source: Field survey, 2023

Gender (X$_2$): The coefficient gender had a positive and statistically significant impact on respondents' income from NTFP. This implies, men were the dominant extractors of NTFPs than women. The probable reason could be that the large percent of NTFPs were sourced from dense forest where women might not be secure enough to go and collect from long distances and hilly area. NTFPs collection activities in natural forest need active individuals and are illegal, time-consuming and tedious, women are discouraged from the risky practices compared with men who are more willing to take risks of violating the rules governing extraction of NTFPs. This result is inline study done by Opaluwa *et al*. (2011) in North Central, Nigeria who reported

that gender is the factor that affects the collection of NTFPs.

Educational status (X$_4$): Education of the household head is negatively correlated with NTFPs. This result is in line with the general expectations. It is expected that higher level of education will avail better livelihood opportunities away from forest resources. It is assumed that the high level of education of respondents would lead to extraction of fewer forest products since education opens up alternative employment opportunities and diverts people from subsistence livelihoods activities such as the gathering of NTFPs from the forest reserve (Newton *et al*. 2016).

Household size (X$_5$): The positive correlation of household size with income from NTFPs implies that a household with a lot of members could have more hands to collect various kinds of NTFPs and subsequently generate more income. This result supports the findings of Kar and Jacobson (2012), Moe and Liu (2016), and Suleiman *et al*. (2017) who also reported a positive and significant correlation between household size and income from NTFPs. Household with larger number of working people may tend to involve more in the NTFPs collections. Other studies such as Melaku *et. al*. (2014), Pyi Soe Aung *et. al*. (2014) used household size as an explanatory variable. They found that household size was positively correlated with NTFPs income.

Non-farm income (X$_{11}$): Non-farm income was statistically significant and negatively correlated to NTFPs income. Rayamajhi (2012) opined that the more income from outside and the more savings, the less households rely on forests. In terms of sustainable livelihood framework, the dependence on natural capital reduces when there is more physical capital such as agricultural land.

Farm size (X$_7$): The coefficient of farm size is statistically significant and negatively correlated with the NTFPs income. Agricultural land is the most important factor that is likely to reduce the dependency of local community on NTFPs because households with large plots of land are less likely to engage in forest extraction as their dominant strategy. This result agrees with the findings of Moe and Liu (2016) and Heubach *et. al*. (2011) who in their separate studies reported that households with large agricultural lands showed a significant and inverse

relationship with income from NTFPs. Sumukwo (2017) revealed that when income from agriculture increases, people are more likely to reduce the extraction of NTFPs. With this result it can be seen that the socio-economic attributes of the farmers had a great influence on income derived from NTFPs.

Table 9: Determinants of NTFPs Income of the Farmers

Variable	Coefficient	Std. Error	T-ratio	P-value
Constant	1.071	0.689	1.55	0.120
Age (X_1)	0.100	0.290	0.34	0.730
Gender (X_2)	0.944	0.213	4.43	0.000***
Marital status (X_3)	-0.850	0.711	-1.19	0.232
Education (X_4)	-0.385	0.188	-2.04	0.041**
Household size (X_5)	0.432	0211	205	0.041**
NTFPs /Exp (X_6)	0.054	0.263	0.20	0.838
Farm size (X_7)	-0.581	0.168	-1.15	0.249
Main occupation (X_8)	-0.777	0.674	-1.15	0.249
Distance (X_9)	-0.149	0.181	-0.82	0.411
Farm income(X_{10})	0.313	0.383	0.82	0.415
Non-farm income (X_{11})	-0.024	0.014	-1.75	0.083*
R Square	= 51.96			
F statistics	= 767.886***			
Observations	= 120			

***, ** and *= Significant at 1%, 5% and 10%

Conclusion: Findings from the study revealed that majority of the farmers were young, married and had low level of formal education. This study found that the contribution of income from NTFPs to household income plays a significant role in household income. The study area is mainly agrarian, with agriculture contributing the highest share to household income followed by income from NTFPs. Empirical results showed that sex of respondent, household size, agricultural land size significantly and positively correlated with income from NTFPs. Gender, household size, educational status, farmland size and non-farm income were significant determinant of income from NTFPs. The study recommended that stakeholders and policymakers should consider NTFP sector in forest conservation measures that could meet the needs of forest-dependent communities.

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