CONTRIBUTIONS OF SELECTED NON-TIMBER FOREST PRODUCTS TO COMMUNITY LIVELIHOODS IN TARABA STATE, NIGERIA

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ABSTRACT

Non-Timber Forest Products (NTFPs) have been identified to contribute to community livelihoods. Such contributions are people as well as site specific and may be short-lived if continuous availability cannot be guaranteed. Information on the role of NTFPs in community livelihoods is crucial to their sustainable management; however, this role has not been properly documented in Taraba State. Therefore, contributions of selected NTFPs to community livelihoods in Taraba State were investigated.

A four-stage sampling procedure was used in the study. Three Local Government Areas (LGAs) were randomly selected from each of the three existing Agro-ecological zones (AEZs) in Taraba State. Five wards from each LGA and 30 household heads (HHHs), using 30% sampling intensity were then randomly selected to give a total of 1,350 HHHs. Five sets of questionnaire were administered to 435 Harvesters, 188 Livestock Managers (LMs), 338 Marketers, 327 Building and Energy materials Suppliers (BEMSr) and 62 Medicinal Herbs Collectors (MHCs). The NTFPs were identified and prioritised. Contributions of selected NTFPs to community livelihoods were evaluated using Food, Livestock Feed (LF), Income and Employment Generation (IEG), Building and Energy Material Supplies (BEMS) and Medicinal Herbs Utilisation (MHU) as indices of livelihoods. Data were analysed using descriptive statistics, t-test, Chi-square and logistic regression at $\alpha_{0.05}$.

Two hundred and six NTFPs were identified. Ten species having priority for community livelihoods were *Afzelia africana* (35), *Balanites aegyptiaca* (34.5), *Vitellaria paradoxa* (34), *Parkia biglobosa* (33.5), *Irvingia gabonensis* (33), *Xylopia aethiopica* (32.5), *Faidherbia albida* (32), *Adansonia digitata (*32), *Brachystegia eurycoma* (32), and *Elaeis guineensis* (31.5). Forty-six species of NTFPs were used as Food (36 trees, 3 shrubs, 7 herbs), twenty-four as BEMSr (17 trees, 3 shrubs, 4 herbs) and twenty-nine for MHU (24 trees, 2 shrubs, 3 herbs). The two hundred and six NTFPs belong to forty-four families. The NTFPs contributed ₦2,065±1197.43 to Harvesters, ₦1,523.18±977.71 to LMs, ₦4, 882.06±3391.75 to Marketers, ₦1, 268.47±2023.61 to BEMSr and ₦1, 553.23±1062.74 to MHU as income/month. The NTFPs contributions to community livelihoods were: 34.1% (food) 14.9% (LF); 22.9% (IEG); 22.8% (BEMS) and 5.3% (MHU). Community livelihoods significantly depended on NTFPs (χ^2 = 94.83). Harvesters' occupation (6.25), age (9.22), monthly income (2.13), AEZ (1.77), sex (1.65), educational status (1.22) and main forest based activities (1.21) are likely to influence their dependence on NTFPs for livelihood. The AEZs (6.88), sex (5.85) and age (4.09) of LMs are likely to influence their dependence on NTFPs, while monthly income (7.99), AEZ (6.28), sex (2.01) and educational status (1.63) of marketers are likely to influence their dependence on NTFPs for livelihood. Also, AEZ (1.98) and monthly income (1.31) are likely to influence BEMS dependence on NTFPs, while age (4.87), sex (6.84) and AEZ (4.29) are likely to influence MHC dependence on NTFPs for livelihood.

Ten of the identified 206 Non-Timber Forest Products significantly enhanced livelihood status in Taraba State. These species are however under pressure due to multiple usage, which have implication for their sustainable management. *In situ* conservation is therefore recommended to mitigate the pressure on them.

Keywords: Household income generation, Community livelihoods, Priority tree species, Forest products.

Word count: 494

DEDICATION

This thesis is dedicated to my late uncle, sponsor and mentor, Mr. John Bala Maisongo who died on 21 January, 2015 in a ghastly motor accident along Gashaka- Gembu Road. May his soul rest in perfect peace, Amen.

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CERTIFICATION

I certify that this work was carried out by Mr. Sabo Zaku in the Department of Forest Resources Management, University of Ibadan

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ACRONYMS

1. ADB: African Development Bank
2. AEZ: Agro-Ecological Zones
3. BPF: Bye-products of forest
4. BSP: Bio-diversity Support Programme
5. CAMPFIRE: Communal Areas Management Programme For Indigenous Resources
6. CARUDEP: Catholic Rural Development Programme
7. CBN: Central Bank of Nigeria
8. CIDA: Canadian International Development Agency
9. CEEPA: Centre for Environmental Economics and Policy in Africa
10. CIFOR: Centre for International Forestry Research
11. CNTR: Centre for Non-Timber Resources
12. FAO: Food and Agriculture Organization
13. FORMECU: Forestry Management, Evaluation and Co-ordinations Unit
14. FOS: Federal Office of Statistics
15. FRT: Forest Rubber Tappers
16. FMNRI: Farmer Managed Natural Regeneration
17. FBRS: Forest Biological Resources
18. FGPS: Forest Garden Products
19. HH: Hidden Harvest
20. IFADRPS: International Fund for Agricultural Development and Rural Poverty Study
21. IFPRI: International Food Policy Research Institute
22. IDRC: International Development Research Centre
23. INBAR: International Network for Bamboo and Rattans
24. IUCN: International Union for the Conservation of Nature
25. MFPS: Minor Forest Products
26. NBS: National Bureau of Statistics
27. NPS: Natural Products
28. NPC: National Population Census
29. NTFPS: Non-Timber Forest Products
30. NWFPS: Non-Wood Forest Products

31. NWGS: Non-Wood Goods and Services
32. PEN: Poverty and Environmental Network
33. SCBD: Secretariat of the Conservation on Biological Diversity
34. SFPS: Special Forest Products
35. SEFPS: Secondary Forest Products
36. TSD: Taraba State Diary
37. WB: World Bank
38. WHO: World Health Organization
39. WPS: Wild Products
40. NEST: Nigeria Environmental Study / Action Team
41. CLH: Community Livelihoods
42. HVTs: Harvesters of NTFPs
43. LMs: Livestock Managers
44. IEG: Income/Employment Generation
45. MKTs: Marketers of NTFPs
46. BEMSr: Building/Energy Materials Suppliers
47. MHCs: Medicinal Herbs Collectors
48. MHU: Medicinal Herbs Utilization

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CHAPTER ONE

1.1 Introduction

The term "Non-Timber Forest Products (NTFPs)" is used inter-changeably with Minor Forest Products (MFPs) or Non-Wood Forest Products (NWFPs) or Secondary Forest Products (SEFPs). It refers to all biological resources, products and services other than timber that can be harvested from forest ecosystem for subsistence and trade (Shamly *et al*., 2002; Arnold *et al*., 2011; Bahru *et al*., 2012). They include fruits, nuts, spices, oils, vegetables, crafts, construction materials, fuel wood, charcoal, medicinal plants, fibers, resins, latex, gums, dyes, wild honey, bush meat, fish, rattans and bamboo. The past twenty years have witnessed a rapid growth of interest in NTFPs. It is believed that, the promotion of sustainable use of NTFPs could lead to a win-win situation for poverty reduction and biodiversity conservation (Neumann and Hirsch, 2000; Marshall *et al.*, 2003; Jimoh *et al.*, 2013).

There is increasing recognition that NTFPs can contribute significantly to the livelihoods of forest-dependent-communities. NTFPs provide food security and nutrition for both human beings and live stocks. It also provides additional income, employment and foreign exchange earnings (FAO, 2007; Arnold *et al*., 2011).

The significance of NTFPs effectively captured the imagination of conservationists around the world when Choudhury (2007) in Peter *et al.(*1989) reported that, more money could be earned from tropical forest by collecting NTFPs than from logging timber (Choudhury, 2007). Since then, the importance of NTFPs has moved to the centre stage of the global development agenda. The Food and Agriculture Organization (FAO) of the United Nations was one of the first agencies to promote NTFPs through programmes on Non-Wood Forest Products. Today, other International agencies such as the World Bank (WB), Canadian International Development Agency (CIDA), International Development Research Centre (IDRC), Centre for International Forestry Research (CIFOR), International Union for the Conservation of Nature (IUCN), Biodiversity Support Programme (BSP), International Network for Bamboo

and rattan (INBAR) etc. have incorporated the concept of NTFPs into their research and development programmes thereby making the concept of NTFPs an ecologically acceptable economic option for development (FAO, 2007; Arnold *et al*.,2011).

"Community livelihoods" as defined by Loubser (1995) is the totality of the means by which people in a community secure a living, have or acquire in one way or another, the requirements for survival and satisfaction of needs, as defined by the people themselves in aspects of their lives. Community livelihoods are therefore different from job, which is a specific piece of work or activity performed in exchange for payment. While communities work to obtain money, communities engage in a livelihood to support life; as such community livelihoods may or may not involve money. However, there are instances where a job is a means of livelihood. From the forgoing, livelihoods are the activities people undertake to meet basic needs and to generate income. The concept embraces not only the present availability of the means for making a living but also the security against unexpected shocks and crises that threaten livelihoods. The term "Sustainable" livelihood is different from environmental sustainability. Sustainable livelihoods in this sense refers to the nature of the ways in which livelihood is secured. Thus, according to Loubser (1995), sustainable livelihood must be considered in several dimensions including physical, social, economic, spiritual, ethical and environmental. The connotations of the dimensions are:

- Physical: Does it provide physical security, protection of health and other safe conditions of work?
- Social: Does it allow balance and is it in consonance with social responsibilities and ties within the family and community?
- Economic: Does it provide adequate reward or return for the effort expended?
- Spiritual: Is it free and does it respect human dignity, self- esteem and identity?
- Ethical: Is it fair, equitable, just and respecting of human rights?
- Environmental: Is it inter-generationally equitable and does it allow the regeneration of resources?

Livelihoods are dynamic and can be changed by either internal or external stressors. The strength of a given livelihood is not only measured by its productive outcomes but equally it's resilience to shocks. Livelihoods can only be sustainable if the natural resources are sustained. Sustainable livelihoods therefore describe the variety of ways

in which people in different societies make a living or secure a livelihood. Livelihood is a system of live maintenance which can either be monetary or non-monetary in reward. The non-monetary activities include fetching of firewood and water for domestic use, collection of NTFPs such as snails, mush rooms, wild vegetables and herbs for family utilization. Monetary activities include harvesting of NTFPs such as snails, mush rooms, wild vegetables, fruits, nuts, seeds, medicinal plants and others for sales. Community livelihoods in Taraba State are under threat due to environmental challenges such as drought and floods, thereby leading to:

- Food insecurity and in-adequate livestock feeding
- Low income and un-employment
- In-adequate housing and energy materials
- Increased human diseases

Food insecurity militates against community livelihoods of the rural populace in Taraba State. Food security is vulnerable to extreme environmental challenges such as drought and floods. When the Sahelian region, Taraba State inclusive, suffered drought in the 1970s and 1980s; crop failure was remarkable throughout the region. Crops and livestock worth billions of naira were destroyed thereby affecting food, meat and dairy supplies throughout the country (Adebayo, 2002; 2012). During the said period (1970s and 1980s), communities in Taraba State falls back on NTFPs to augment this agricultural shock but this is not documented in Taraba State.

NTFP are consumed locally all over the communities in Taraba State and has been a means of livelihood. Zaku (2013) recorded 97 species of NTFPs in Gashaka-Gumti National Park alone which are consumed locally Gashaka LGA of Taraba State.

The dependence on NTFPs by communities in Taraba state may take three forms as follows:

- Type or species of NTFPs not often used by households but now being used.
- Increased consumption of harvested NTFPs over purchased items due to cash shortage.
- Increased sales of NTFPs in local and regional markets

(Regmi *et al.*, 2010; Loo *et al.*, 2011; Bahru *et al*., 2012; Zaku, 2013a).

1.2 Statement of Problem

Non-Timber Forest Products (NTFPs) are important means for meeting the basic needs of communities in Taraba State. However, there is a dearth of information on the species of NTFPs that are used for community livelihoods in Taraba State. Most of these species are not documented and the indigenous knowledge of their relevance is steadily being lost particularly now that children who are supposed to inherit this knowledge spend most times in schools than on farms or forest.

NTFPs are also an important means for providing income/employment to communities in Taraba State. Nevertheless, there is failure to appreciate the relative value of these NTFPs in monetary terms as well as the people that are gainfully engaged by the sector. As a result, NTFPs have been under-valued, over-looked and poorly regulated in Taraba State.

Similarly, NTFPs contribute to community livelihoods in Taraba State in terms of food, livestock feeds, income/employment, building/energy material supplies and medicinal herbs utilization. However, the level of dependence on these NTFPs for community livelihoods in Taraba State is not known and documented.

The level of dependence on NTFPs for community livelihoods in Taraba State are influenced by some factors. These factors however are not known and documented in Taraba State. Apparently, the role of NTFPs to community livelihoods as well as the socio-economic characteristics that may influence the level of dependence on NTFPs by the communities in Taraba State is not well understood, studied or documented. In view of the above, studies are required to investigate the crucial role played by NTFPs in community livelihoods in Taraba State. This is with a view to re-emphasizing the contributions of NTFPs to community livelihoods in Taraba State as well as providing information on sustainable management of NTFPs in Taraba State.

1.3 Research Questions.

- Which NTFPs are used for community livelihoods in the study area?
- What is the contribution of NTFPs to household income in the study area?
- Do community livelihoods depend on NTFPs in the study area?
- What are the socio-economic characteristics that influence dependence on NTFPs for community livelihoods in the study area?

1.4 Objectives of the Study

The main objective of the study is to document the contributions of Non-Timber Forest Products to community livelihoods with a view to providing information on sustainable management of NTFPs in Taraba State.

The specific objectives are:

- to compile a compendium of NTFPs that are used for community livelihoods in the study area.
- to determine the income and employment generated from NTFPs in the study area.
- to evaluate the level of dependence on NTFPs by communities for their livelihoods in the study area,
- to identify the socio-economic characteristics that influence dependence on NTFPs for community livelihoods in the study area.

1.5 Justification of the Study

Community livelihoods are under serious threat in Taraba State due to several environmental challenges such as drought, desert encroachment and erosion (Berg *et al*., 2010; Bahru *et al*., 2012; Chia *et al*., 2013). It is threatening, not only to the sustainable development of socio-economic and agricultural activities, but to the totality of human existence. The threat to community livelihoods in Taraba State is well documented (Adebayo, 2002; 2012).

These environmental challenges affect food and water resources that are essential for community livelihoods, more importantly in Taraba State, where many of the communities, rely on local supply systems (Adebayo, 2012).

The disruption of the existing food and water system had given rise to devastating implications for community development and livelihoods; hence the need to understand the role of NTFPs to community livelihoods. In order to assist policy makers to enunciate sustainable forest management policies on NTFPs; it is important to furnish them with necessary facts and figures based on empirical research on NTFPs. This study on NTFPs provides such hard facts. The contribution of NTFPs to community livelihoods could be a suitable means or medium by which sustainable management of NTFPs could be sold to policy makers of community livelihoods to win their good will to invest in the forestry sector, particularly in the management of

NTFPs, knowing well too that,, it does contribute to community livelihoods. Therefore as forest managers, we need to exploit the interest of policy makers to win this good will for sustainable forest management.

Understanding the role of NTFPs in community livelihood is relevant for creating better awareness on the significance of the forest ecosystem to livelihood sustenance. This research is important in that, it helps to keep track of the potential NTFPs that are utilized for community livelihoods in Taraba State. It will however be weak and vague without empirical data to support such claims that NTFPs contributed to community livelihoods in Taraba State.

The study contributed to other literary works on NTFPs with emphasis on their role to community livelihoods in the study area. Information from the study can assist communities in Taraba State in the identification and promotion of NTFPs which could be relied upon for livelihoods support. Such information can also be used to form the basis for design and implementation of effective rural household development and forest management intervention. The study produces a compendium of NTFPs. This compendium is useful to conservationists, forest policy planners and forest managers as base line information for forest development and management interventions in Taraba State. It is hoped, that, the findings of the study can be used as a resource material by politicians, policy makers and economic planners who may have limited knowledge about community livelihood threat to help them formulate pro-community livelihood threat policies and strategies in Taraba state, Nigeria.

1.6 Scope of the Study

The study covered the contributions of selected NTFPs to community livelihoods in Taraba State. The contributions of the NTFPs to community livelihoods were evaluated using food, livestock feeds, income/employment generation, building/energy material supplies and medicinal herbs utilization as indices of livelihoods.

CHAPTER TWO

LITERATURE REVIEW

2.1 Definition of Non-Timber Forest Products (NTFPs)

The concept of Non-Timber Forest Products (NTFPs) has generated a lot of controversy as regards its meaning (Arnold and Ruiz-Perez, 1998; Ros-Tonen *et al.*, 1998; Shiva and Verma, 2002; Belcher, 2003; Basu, 2009; Chia *et al.*, 2013). So many terminologies have been used interchangeably by various authors to mean the same thing e.g. Non Wood Forest Products (NWFPs), Minor Forest Products (MFPs), Forest Biological Resources (FBRs), Special Forest Products (SFPs), Non-Wood Forest Benefit (NWFBs), Non-Wood Goods and Services (NWGS), Forest Garden Products (FGPs), Wild Products (WPs), Natural Products (NPs), By-Products of Forest (BPF), Hidden Harvest (HH), Secondary Forest Products (SEFPs) and Non-Timber Forest Products (NTFPs) (Chandrasekharam, 1995; FAO, 1999a; Wunder and Angelsen, 2003; FAO, 2006; Arnold *et al.*,2011; Bahru *et al.*,2012).

There is no standard agreed definition of Non-timber forest products (FAO, 2008). FAO (1992) defined NTFPs as "All goods of biological origin, as well as services derived from forest or any land under similar use, and exclude wood in all its forms". Non-Timber Forest Products refer to all the resources or products (other than industrial round wood and derived sawn timber, wood chips, wood based panels and pulp), that may be extracted from forest ecosystem and are utilized within the household or are marketed or have social, cultural or religious significance (FAO, 2006). These include plants and plant materials used for food, fuel, forage and fodder, medicine, cottage and wrapping materials, biochemical's, as well as mammals, birds, reptiles and fishes, for food and feather, hides and skins. Okafor (1994) defined NTFPs as forest goods and services gotten from wood products. They include poles, fuels, chewing stick, gum, dye, herbs, shrubs, wine, stem fibres, seed, spices, mushrooms and condiments among others. In 1995, FAO made the first attempt towards a harmonized definition of NTFPs by organizing the "International Expert Consultation on "Non-Wood Forest Products" in Yogyakarta, Indonesia to agree on a common definition for NTFPs. Also several

attempts have been made by different Authors and International Institutions to find an acceptable definition for NTFPs. (de Beer and McDermott, 1989; Peters, 1989; Chandresekharan, 1995; FAO, 1995; Ros-Tonen *et al.*, 1995; Peters, 1996; FAO, 1999a; Wong, 2000; Shiva and Verma, 2002; Marshall and Schreckenberg, 2005; Ahenkan and Boon, 2008; Arnold *et a*l.,2011). The important elements in the concept of NTFPs depend on the interests and priorities of the proponents and are usually centred on five (5) main issues as follows:

- The nature of the product – Inclusion/Exclusion of Non-Industrial Timber and other Wood Products (Belcher 2003; Arnold *et al.*, 2011).
- The source of the products – Inclusion/Exclusion of Forest/Tree Plantations, Managed Forest, Grass Land, Managed Agro forestry Systems within agricultural land.
- The nature of production of the Product – Gathered only from the wild or include those that are domesticated (e.g. Rubber, Mushrooms, Snails, Oil Palm and other Industrial Tree Plantation Crops) (Belcher, 2003).
- The Scale of Production – Capital Intensive, Industrial Scale Versus Small Scale Mixed Systems.
- The ownership and distribution of benefits (Ros – Tonen, 1999; Belcher, 2003; Marshall *et al.*, 2005; Arnold *et al.*, 2011).

The debate also centres on the expected contribution of NTFPs to poverty reduction, health, conservation as well as on their current and potential benefits to the poor communities and their further improvement (FAO, 1995; Peters, 1996; Arnold *et al.*, 2011; Bahru *et al.*, 2012). At the centre of the debate over NTFPs, is whether or not to include Woody Plant Materials and products in the definition, the question of whether the product or service is produced in a forest environment; what exactly is a forest; and the more problematic question of whether an NTFP is really an NTFP if it is cultivated. Some argue that if an NTFP has been domesticated or produced outside a forest environment, then it is no longer a NTFP; an important question that has been raised is whether NTFPs are only those biological resources that originate from within natural forests (Ros-Tonen, 1995; Belcher, 2003; Mukhopadhay, 2009; Msuya *et al.*, 2010).

This raises a different set of questions as to how a natural forest is defined and whether the concept of NTFPs should be tied to such a definition. Intractable and thorny questions include: whether products such as honey, mushrooms, medicinal plants and fruits harvested from the forest and the ones domesticated or under managed regimes should all be classified as NTFPs?(Ros-Tonen 1995; Belcher, 2003).

Should grass-cutters and snails from the forest and the ones produced under managed regimes be included as NTFPs? (Ros-Tonen 2000; Belcher, 2003). The controversy about whether or not to include cultivated NTFPs of forest origin in the definition of NTFPs is as old as the term itself. According to de Beer and McDermott (1989), who were among the pioneer writers on the subject, NTFPs "Encompassed all biological materials other than timber which are extracted from forest for human use", they defined forest as a natural ecosystem in which trees are a significant component. However, forest products are derived not only from trees but also from all plants, fungi and animals (including fish) for which the forest ecosystem provides habitat. Clark *et al.* (2004) argue that NTFPs such as Gnetum occur naturally in forest openings but are also found in secondary forests, fallow fields and sometimes in mixed crop fields. In other words, it is difficult to decide whether a resource should be described as an NTFP or as an agricultural product. This controversy has led to some of the NTFPs pioneers including Ros-Tonen *et al.* (1995) and Belcher (2003); attempting to re-define the term NTFP in order to distinguish between NTFPs collected from wild and domesticated NTFPs of forest origin. For instance, Ros-Tonen *et al*. (1995) defined NTFPs as "All tangible animal and plant products from the forest other than industrial wood". But in 1998, they slightly modified this definition to include:

"All tangible animal and plant product other than industrial wood, coming from natural forest including managed secondary forest and enriched forests (Ros-Tonen *et al.*, 1995). The distinction between wild and cultivated products is often difficult to make (Ros-Tonen *et al.*, 1995; Belcher 2003). This is because when they appear in the market, they bear no label to clarify their origin. Belcher *et al.*, (2005) therefore proposes three main categories of NTFPs as follows: wild, managed and cultivated.

- "Wild NTFPs" are NTFPs gathered from fallow, secondary forest or mature forest with little transformation of forest structure due to the extraction of NTFPs. Regeneration often depends on natural processes and forests are left to natural succession stages.

- "Managed NTFPs" are NTFPs produced in forests that are partially transformed through treatments such as weeding or crown opening to encourage the production of preferred species.
- "Cultivated NTFPs" are those NTFPs that are deliberately planted as seeds, seedlings or breeding stocks such as grass-cutters and snails. For example, Dacryodes edulis (Safou fruit) and *Irvingia gaboneensis* (bush mango) have been included as NTFPs. These fruit trees grow in natural forest areas but are also widely cultivated.

De Beer and McDermott (1989) define NTFPs as "All biological materials other than timber which are extracted from forest for human use".

Chandresekharan (1995) sees Non-Wood Forest Products as "All goods of biological origin as well as services, derived from forest or any land under similar use and exclude wood in all its forms.

Mathur and Shiva (1996) on the other hand define NTFPs as, "All products obtained from plants of forest origin and host plant species yielding products in association with insects and animals or their parts and items of mineral origin except timber may be called Minor Forest Products (MFPs), Non-Wood Forest Products (NWFPs) or NTFPs.

Shiva and Verma (1998) sees it as "All utility products of plants, animal and mineral origin except timber obtained from forests or afforested and domesticated land areas.

FAO, (1999a) define Non-Wood Forest Products (NWFPs) as "Goods of biological origin other than wood derived from forests, wooded lands and trees outside forest.

Wong (2000) on the other hand, sees it as "All products derived from biological resources found on forest land but not including timber, fuel wood or medicinal plants harvested as a whole plant.

In summary, NTFPs refers to all biological resources, products or service other than timber that are harvested within or outside forest ecosystem for subsistence and trade. (Shamley *et al.*, 2002). In this study, NTFPs refer to all biological resources, products or service obtained from the forest ecosystem or associated ecosystem for household livelihoods.

2.2 Trade of wild NTFPs

Not all (cross-border) trade of NTFPs is monitored and part of transparent (international) trade systems. Some NTFPs can be linked to illegal trade activities. In

addition, there are a number of trade constraints for the trade of NTFPs. "While many constraints are specific to a particular forest product or service, and the socio-political context in which they are based, there are also a number of more generic hindrances. These include the difficulty to penetrate international markets in order to meet the quality or sustainability standards; lack of business networks; limited or no access to relevant information about sustainable trade and investment trends, overseas consumer demand for specific sustainable products; and the absence of any institutional framework for the management, support and regulation of the NTFP sector".

This makes it difficult to quantify the monetary value of many NTFPs for communities – even though they might play a central role in certain rural economies. This difficulty can also be linked to lacking policy support or lobbying. "At the level of international trade, NTFPs face both tariff and non-tariff trade barriers (FAO, 1995; Tewari, 1998). The nature of these barriers varies from country to country and from product to product. Excessive tariff rates can be counter-productive as they may encourage illegal trade in products in order to avoid levies. Clarifications are required, depending on the various types of certification systems applicable to NTFPs and how they may facilitate access to various markets". Therefore it is important to reduce trade barriers on NTFPs and to monitor (international) trade, so that sustainable livelihoods and management strategies can be ensured.

2.3 Role of NTFPs, in Sustainable Forest Management and Biodiversity Conservation

Since the early 1990s, the role of NTFPs in sustainable forest management has received increased attention. Starting with the famous article by Peters *et al.* (1989), the original idea on the potential of NTFP exploitation as a way to sustainable forest management was primarily based on the assumption that the commercial extraction of NTFPs from natural forest could simultaneously serve the goal of biodiversity conservation (Anderson, 1990; De Beer and McDermott, 1989; Nepstad and Schwartzman, 1992; Plotkin and Famolare, 1992; Ros-Tonen *et al.*, 1995; Ruiz Perez, 1996). Proponents of NTFPs strategy pointed to important benefits of NTFPs exploitation for local communities such as goods (Food, fodder, fuel, medicine, construction materials and small wood for tools and handicrafts, income and employment).

Compared to timber, the harvesting of NTFPs seemed to be possible without major damage to the forest and its environmental services and biological diversity. In sum, NTFPs are expected to offer a model of forest use which could serve as an economically competitive and sustainable alternative to logging. Since the publication of Peters *et al.* 1989 propositions, the forestry and the academic world has witnessed a wave of studies and projects based on the assumption that, by adding value to the forest and generating income and foreign exchange, the commercial exploitation of NTFPs could provide an incentive to keeping the forest intact and managing it sustainably.

2.4 Economic Values and Potentials of NTFPs

People are dependent upon natural resources for meeting a large part of basic necessities of life (FAO, 1995; Clendon, 2001; Jimoh, 2006; Choudhury, 2007; Ahekan and Boon, 2008; 2010). The type of resources and utilization patterns, however, vary by ecological zone and socio-cultural area. Forest provides a wide range of benefits at the local, national and global levels. The contribution of NTFP to the forestry sector in particular and the rural households in most countries is generally significant, though it had been undervalued in the past. NTFP play a very significant role in many developing countries due to the fact that great proportions of the population rely directly on the forest.

According to the United Nations, "International definition and measurement of standards of living" the number of rural households living in absolute poverty in the developing countries including Nigeria increased from 400 million in 1965 to 600 million in 1988 and more than 600 million in 2010 (Msuya *et al.*, 2010; Anorld *et al.*, 2011) thus leading to the problem of food insecurity. In the rural areas, the problem of food insecurity lingers on, and has defied any precise solution. In many parts of the world, forest lands are under threat from several sides, leaving the poor even more vulnerable (FAO, 2008). Due to increase in population level, less agricultural land is available and ever growing number of people are turning to forest products exploitation to supplement their income. Trees and other products are being removed from the forest faster than they can grow thus, leading to a diminishing source of raw materials, soil erosion, reduction in agricultural yields and imbalance in the

microclimate and resource depletion, which the end-product of forest mismanagement is affecting more than fuel collection (Posey, 1982; Pattanayak and Sills, 2001;Rahma *et al.*, 2012). There is therefore a growing awareness of the contributions of NTFPs to household economies, food security, national economies and conservation of biodiversity. Non-Timber Forest Products provide food, medicines, fibres and cash income for rural households (Okafor *et al.*, 1994).

In the developing countries, 80 percent of the people use forest products for food and personal care (Anon, 2000). For example in Ghana, karite butter is used as cosmetic product distributed by the International Body Shop Chain of Shops (Anon, 2000). In Nigeria, food security of rural dwellers is improved by growing trees in the home gardens and on farms. Leaves, rattan, honey, sap, gums from the small scale industries are important sources of income (Okafor *et al.*, 1994). In Zimbabwe, 237,000 people were employed in Non-Timber Forest Products related activities in 1997, compared with 16,000 in industrial forestry (Anon, 2000). Most Non-Timber Forest Products are sold locally or in regional markets. In Cameroon, according to Anon (2000), sales of NTFPs are worth several million euros and go beyond local market as market stalls in the *conurbations of* Douala and Yaounde are full of such products as butter tree plums or safou *(Dacryodes edulis)*, groundnut tree nuts *(Ricinodendron heudelotti* used as a condiment), dika bread fruit and kolanut.

They can be harvested in forest plantations or on trees outside the forest. These products range from being used as food or food additives (nuts, mushrooms, wildfruits, herbs, spices, aromatic plants) and as plant materials (fibres, creepers and flowers) and plant derivatives (raffia, bamboo, rattan, cork and essential oils) to animal (game), bees, honey etc. Forests and farm trees make significant direct contributions to food security of the rural population providing a vast array of food which supplies essential nutrients especially at times when other food sources are unavailable (Olawoye, 1996). Processed and stored forest foods products help insure a year-round food supply. Non-timber forest products are also important for seasonally dependent agricultural systems (FAO, 1989). They provide food, fodder and energy (compared to other forest food such as leaves and fruits). They contribute to the quality of rural household diet indirectly by providing a habitat for wild animals and fish, thus providing livestock fodder. They supply medicine and fuelwood for human livelihoods.

FAO (1989) found that *sandawe* (i.e. people living in Tanzania) had 45 percent of their meals from the forest with at least two or three different species consumed on a monthly basis. Also, many pastoralists in Tanzania relied on the seasonal products of forested areas for sustenance. Olawoye (1996) opined that, rural households spend income realized from Non-timber forest products to buy other things that cannot be gotten from the forest. This provides a supplement to the economic status of the generality of the rural dwellers. Hence, dependence on combined and seasonal activities is the only way to ensure household food security.

Forest fuels are important for ensuring and enhancing food security (FAO, 1989) by providing energy for processing edible food and for preserving food to counteract seasonal shortages. In Bangladesh, Zambia, Honduras, Egypt, Jamaica and Sierra-Leone, forest product processing enterprises were found to be a major rural employer. While in Botswana, gathering of NTFPs is a major and more important economic activity for the poor than farming (Oluwole, 1999; Fisher, 2004; FAO, 2005; Belcher *et al.*, 2005; Golam *et al.*, 2008; Ahekan and Boon, 2010; Rahma *et al.*, 2012). In Ghana, charcoal making from trees grown on fallow agricultural land, provides the only source of household cash income (FAO, 1992).

According to FAO, (2008), 817 different NTFPs enter international trade for medicinal purposes. In India, 50% of forest revenue and 70% of export earnings are obtained from NTFPs thereby providing 50% of the income of about 30% of the rural people in India. According to Tewari (1998), the list of such products include 282 edible fruits, 104 edible stem tubers, 199 edible leaves, 112 edible seeds, 46 edible flowers and 74 underground roots, rhizomes and tubers. In Brazil, over US $100 million accrued to its economy in 1987 from forest revenue. The breakdown includes: Itchy US $42 millions, Babassu US $20 million, Palm hearts, 22 million, Brazil nuts US$9million and Sorva US $1 million. Other NTFPs whose values were less than US $1 million includes Gums and Waxes, Fibres, oils and medicinal plants (FAO, 1995; Tewaari, 1998).

Brazil generates about US $15 million annually from Brazil nuts which represent 80% of the total world production while the remaining 20% is covered by Bolivia and Peru. Also 350,000 tones of *tendu* leaves (ebony tree used as tobacco substitute) are produced annually in India which represents about 85% of the total world production (approximately US $30 million). Over 107,000 people are also said to be engaged in

leaves collection, drying, packaging and transportation (FAO, 1995; Tewaari, 1998; Msuya *et al.*, 2010; Anorld *et al.*, 2011).

FAO, (2007) worked in the Mediterranean region of Rome and reported that, forest based activities provided supplementary sources of family income apart from agriculture. Jumbe *et al.* (2007) in another study in Zambia reported that, NTFPs contributed 34% to household income in rural Zambia. Anon, (2000) reported in Zimbabwe, that, 237,000 people were gainfully employed in NTFPs related activities. Similarly, Tewari, (1998) reported that, NTFPs provided 50% of the income of about 30% of the rural people in India while FAO, (1992) reported that, charcoal making constituted a major source of household cash income in Ghana. FAO, (2005) also reported that, the gathering of NTFPs is a major and more important economic activity for the poor in Botswana.

Also, Bahru *et al*. (2012) reported that, fuel wood and charcoal provideded a very good source of income for most households in Ethiopia. Similarly, Okafor *et al.* (1994) reported that, NTFPs provided food, medicines, fibres and cash income for rural households in Nigeria. Furthermore, Anorld *et al.* (2011) stated that, NTFPs contributed significantly to food security in a study carried out in Bogor, Indonesia. Also, it was affirmed in Tanzania that, NTFPs provided forest foods to rural communities in a study carried out by Msuya *et al.* (2010) in Tanzania. In same vein in India, it was also reported that, NTFPs provided 50% of the income of about 30% of the rural people in India in a study carried out by Tewari, (1998) in India.

According to Jimoh *et al.* (2007) NTFPs contributed to household food security and income in a study carried out in Onigambari Forest Reserve Oyo State, Nigeria. Similarly, Olawoye, (1996) opined that, NTFPs provided food sources when other food sources are un-available in Ghana. FAO, (2008) estimated that, up to 80% of the population in Rome relies on traditional medicines, mostly plant-based drugs, for their primary health care in a study carried out in Rome on Non-wood forest products. In same vein, in Ethiopia, it was also affirmed that, NTFPs provided firewood and charcoal for the rural communities in Ethiopia in a study carried out by Bahru *et al.* (2012).

According to Lyimo and Kangalawe, (2010) “All ethnic groups” in Tanzania depended on mushrooms for consumption with 85% relying on wood based energy. Lyimo and

Kangalawe, (2010) and Musterlin, *et al.* (2010) also reported separately that, well over 80% of the rural people in Tanzania depended on medicinal herbs for their primary health care needs. They also observed that, many farmers quit farming to trade in charcoal in Tanzania. According to Msuya *et al.* (2010) NTFPs provided livestock nutrition in lean periods in Tanzania. Also, Arnold *et al.* (2011) reported in another study in Bogor, Indonesia that, NTFPs provided fodder for lives tocks.

Nevertheless, so many factors tend to influence or undermine the dependence on NTFPs. These factors include; age, sex, educational status, occupation, main forest based activity, agro-ecological zone e.t.c. Although all ages benefited from NTFPs in terms of food, income and medicinal herbs. Age of a respondent influenced dependence on NTFPs because they too young and the too old may not find it easy to enter the forest to harvest NTFPs. They may not have the physical, strength to engage in strenuous activities involved in the harvesting of NTFPs for livelihoods e.g. felling or uprooting a tree for conversion to charcoal or cutting and loading a pick up van with fire wood to be sold in a rural market. Age is also an indication of the active working life of the respondents. Age also dictates access to relevant community networks where information on NTFPs can be accessed (Barret *et al*., 2001; Fisher, 2004; Quang and Anh, 2006; Ahekan and Boon, 2008; Jumbe *et al.,* 2008).

Similarly, sex of respondent also influenced dependence on NTFPs. This is because the harvesting of some NTFPs are sex specific, may be because of the traditional beliefs and the physical strength involved in the harvesting of such NTFPs e.g. Females are restricted from entering the forest and are also denied access to own land. They merely collect fire wood, vegetables and fruits from nearby farms and wait at home to process NTFPs harvested and brought home by male harvesters. Also strenuous activities such as felling trees or uprooting a tree for charcoal production and lateral roots collection for medicine, palm tapping, hunting etc are exclusively done by male NTFPs harvesters. Perhaps because of the skills and the physical strength involved in the harvesting of such NTFPs in the study area ((Reddy and Chakravaty, 1999; Quang and Anh, 2006).

Educational status of the respondents influences the dependence on NTFPs. This is because those respondents that are not learned are more likely to fall back on the harvesting of NTFP during shocks than those that are learned, because they learned may afford a wider range of income generating opportunities while those that are not

learned, have only one alternative which is farm work. This is because they are largely un-skilled and as such can only limit themselves to farming which is freely accessible and has low technical entry requirement(Barret *et al*., 2001; Fisher, 2004; Quang and Anh, 2006; Ahekan and Boon, 2008;Jumbe *et al.*, 2008).

The Agro-ecological zone (AEZ) influences dependence on NTFPs. This is because NTFPs are location specific. People living near forest are prone to exploitation than those living further away. The AEZs also differ in their composition of NTFPs and so do NTFPs that will be harvested. Some NTFPs are high forest species while some are savannah species. So NTFPs to be harvested by the harvester depends on the location of the harvester and vice versa (Barret *et al*., 2001; Fisher, 2004; Quang and Anh, 2006; Ahekan and Boon, 2008; Jumbe *et al.*, 2008). Also, monthly income influences dependence on NTFPs. This is because when there is a shock, the poorer households are worst affected. There is a positive relationship between poverty and reliance on NTFPs i.e intensive harvesting of NTFPs by those with lower income compared to the rich (Barret *et al*., 2001; Fisher, 2004; Quang and Anh, 2006; Ahekan and Boon, 2008; Jumbe *et al.*, 2008).

Occupation of the respondents influences dependence on NTFPs. Occupation such as farming, fishing etc. are faced with shocks compared to occupations such as motorist driver, okada, riders, Artisans, civil servants etc. are less likely to depend on the harvesting of NTFPs for livelihood support because they have alternatives that generated daily income to them and this can cushion the effect of any shock that might come their way. Occupation therefore is negatively related with a household's likelihood of harvesting NTFPs (Barret *et al*., 2001; Fisher, 2004; Quang and Anh, 2006: Ahekan and Boon, 2008; Jumbe *et al.*, 2008).

The main forest based activity also influences dependence on NTFPs. Livestock managers harvested NTFPs for livestock nutrition, medicinal herbs collectors collected leaves, barks, root etc for medicinal utilization. Similarly, fire wood collectors cut branches of trees for fire wood while charcoal producers fell or uproot an entire tree before converting it into charcoal (Barret *et al*., 2001; Fisher, 2004;Quang and Anh, 2006; Ahekan and Boon, 2008; Jumbe *et al.*, 2008). The monthly income of the respondents influenced dependence on NTFPs. This is because the more money a marketer of NTFP has the more he can purchase of NTFPs and the more varieties of NTFPs he can trade in the market and consequently, the more profit he generates. How

much an individual marketer earns in a month determines how NTFPs he can buy to trade with. This is important because marketers with low income tend to buy less of NTFPs to trade with compared to marketers with higher income who could buy larger quantities of NTFPs for trade and hence makes much profit in the process. Similarly, the more money one has the less he will depend on the harvesting of NTFPs (Barret *et al*., 2001: Fisher, 2004; Quang and Anh, 2006; Ahekan and Boon, 2008; Jumbe *et al.,* 2008).

2.5 Classification of NTFPs by Food and Agriculture Organization

According to FAO (1992), NTFPs are classified based on the type of products and the end uses as follows: Forest food, Medicinal plants, fuel wood and charcoal. They also provide indirect benefits such as aeration, shade, shelter belt as well as recreation and tourism.

2.5.1 Forest food

Forest foods are NTFPs and contributed significantly to community livelihoods by providing wild leaves, fruits, roots, tubers, seeds, nuts, mushrooms, saps, gums, and wild animals and their products, such as eggs and honey to augment the foods produced by agriculture and those obtained from other sources (Arnold *et al.,* 2011).

2.5.1.1 Fruits

Fruits are one the forest food and are major sources of proteins, vitamins, minerals, fats and roughages (FAO, 1992). Fruits are the main source of vitamin A and C. They contain vital nutrients and essential vitamins which are important, especially for growing children who are prone to malnutrition and related diseases. Vitamin C is essential for protecting cells and keeping the body healthy and also absorbing iron from food.

According to FAO (1992) some of the wild fruits have higher vitamins contents compared to farm fruits. The vitamin C content of an orange is 57mg/100g and the fruit of the baobab tree (*Adansonia digitata*) is 360mg/100g. It was also reported that fruits of *Adansonia digitata* and *Ximenia caffra* contain higher vitamin C content than mango (*Mangifera indica*) or orange (*Citrus sinensis*). The variations in vitamin C content between the wild and cultivated fruits do not imply the later to be abandoned

but rather stressing the importance of wild resources, since the two occur in different environment.

2.5.1.2 Mushrooms

Mushrooms are also another form of forest food and depend on other plant nutrients where they form symbiotic relationship with most of the trees. Most of the mushrooms found in the miombo woodlands are mainly available during rain seasons. Mushrooms provide valuable source of certain food protein and vitamins. Mushrooms are important sources of medicines and nutritive proteins and minerals. The average protein content of 30 edible mushroom species from Upper Shaba, Zaire was reported to be 22.7g/100g dry weight (Lyimo and Kangalawe, 2010; Musterlin *et al.* 2010). The mean calcium content was 349mg /100g and average iron content was 1552 mg /100g of mushrooms.

In Tanzania, almost every ethnic group has a traditional knowledge of mushrooms growing in the wild and members of each group harvest consume and sell them. Over 60 edible mushroom species have been identified in Tanzania (Lyimo and Kangalawe, 2010: Musterlin *et al.* 2010). Mushrooms are frequently collected in southern Tanzania by the local population, mainly for domestic consumption. They can be used as fresh or dried mushrooms depending on the preference of the user. Some of the mushrooms are cooked fresh while some are preserved by sun dying or smoking for use in dry season (Lyimo and Kangalawe, 2010; Musterlin *et al.* 2010).

2.5.1.3 Wild vegetables

Wild vegetables are another form of forest food. Leaves of wild plants like trees, shrubs and herbs, are used as wild vegetables in the semi-arid areas. The wild vegetables serve as buffer food supplies during periods of food shortage. African indigenous vegetables play a highly significant role in food security of the underprivileged in both urban and rural settings.The wild vegetables are good sources of micronutrients including iron and calcium as well as vitamins A, B complex, C and E. Some of these wild vegetables contain more nutrients values compared to cultivated vegetables for example; Wild Amaranthus contains a multiple of these nutrients compared to green cabbage. Also, wild vegetables such as *Bidens pilosa, Corchorus olitorius* and *Solanum nigrum* have higher protein, fat, minerals (Calcium and Iron) and carotene contents than some exotic vegetables such as *Brassica chinensis* and

many other vegetables of cabbage family (Lyimo and Kangalawe, 2010; Musterlin *et al.* 2010).

2.5.1.4 Roots, tubers and gums

Roots and tubers are also a form of forest food. They provide carbohydrates and minerals. Tubers are very small in size and are too few to constitute a complete meal. In Tanzania, roots of *Comminphora spp.*, tuber of *Eriosema spp* and gums of *Acacia spp.* are chewed raw as forest food by the herdsmen and hunters. Other edible roots and tubers include *Negleta canensis* and *Oxalis semicobata* (FAO, 2006; Lyimo and Kangalawe, 2010; Musterlin *et al.* 2010).

2.5.1.5 Insects and bush meat

Insects and bush meat are another form of forest food. There are very good sources of proteins and are very useful in reducing protein-energy malnutrition. The common known insects include bees, flying higher termite species (*Macro termes*) and grasshoppers (*Caelifera sp*). Tanzania is among countries in the world with a high production of bee products especially honey and beeswax. Based on statistics of 1998, the annual capacity of Tanzania for honey and beeswax production is 138,000 and 9,200 tones respectively (Lyimo and Kangalawe, 2010; Musterlin *et al.*, 2010). Honey is believed to have medicinal properties, it helps against infections, promote tissue regeneration, and reduce scarring. The animals hunted include wild pigs, Antelopes, Duiker, Hares and Moles. Birds are also hunted but more especially Guinea fowls and wild ducks (Lyimo and Kangalawe, 2010; Musterlin *et al.* 2010).

2.5.2 Medicinal plants

Medicinal plants are second to forest food and are another form of NTFPs. They are widely and successfully used on every continent. They are important in solving human health challenges and also contribute to the income of the community. Most of the rural communities in developing countries continue to rely heavily on the use of traditional medicines as their source of health care (Lyimo and Kangalawe, 2010: Musterlin *et al.* 2010). Ethno botanical studies carried out throughout Africa confirm that indigenous plants are the main constituents of traditional African medicines.

Over 80% of rural people in Tanzania depend on traditional healers that use herbs for treating human diseases. The reliance on medicinal plants creates the need to maintain and conserve biodiversity. Medicinal plants function well to a good number of people. For example, the numerous herbalists in the Muhimbili National Hospital indicated the importance of medicinal plants in the society (FAO, 2008). The Maasai women on the other hand are found in towns nationwide selling traditional medicines (FAO, 2008). Several studies have been carried out and a number of medicinal plant species have been recorded in Tanzania. For example, Abdallah (2007) documented a total of 45 medicinal plant species in the New Dabaga Ulongambi Forest Reserve (NDUFR).

2.5.3 Firewood and charcoal

Fire wood and charcoal are another form of NTFPs. Many communities and families in the developing countries use fire wood and charcoal as their major source of energy. A study in Tanzania estimated that, about 85% of the Sub-saharah population relies on wood based energy (Lyimo and Kangalawe, 2010: Musterlin *et al.* 2010). According the report, about 97.9% of total wood consumed in Tanzania was on wood biomass (charcoal and firewood). Total wood fuel consumption in Tanzania was estimated to be 46.2 million cubic metres of solid round wood. Firewood and charcoal supply the energy needs of numerous industries and small business in the third world. In Tanzania for example, the industries using fire wood include tobacco curing indutries, salt mining industries (drying), tea curing industries, brick kilning and fish smoking industries (Lyimo and Kangalawe, 2010; Musterlin *et al.* 2010).

It has been estimated that, the average wood fuel use per capita per year in Tanzania ranges from 0.6 m^3 to 1.86 m^3. They also reported that in most of the rural areas, fuel wood is becoming a commercial good. This has attracted farmers near urban areas to quit farming in order to trade in charcoal (Lyimo and Kangalawe, 2010; Musterlin *et al.* 2010).

2.6. Collectors of Non-Timber Forest Products

Collectors of NTFPs can be classified as follows:

- Incidental collectors; they are those who collect a small quantity of NTFPs for immediate consumption, usually on site e.g. A camper who collects few fruits as evening meal.

- Recreational collectors; They are those who collect NTFPs for home use and consider the collecting experience to be a recreational outing e.g. Having a family picnic with the intention of also picking fruits home for caning.
- Ceremonial collectors; they are those who collect NTFPs to use in religious ceremonies or those to whom the harvesting of an NTFPs in their traditional manner is part of religious or cultural custom.
- Subsistence collectors; They are those who collect NTFPs for food, medicine, shelter e.t.c. Those that depend on NTFPs for survival.
- Commercial collectors; They are those who collect NTFPs to sell or trade either to provide supplemental income or as a principal form of employment or business (Chandrasekan, 1995: Charlie and Sheona, 2004).

2.7. Impact of NTFPs Extraction on Forest Resources

It is often assumed that NTFPs are sustainably harvested and that this "green social security" will always be available to resource users. This is not always the case. The early interest in NTFPs was encouraged by the belief that NTFP commercialization that added sufficient value to forest products could contribute to forest conservation (Nepstad and Schwartzman, 1992). Where NTFPs are harvested in a sustainable manner, this may indeed be the case (Sunderland *et al*., 2004: Belcher and Schreckenberg, 2007). Several scientists have stressed that NTFPs can be harvested without much destruction of the forest, while maintaining essential environmental functions and preserving biological diversity (Anderson, 1990; Plotkin and Famolare, 1992; Peters, 1996).

The extraction of NTFPs is considered sustainable if it has no long-term deleterious effect on the regeneration of the harvested population and when the yield remains more or less constant throughout the years (Cunningham, 2000). Nevertheless, uncontrolled extraction due to population increases, high demand for NTFPs and high prices has caused species extinction and forest degradation in many countries (Browder, 1992; Ahenkan and Boon, 2010). Unsustainable harvesting of NTFPs has ecological impacts as follows; a gradual reduction in the vigour of harvested plants and animals, as well as decreasing rates of seedling establishment of harvested species, potential disruption of local animal populations and nutrient loss from harvested material (Peters 1996).

2.8. The need for NTFPs Farming

In many parts of the world, local people are losing access to valued plant and animal species either through overexploitation and habitat destruction or loss of access as former harvesting areas are included within national parks or forest reserves (Marshall *et al.*, 2005). Achieving sustainable NTFPs harvest and forest conservation relies entirely on the ability to reconcile ecosystem productivity with human exploitation (Marshall *et al*., 2005).

Higher demand for NTFPs has increased pressure on them thereby leading to their being depleted in the near by farms and forests and when this happen, three main strategies are employed to militate against shortfalls in their supply; travel further to find the product, substituting the particular product with a similar product or to develop a more intensive or cultivated sources of supply (Cunningham, 2000; Ahenkan and Boon, 2010).

As a result of the recognition that the extraction of NTFPs from natural forests has limited potential for improving household economies, several scholars began to question whether the objective of enhancing forest-based livelihoods through NTFPs could not be better fulfilled by optimizing NTFPs production through domestication (Kusters *et al.* 2001: Arnold and Ruiz Pérez, 2001: De Jong *et al.*, 2000).

Ros Tonen (1999) and Ahenkan and Boon (2008) stated that, it is incorrect to suggest that NTFPs can be harvested indefinitely without proper management practices and domestication to sustain their yield and therefore call for the need for intensification of management and semi-domestication of these products of forest origin, including honey, mushrooms, snails, grass-cutters, medicinal and aromatic plants and fruits. The contribution of NTFPs to improving livelihoods can best be assured through a process of gradual domestication of NTFPs in human-modified (agro) forest types (Kusters *et al.* 2001; Arnold and Ruiz Pérez, 2001; De Jong *et al.*, 2000).

It was noted that, intensive management and domestication of NTFPs may be an important means of improving livelihood of the poor through higher yields, improved and more consistent quality and control over the timing of harvests and reduced pressure on wild and presumably endangered resources. The study by De Jong *et al.* (2000) of forest products and local forest management in three Bidayuh villages in

West Kalimantan also confirms the coexistence of several NTFP exploitation systems involving various types of managed natural forests and domestication types.

2.9. Trading and marketing of Non-Timber Forest Products

Many researchers have been developing and testing models and hypotheses to assist in predicting how market forces are likely to have an influence on forest structures (Homma, 1992; Jean-Laurent and Patrick, 2002; Kosoy *et al.*, 2007; Jumbe *et al.*, 2008). It is argued that, with increased exposure to trade and markets, per capita income rises, imported goods are substituted for some NTFPs and others are exploited primarily for sale. As alternative uses of labour become more attractive, utilization of the forest is increasingly concentrated on higher-value NTFPs.

In another influential model based on Brazilian experience, Homma (1992) postulated that as commercial demand for a forest product increases, output first expands then, as quantities and qualities from wild sources decline, prices will rise. Inelasticity of the supply of naturally occurring products then lead to development of domesticated sources and synthetic alternatives that replace the natural source.

Both of these models point to selective harvesting of those species that are more valued by the market place. This implies that, over time the composition of the remaining forest stock shifts to less desired species. In practice, these unidirectional evolutionary paths are not inevitable. Shifts in demand for forest products, for example, could reduce pressure on the resource or transfer it to another resource. Institutional measures to control the way in which the forest is used would also modify the impact of harvesting. Forest management interventions, for instance by increasing the productivity of the NTFP species, could prove to be an alternative to domestication, or could delay or modify the progression towards domestication. The limits between wild and domesticated NTFPs are not clear cut, giving ample room for a large variety of systems with good conservation potential. These range from agro forestry to islands of high productivity in a matrix of little-disturbed forest (Ros-Tonen *et al.*, 1998; Belcher, 2003).

Nevertheless, it is clear, that market demand is selective, and therefore works against the ecological objective of conserving the profile of biological diversity present in the untouched forest. Moreover, as market prices seldom reflect the values of

environmental and other externalities, market demand may lead to short-term over-exploitation and even to local extinction of some plants and animals that provide highly desired products. This divergence between market and real economic and societal values must cast doubt on the argument that the increased values attributable to tropical forests as a result of higher commercial demand for NTFPs necessarily encourage conservation of the resource.

Tropical forests provide many Non-Timber Forest Products (NTFPs) such as, charcoal, wild fruit, bush meat, mushrooms, roots and fodder, used by numerous communities around the globe for livelihood support (Chambers and Leach, 1987; de Beer and McDermott, 1989; Falconer and Arnold, 1989; FAO, 1995: Townson, 1995: Delacote, 2002).

Low-income households close to the forests turn to them in times of misfortune for several reasons; Forest products are freely available to local communities, as forests are often under state or communal tenure. They are also more accessible for the poorer people as harvesting them usually requires limited financial, physical or human capital. Furthermore, forest resources are often available when other income sources are not, helping households to avoid starvation when disaster strikes. The poorest of the poor might turn to the forest during or after a disaster in order to survive.

Households in Tanzania for example, use firewood, fruits, spices, fodder, traditional medicines and bushmeat and also fell trees for the production of fire wood and charcoal and represent the largest and most frequent removal of goods from the ecosystem. Also, harvested from the forest and sold in the markets of Tanzania are NTFPs such as caterpillars and mushrooms e.t.c practiced frequently for both trade and direct consumption due to their role as dietary sources of protein (Chambers and Leach, 1987; de Beer and McDermott, 1989; Falconer and Arnold, 1989; FAO, 1995; Townson, 1995).

2.10. Conservation and development of NTFPs.

The interest in Non-Timber Forest Products (NTFPs) that has built up over recent decades in conservation and development circles has its origin in a number of propositions: NTFPs, much more than timber, contribute in important ways to the livelihoods and welfare of populations living in and adjacent to forests;

providing them with food, medicines, other material inputs, and a source of employment and income (Myers, 1988:Plotkin and Famolare, 1992).

The exploitation of NTFPs is less ecologically destructive than timber harvesting and therefore provides a sounder basis for sustainable forest management. Increased commercial harvest of NTFPs should add to the perceived value of the tropical forest, at both the local and national levels, thereby increasing the incentive to retain the forest resource, rather than conversion of the land for use for agriculture.

The interest aroused by such arguments has been considerably enhanced by the apparent coincidence of conservation and development objectives that they provide (Myers, 1988; Plotkin and Famolare, 1992). The valuations of forest sites have been interpreted to indicate that, the potential income from sustainable harvesting of NTFPs could be considerably higher than timber income, as well as income from agriculture (e.g., Peters *et al*. 1989b). This has led to initiatives to expand and provide markets for more locally produced NTFPs, in order to tap an increasing share of this apparent cornucopia of sustainably harvestable wealth in tropical forests. This is the basis of the .conservation by commercialization.

The attention of people in the forestry sector has also been drawn to the advantages to be gained by drawing on indigenous knowledge of the forests and forest products, and building on the sustainable systems of use that local people often seemed to have created (Posey, 1982). It has been proposed that this can only be possible if people have recognized and legally secured rights to manage their forest resources. Another component of the heightened attention to NTFPs has consequently been linked to possibilities for empowering local people.

The ancient practice of extracting economically valuable Non-Timber Forest Products (NTFPs), leaving the forests structurally and functionally intact, has emerged as a possible means of reconciling the conflicting roles of tropical forests. This practice captured the attention of defenders and developers of tropical forests around the world in the late 1980s when a grass-root movement of autonomous Forest Rubber Tappers (FRT) fought to protect their lands from encroaching Cattle Ranchers (Nepstad and Schwartzman, 1992).

2.10.1. Conservation, Ecological Perspective,

A forest exploited for fruits and latex, unlike a logged-over forest, maintains the appearance of being undisturbed. It is easy to overlook the subtle impacts of NTFP harvest and to assume " a priori" that this activity is something that can be done repeatedly, year after year, on a sustainable basis. This ubiquitous idea, or some variant of it, has appeared in books, scientific papers, conference proceedings, grant proposals, magazine, articles, newspaper stories, e.t.c.

Unfortunately, in the great majority of cases, this assumption is patently incorrect (Peters, 1996). Ecologists point out that, most plant species occur at low densities in tropical forests and require the presence of animals to pollinate their flowers and disperse their seeds. Removal of excessive quantities of the seeds, or their failure to disperse or establish themselves, can rapidly alter the composition of the forest and the frequency of occurrence of particular species. Although the exploitation of some plant parts is less damaging than others, almost any form of resource harvest produces an impact on the structure and function of tropical plant populations. The continuous harvesting of NTFPs will deplete the NTFPs, although some NTFPs are better able to sustain continuous off take than others (Cunningham, 2000: Peters, 1996). Similar considerations apply to the animal constituents of tropical forests. In addition to their critical role as pollinators and dispersers of economically important plant species, animal populations are important as predators and regulators of pest populations, unfortunately, these animals are heavily affected by hunting (Cunningham, 2000; Peters, 1996).

Nevertheless, except harvesting of NTFP is controlled, some species will therefore become depleted much more rapidly than others. It is argued that, managing tropical forests to meet an objective of maintaining biodiversity will require a monitoring and control system that provides a constant flow of information about the ecological response of species to varying degrees of exploitation. This would allow a continual process of adjustment in which any change in seedling establishment or population structure results in a corresponding change in harvest level (Cunningham, 2000; Peters, 1996).

2.10.2. Conservation, Local User Perspective,

Falconer, (1996) has pointed out that, in connection with a stable subsistence system in the Amazon, Amerindians from the Amazon basin are no protectors of nature, in the sense understood today, because the concept itself is completely foreign to them. Rather their system is based on the abundance and diversity of the resource and its ability to renew itself. Therefore, even in indigenous systems where harvests do not result in destruction of the resource, use can be heavy. Similarly, Delacote (2009), writing about West African experience, has pointed out that the level of exploitation for subsistence use should not be underestimated. While many foresters see subsistence exploitation as harmless and commercial exploitation as destructive, it is evident that the forest and fallows are intensively and extensively used to meet domestic needs.

Most collecting and harvesting of NTFPs is by populations who combine this with some form of agriculture. It is therefore taking place not in pristine forest, but largely in secondary forests, bush fallow or farm bush. This is partly explained by the proximity of these areas to the user communities and households, but also reflects the fact that in a number of respects such formations are more productive sources of desired species and products. In Sierra Leone, for instance, where only 14 per cent of all hunted or collected foodstuffs and 32 per cent of the medicinal plants collected were found to come from the forest itself, the four tree species used most frequently for construction were all fallow species not forest species and the most used bush meat species, the rodent grass cutter, is found only under open tree cover, not in the closed forest (Posey, 1982, 1999)

Similar study was conducted by Richardson (2010) with respect to rubber tapper communities in the Brazilian Amazon where, of the 150 plants collected by women, only 35 per cent came from the forest. Posey (1982) had also earlier indicated the importance of fallow lands showing that the conventional Western view of fallows as abandoned lands did not correspond with the long-term tending efforts made by the indigenous populations, and the importance that they paid to them as a major supply of resources. As is pointed out in the discussion of the situation in Sierra Leone outlined above, this has important implications for conservation.

It is clear that Mende villagers look at and place values on these resources in ways that differ significantly from the valuations of outsiders interested in conservation. In particular and crucially, it would seem that high forest is seen to have little value in and of itself. In practical terms, the bulk of subsistence-oriented forest products derive from secondary successions, not from high forest. This orientation towards the boundary between forest and farm, as distinct from a concern for the forest itself has a most important consequence for forest conservation. The priority area of attention for a conservation strategy sensitive to local interests and concerns should be the bush fallow system, and not, in the first instance, the forest itself (Posey, 1982)

In many situations, fallow land, farm bush and even the forest itself have in fact been found to be actively managed by local users to conserve or encourage species of value. The babaçu palm (*Orbygnia phalerata*) in northeast Brazil has long been integrated into local farmers shifting cultivation systems and farmers in the flood-plain forests of the Amazon area manage them to favour the economically more valuable species they contain. Rattan and fruit gardens are examples of enriched forest management systems in Kalimantan

Much harvesting of NTFPs from natural forest tends to be in locations that have relatively high densities of the valued species and products. If these species are dominant, the forests may be biologically poor (Peters *et al.* 1989a; Browder, 1992) and therefore probably of less interest as targets for biodiversity conservation. It can be argued that such patterns of concentration support the contention that NTFP use is relatively benign in terms of the objectives of such conservation. There are also important differences between short-term and long-term impacts of forest use and management. As has been shown repeatedly in studies on the impact of timber harvesting, tropical forests can and do recover from even heavy use if allowed the time to do so without further disturbance. But this does not happen if there is repeated harvesting at short intervals relative to the forest regeneration cycle(Peters *et al.* 1989a ; Browder, 1992).

There are of course, many other patterns of use associated with NTFPs. These frequently reflect important cultural, spiritual and social considerations, in addition to the satisfaction of material needs. Given this and the frequently emphasized fact that tropical forests are characterized by multiple users pursuing multiple objectives, it is clearly unwise to expect much in the way of generally applicable conclusions. For

conservation, though, two conclusions do emerge. The first is that all harvesting of NTFPs does have an ecological impact, and that much use can significantly change the composition and structure of the forest. The second is that different stakeholders can have quite different interests in what should be conserved. Foresters and Ecologists in Africa have conventionally valued closed-canopy or gallery forest almost defining forest in these terms so that any conversion of such a vegetation community is seen to constitute degradation. Yet such conversion may be viewed positively by local inhabitants, for whom the resulting bush fallow vegetation provides a greater range of gathered plant products and more productive agricultural land. Thus, the same landscape changes can be perceived and valued in different ways by different groups; what is .degraded and degrading for some may for others be merely transformed or even improved (Peters *et al.* 1989a; Browder, 1992).

2.11. Contributions of NTFPs to Household livelihoods

Forests are the source of a variety of foods that supplement and complement what rural households obtain from agriculture, and of a wide range of medicines and other products that contribute to health and hygiene. Supplies of wood fuels influence nutrition through their impact on the availability of cooked food, and ready accessibility can affect the time available for food production. Gathering and sale of NTFPs can provide income to households. NTFPs are generally most extensively used to supplement household income during particular seasons in the year and to help meet dietary shortfalls..

Many agricultural communities suffer from seasonal food shortages, which commonly occur at the time of year when stored food supplies have dwindled and new crops are only just being harvested. During this period the consumption of forest and tree foods increases. Similarly, income-earning activities based on marketable forest products may be seasonal or year-round, or may be occasional when supplementary cash income is needed. Seasonality may reflect availability, needs for additional cash at particular points in the annual cycle (e.g., to purchase seed) or seasonal fluctuations in demand. The importance of forest foods and incomes thus often lies more in its timing than in its magnitude as a share of total household inputs. NTFPs are also widely important as a subsistence and economic buffer in hard times.

Medicinal usage of NTFPs tends to overlap with that of forest foods; indeed particular items added to foods serve both to improve palatability and act as a health tonic or prophylactic. There are also often strong links between medicinal use and cultural values especially where illnesses are thought to be due to the spirits.

A study in Sierra Leone found that fuel wood selling provided the first cash income from land cleared for rice production. Subsequently fuel wood collection for the market was concentrated during the off-peak agricultural period, providing cash income in a period when food supplies were generally at their lowest (FAO, 1995).

Income from the collection and processing of babaçu palm kernels in northeast Brazil has been shown to account for 39 per cent of cash income and 34 per cent of total household income for livelihood support (FAO, 1995).

2.12. Dyanamics of the consumption pattern of NTFPs

Some studies indicated that, uses of forest foods are dwindling as people gain more access to purchased foods and relief programmes become more effective. In Vanuatu, for instance, the introduction of the sweet potato, which could be planted at any time and produce an edible crop within three months and manioc, which can be left unharvested for up to two years, has cause a decline in the consumption of NTFPs such as wild taro, arrowroot, wild yams and sago (Falconer, 1997). Other changes that reduce the role of forest food and other NTFPs in household nutrition may reflect penetration of rural markets by new products, changing tastes or decreased availability. However, the latter may be a result of changes in the availability or allocation of a households supply of labour rather than physical shortage of the product. As the value of labour rises with increasing wealth, the opportunity cost of gathering rather than purchasing foods or medicines, fuel wood, etc. becomes higher (Falconer, 1997).

A decline in use of NTFPs can also reflect reduced knowledge. As children spend more time in school than in the fields and the bush, the opportunity to learn about which NTFPs can be consumed and which cannot, is reduced. Settlement in a fixed location is another widespread change that distances people from previously familiar food sources, constraining people's use of these foods even when they are still available and important for dietary balance (Falconer, 1997).

Another cause of reduced subsistence use of NTFP is likely to be shortages in its supply. These may be physical shortages due to over-use, shortages created by reduced access to the resource, or shortages induced by competition for supplies available from markets. Many farm households sell NTFPs on a part-time basis to raise enough to be food self-sufficient year round. However, the dependence of the poor on income from NTFPs and competition from urban traders, can result in reduced own consumption (Falconer, 1997). A recent study of forest products use in mountain communities in an area of North Vietnam, for instance, found that, the forest vegetables, bamboo shoots and mushrooms collected were eaten in richer households, but in poorer households these forest foods were sold to buy rice (Falconer, 1997).

2.13. Dependency and Equity issues

A feature of most detailed local-level studies is the variety of needs met in part through NTFPs. Patterns of use are likely to differ among groups or households and within households by gender and age. One relationship that has been widely observed is that where people have had relatively unrestricted access to forests, forest foods and forest products income are particularly important for poorer groups within the community.

Differential interests in NTFPs utilization for community livelihoods within rural communities are often politically fractured and socially differentiated in complex ways. Fractures in the local community may run along gender, class, age, or ethnic lines of identity. Lines of differential access and ownership between men and women may be drawn depending upon the type of activity, type of product, the species, the location or the intended use of the product. It is quite possible that men and women make conflicting claims on NTFPs. In such a situation, interventions for conservation and community development may favour one group over another and exacerbate inter-gender conflicts.

Pronounced socio-economic stratification within communities can lead to the formation of class interests which may conflict on the question of NTFP use. Conflict may be particularly strong in cases where NTFP extraction for market sales is being promoted as a sustainable development alternative. In such a situation, profits may flow to the wealthy that have the capital, knowledge, and resources to mobilize labor and transport products to market. In effect, where patron-client relations exist,

sustainable development projects based on NTFP extraction can serve to perpetuate or reinforce those relations without substantially improving the livelihoods of the local people with the exception of a very few individuals (Dove, 1994; FAO, 2008).

In situations where agricultural productivity is low, poorer households, who find livelihoods difficult to sustain, may rely on NTFPs as their primary means of survival and when that happens, more NTFPs are extracted, consumed or sold and more encroachment takes place as well as the depletion of such NTFPs (Dove, 1994; FAO, 2008).

2.14. Institutional and policy context over forest resources

Many of the features and trends noted in the previous discussion have their origins in national policies. In most countries the frameworks within which sustainable management of forests for NTFPs has to operate have been heavily influenced by the following political trends: The widespread assertion of tenure by governments over forest lands, restricting or removing local rights; The intrusion of the authority of the central state at the expense of local systems of leadership, control and management of forest lands; and The more recent thrust towards structural adjustment, land titling, debt reduction and free trade. Policies that assert government control over the NTFPs, or that override local rights, undermine the authority and effectiveness of community-level institutions to control and manage NTFPs. They therefore act forcefully against the empowerment of local user communities (Jodha, 1986).

Given that, so much NTFP use is based on resources that are held in overlapping combinations of private, state, common property and open access tenure regimes, the current drive towards altering land tenure could also have major implications. Land tilting in Africa for instance, can transform flexible, multidimensional rights to forest resources into rigidly circumscribed rights to land (Neumann and Hirsch, 2000). The insecurity of tenure that such change, or threat of change, induces is likely to favour short-term activities, such as destructive harvesting and slash-and-burn agriculture, that assure more certain though lower returns than might be obtained from forest conservation and management. The increasing effect of market forces introduces another dimension that can weaken the institutional capacity to manage NTFPs locally. Although market demand for NTFPs can give added value it, which could increase the incentive for its conservation in order to secure its future availability,

it can equally subject the local control and management systems to increased use pressures. Simple rules are unlikely to be workable if a NTFP has high value. Enforcement of rules is likely to be complicated by high-value NTFPs, especially if the NTFP is wanted by elites. Bribes and coercion to escape enforcement are more likely when high valued NTFP brings cash (Neumann and Hirsch, 2000).

High value commercialized NTFPs create incentives for outsiders and the state to appropriate the land and dispute legal claims. Legitimacy of NTFP use is contested by regional, national, or international organizations who see their interest at stake in the use of the product. As NTFPs become increasingly important commercially, local efforts to take advantage of the opportunities they present can be complicated or frustrated by forest policies. Because they give high priority to conservation objectives, many governments have set in place forest and environmental policies and regulations designed to limit rather than encourage production and sale of NTFPs (Dove, 1994; Dovie *et al.,* 2002).

One widespread result of such features of the changing policy and institutional situation on NTFPs is ineffective local control of NTFP resources utilization. Moreover, it is often unclear which institutional models might be appropriate at present in situations marked by increasing conflict and lower commonality of purpose, and increasingly ineffective conflict resolution mechanisms that such policies and practices engender (Neumann and Hirsch, 2000).

Alternative institutional models have been proposed and a number of them are being implemented. They include Joint Forest Management in India, extractive reserves in Brazil, communal reserves in Peru, Indian reserves for indigenous people in several Amazonian countries, the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe and the Household Responsibility System in China (Bromley *et al.*, 1989; Arnold, 1998). User groups need the right to organize their activities or at least a guarantee of no interference. The boundaries of the resource must be clear. The criteria for membership in the group of eligible users of the resource must be clear. Users must have the rights to modify their use rules over time. Use rules must correspond to what the system can tolerate and should be environmentally conservative to allow a margin for error. Use rules need to be clear and easily enforceable. Infractions of use rules must be monitored and punished (Bromley *et al.*, 1989; Arnold, 1998).

Poor households depended on Non-Timber Forest Products. The sale and use of Non-Timber Forest Products (NTFPs) is one of the most common livelihood supports in South Africa's poorest provinces. According to a recent study in South Africa, The study found that well over 70% of the households that were sampled relied, to some extent, on NTFPs as part of their livelihood portfolio (Delacote, 2009).

The study examined the livelihood strategies of 100 households in the villages of Dyala in the Eastern Cape Province and Dixie in the Limpopo province in South Africa, both of which face low levels of development and high unemployment. Families in these communities subsist mostly on income from subsistence agriculture, animal husbandry, NTFPs and government welfare grants. Researchers looked at a range of dynamics and drivers of use and sale of NFTPs. These can be extensive and include internal factors such as household wealth and gender as well as external drivers such as policies on forest use,

The authors surveyed both poor and wealthy households over a two-year period to evaluate whether they chose to use NFTPs in times of natural disasters such as crop damage, livestock disease, illness of household members and the sudden loss of income and how this use manifested.

In both areas studied, over-utilization of NFTPs and increasing population densities meant that these resources are becoming scarcer. This has implications on the possible availability of NFTPs. It undermines overall livelihood security, especially as alternatives are limited, a situation that is unlikely to change in the immediate future as ongoing service delivery failures and high rates of unemployment persist. The understanding of communities' use of NTFPs and the factors that affect their use is the key to reconciling long-term economic development and biodiversity conservation.

The need to study medicinal plants, according to (WHO, 1978) cannot be overemphasized for a vista of reasons including *inter alia* widespread use of plants in folk medicine, rescuing traditional medicinal plants and knowledge about them from imminent loss as well as the need for health for all. Since the first earth summit in Rio de Janeiro, there has been a sustained global awareness of the importance of the plethora of biodiversity and natural resources from tropical forests for several purposes. This stems not only from the ecotourism potentials, the forest products, but also from the ethno botanical and ethno medicinal uses attached to the plant genetic

resources obtained from these forests. The world's tropical rain forests are especially rich in biodiversity but there is rapid depletion of this natural resource worldwide, and in Nigeria in particular, the pressures from degradation, unsustainable arable land use, urbanization and industrialization are taking their toll as well (Ayodele, 2005). The plant genetic resources of Nigeria, according to Gbile and Adesina (1986), are a veritable source of pharmaceuticals and therapeutics though the plants are not adequately documented. Traditional medicine practice has existed in Africa and other countries for centuries since man came into being but until recently, has been neglected or even outlawed in some cases due to undue pressure from practitioners of modern medical practice and the unscientific background of its method of operation.

Ayodele, (2005) opined that, this worldwide-renewed interest in traditional medicine derives from the realization that: modern or orthodox medicine is not widespread in poor countries whereas healthcare has virtually been sustained by these cultural alternatives. As defined by WHO, traditional medicine is the sum total of all knowledge and practical application, whether explicable or not used in diagnosis, prevention, and elimination of physical, mental or social imbalance; and relying exclusively on practice and experience and observations handed down from generation to generation, whether verbally or in writing. In traditional African societies, phototherapy is valued more than orthodox medicine but this practice was disrupted with the coming of the colonialists who considered it crude, ineffective and barbaric. Overexploitation of wild populations and lack of conservation programmes are two interlocking problems dealing with sustainable management of these NTFPs especially in the southeastern parts of Nigeria (Ayodele, 2005).

Medicinal plants are generally scattered in various families of angiosperms, gymnosperms, pteridophytes, bryophytes and thallophytes. It has been observed that traditional medicine practitioners tend to hide the identity of plants used for different ailments largely for fear of lack of patronage should the sufferer learn to cure himself. In order to mystify their trade, cultivation of the plants is not encouraged, thus all the collections are virtually from the wild. With the passing away of most of these practitioners along with their wealth of knowledge, a huge loss is made in the body of knowledge dealing with plants that heal. Often the discerning ones try to relate this important information to a few close relatives where any interest is shown. This mode

of information transfer is, however, grossly inadequate in that it lacks continuity (Ayodele, 2005).

2.15 Forest and Trees providing goods and services to rural communities

Forest and tree products, such as timber and non-timber forest products (NTFPs; for example, Charcoal, firewood, wild fruits, mushrooms, roots and fodder) constitute important in community livelihoods (Browder, 1992; Coppen, 1999; Clark, 2004; FAO, 2008). Rural communities use NTFPs as part of their strategies to augment short falls (i.e., in reaction to stresses) when crops fail due to drought. InTanzania, households consumed NTFPs directly as part of their food intake and earned 42% of their total income from selling wild fruits, firewood, timber, and charcoal. In rural areas of Peru, the gathering of forest fruits, palm hearts, and other NTFP is an important strategy for coping with floods. Forest products also play a part in post disaster strategies in Honduras: rural households sold timber and other products to recover from land losses during Hurricane Mitch (Browder, 1992: Coppen, 1999; Clark, 2004; FAO, 2008).

Many agrarian communities use NTFPs for livelihood diversification. Livelihood diversification is the main strategy for dealing with agricultural shocks in Tanzania and is partly achieved with the collection of firewood, fruits, spices, fodder, traditional medicines, and bush meat as well as the production of charcoal. In some of the studied areas in Tanzania, up to 68% of household income comes from NTFPs (Mustelin *et al.*, 2010).

Rural communities of the Congo Basin use NTFPs extensively for subsistence and livelihoods. Sustainable forest management by hillside communities has enhanced local livelihoods in Bolivia through the provision of NTFPs and has increased their resilience to drought and irregular rainfall. Many studies reported that, the poorest households rely more on NTFPs during agricultural shocks. For example, during flood in Pacaya-Samiria, Peru, the young and poor households without upland access or rich fish stocks nearby turned to NTFP gathering (Cavendish, 2000; Charlie and Sheona, 2004; Ericksen *et al.*, 2005; Choudhury, 2007 ; Mbuvi and Boon, 2008).

Low-income households turned to forests in times of misfortune because harvesting, especially of NTFPs, usually requires limited financial, physical, or human capital and

is possible under local tenure systems. Research in two villages in Eastern Cape and Limpopo provinces, South Africa, revealed that 70% of households used NTFPs to augment agricultural shocks and that, the poorer households relied more on the use or sale of NTFPs.

In southern Malawi, households with the lowest income, or headed by older and less-educated depended more on the forests. People without agricultural assets relied heavily on forests after a disaster in Honduras. Similarly, in Indonesia, the poorest and the least educated relied more on NTFPs after a flood disaster. Many households utilize forest goods as part of their daily livelihoods sustenance. (Baland *et al.*, 2005; Azariad and Starchurski, 2006; Delacote, 2009). A high dependence on forest products for dealing with community livelihood can lead to ecosystem degradation with consequences for users.

Thus, governance systems must deal with the tradeoffs between providing products for current stresses and managing ecosystems for the future. Governance will determine how NTFPs can be transformed into livelihood security. In several case studies, the role of NTFPs is not limited to local consumption for food security, but includes commercial activities. Increasing market access might offer diversification opportunities for NTFPs that are traditionally produced for subsistence alone, with positive outcomes for livelihood and social resilience (Delacote, 2009).

However, market access can also lead to intensive exploitation and resource-decline, particularly for high-value and high-demand NTFPs. Price fluctuations can create additional vulnerabilities, especially for specialized communities or households. Several case studies show that the poorest often rely most on NTFPs. Pattanayak and Sills explained this reliance on forests as resulting from a lack of alternative strategies (e.g., working off-farm, creating buffer stocks, or cultivating different fields) rather than poverty. Levang *et al.* 2005, also recognize the importance of NTFPs when no alternatives are available.

2.16 Rural Urban interaction for sustainable livelihoods.

A major current topic of investigation is the extent to which sustainable livelihood activities span across the 'rural-urban divide'. The topic is based upon the realization that rural and urban areas, as well as the residents' of each are not as separate as has often been believed and that many of the former differences are breaking down

(Tacoli, 1998). The study accepts the position that rural and urban areas are interdependent localities, characterized by activities and exchanges of people, ideas, goods, and services, as well as money towards a common objective, Nigeria Environmental Study/Action Team (NEST) is hearing completion of an investigation, facilitated by the International Institute of Environment and Development into the .types and effects of rural- urban interactions .in southeastern Nigeria, between Aba as a major urban commercial centre and five surrounding towns and villages. The preliminary findings provided substantial support for the relevance and importance of rural-urban interactions for the development status of the towns and villages, as well as the type of livelihoods engaged in by the people residing within them.

CHAPTER THREE

METHODLOGY

3.1 Description and Location of the Study Area

Taraba State is in the North-Eastern Nigeria. It is named after the Taraba River which traverses the southern part of the state. Taraba's capital is Jalingo. Taraba State is located between Latitude 6° 30′ & 9° 36′N and Longitude 9° 10′ & 11° 50′E (Fig.1). The State was created out of the former Gongola State on 27th August, 1991 by the military government of General Ibrahim Babangida. Taraba State is bounded in the West by Plateau and Benue states and on the East by Cameroon. The State has sixteen Local Government Areas. It is bounded by Bauchi and Gombe States on the Northern part, Plateau and Nassarawa States on the Western part and Adamawa on the Eastern part. Taraba State has a population of 2,300,736 (NPC, 2006). This population was projected to 2016 from the 2006 figure provided by NPC using the formula:

$P_n = P_o (1+ r)^n$

Where,

P_n= Projected population of the State.

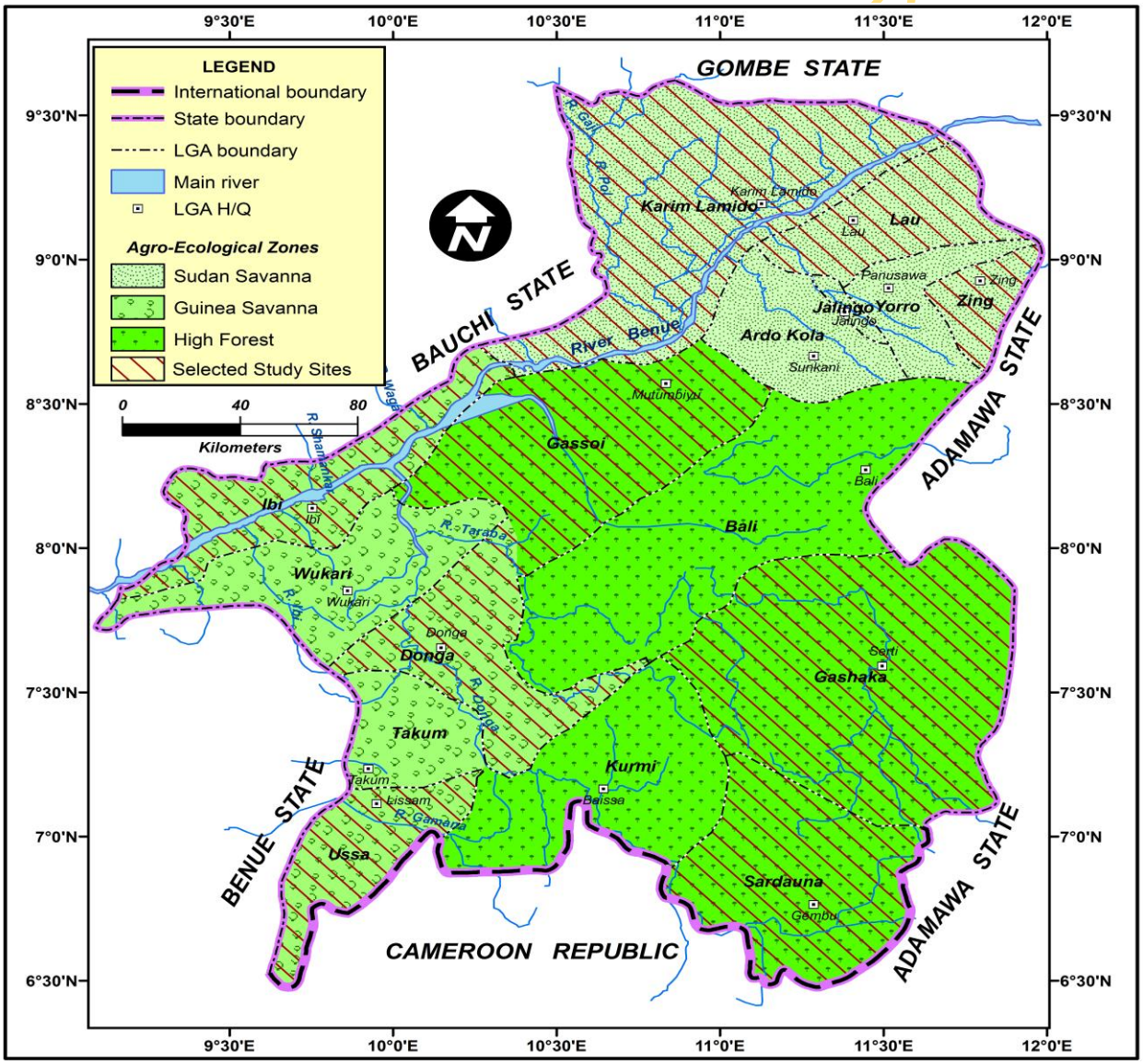
P_o= Previous population (Population of the State in 2006).

r = National population growth rate of Nigeria (3.5%)

n = Number of years in between.

The population of Taraba State by projection to 2016 is thus about 3,245,415

Fig. 1: Map of Taraba State showing the study areas



Source: Department of Geography, University of Ibadan.

3.2 Soil, Climate and Vegetation

The soil is generally sandy-loam. Soil color ranges from grayish-brown to brown and it is well drained (Kowal and Knabe, 1972; Morbeg and Esu, 1991; Esu, 2005; Ojanuga, 2006). It is a savanna region with plenty grasses, shrubs and few scattered trees. Three distinct Agro-ecological zones exist as follows: High forest, Guinea and Sudan savanna respectively. The rainfall of about 4000mm (the heaviest in Africa) is recorded in Mambilla plateau of Taraba State (TSD, 2014).

Taraba State lies largely within the middle belt of Nigeria and consists of undulating landscape dotted with a few mountainous features. These include the scenic and prominent Mambilla Plateau. The State lies largely within the tropical zone and has a vegetation of High forest and Guinea savanna in the southern part and Sudan savanna in the Northern Part (Kowal and Knabe, 1972; Morbeg and Esu, 1991; Esu, 2005; Ojanuga, 2006).

The Mambilla Plateau has an altitude of 1,800 meters (6000ft) above sea level (Adebayo, 2002; Popoola *et al., 2006:* TSD, 2014*).* The major rivers include: Rivers, Benue, Donga, Taraba and Ibi. They take their source from the Cameroonian mountains, spanning almost the entire length of the state in the North and South direction to link up with the River Niger (Adebayo, 2002; Popoola *et al., 2006*: TSD, 2014). Like most parts of Northern Nigeria, Taraba State has a wet and dry climate (Adebayo, 2002; Adebayo, 2012). The wet season lasted from April to October with mean annual rainfall that varies between 1058mm in the North (Jalingo, Zing e.t.c.) to over 1300mm in the Southern Zone (Wukari, Takum, e.t.c.). The dry season last from November to March. The wettest months are August and September while the driest months are December and January (Adebayo, 2002; Adebayo, 2012). Mean annual maximum temperature varies from 30^{o}C to 39.4^{o}C while mean annual minimum temperature ranges between 15^{o}C and 23^{o}C in the Mambilla plateau. The ecological zone favors the cultivation of crops like guinea corn, millet, cassava, yams, beans, cotton, ground nut and maize. The crystalline basement comprises the remnants of highly metamorphosed sedimentary rocks which are considered to be the oldest rock in the region (Kowal and Knabe, 1972; Morbeg and Esu, 1991; Esu, 2005; Ojanuga, 2006).

3.3 Agriculture

The major occupation of the People of Taraba State is Agriculture. Cash crops produced in the state include; cocoa, coffee, tea, pea, kola nut, groundnuts and cotton. Crops such as maize, rice, sorghum, millet, cassava and yams are also produced in commercial quantities. In addition cattle, sheep and goats are reared in large numbers especially on the mambilla Plateau and along riverside areas. Similarly, the people undertake other livestock production activities like poultry production, rabbit breeding and pig farming. Communities living on the banks of Rivers Taraba, Donga, Ma'ale, Tsokundi, Tunari, Kano-kabawa, Kwatan-doya, Ndo-atoro, Nwuko, Nyankwala, Gindin-dorowa, Tapare and Ibi engaged in fishing all year round.

Other occupational activities, such as NTFPs harvesting, pottery, cloth-weaving, dyeing, mat-making, carving, embroidery and blacksmithing are also carried out in various parts of the State. These form the basis of the state's rural economy.

3.4 People, Population and Settlement

Taraba State has a population of 2,300,736 (NPC, 2006), approximately 3,000,000 by projection to 2016. It is a heterogeneous, multi-ethnic state with eighty (80) indigenous ethnic groups, speaking different languages. (TSD, 2014). Some of the major ethnic groups include: Jukun, Kuteb, Chamba, Tiv, Mambilla Kaka, Wurkun, Ichen, Jenjo, Mumuye, Jibawa, Hausa and Fulani. These ethnic groups are widely spoken in the state. The Kumbo, Bakundi, Wurbo, Nyonyon, Ndoro, Bollere, Kode and Lo are among the small ethnic groups in the state. The culture of the people in the state varies as their ethnic groups. These are manifested in their general behaviour, social values, fashion, art and craft, dances, songs and musical instruments.

3.5 Sources of Data

The data for the study was collected from primary sources. The primary data was collected using semi-structured questionnaires. Focus Group Discussion (FGD) and In-Depth Interview Method (IDI) with key informants from General Hospitals and Herbal Homes within the Local Government Areas and the Wards in Taraba State were used to complement the data obtained from questionnaire administration.

3.6 Sampling procedure and sample size

A four stage sampling technique was used for the study using 30% sampling intensity (Diaw *et al.*,2002) The first stage involved the division of Taraba State into three (3) Agro-ecological zones as follows;

- Sudan savanna – Ardo-kola, Jalingo, Karim-Lamido, Lau, Yorro and Zing LGAs
- High Forest – Bali, Gashaka, Gassol, Kurmi and Sardauna LGAs
- Guinea savanna – Donga, Ibi, Takum, Ussa and Wukari LGAs (Taraba State Diary, 2014).

The second stage involved a random selection of three (3) Local Government Areas from each of the three (3) agro-ecological zones as follows;

- Sudan savanna - Karim-Lamido, Lau and Zing LGAs
- High Forest - Gashaka, Gassol and Sardauna LGAs
- Guinea savanna – Ibi, Donga and Ussa LGAs.

This brings the total to nine (9) Local Government Areas for the study. The third stage involved a random selection of five (5) wards from each of the nine (9) Local Government Areas, bringing the total to forty-five (45) wards for the study. The fourth stage involved a random selection of thirty (30) household heads from each of the forty-five (45) wards (Table 3.6 and 3.7).

A total of 4,495 respondents were identified in the 45 wards of the 9 LGAs as 1,450 Harvesters (HVTs), 1,125 Marketers (MKTs), 1,090 Building and Energy Material suppliers (BEMS), 625 Livestock Managers (LMs) and 205 Medicinal Herbs Collector(MHC). At 30% sampling intensity, a total of 1,350 household heads (HHHs) were randomly selected. Five sets of questionnaire in the order of: HVTs, 435; LMs, 188; MKTs, 338; BEMS, 327 and MHC, 62 were administered to the respondents. Listing and prioritisation of NTFPs that contributed to community livelihoods in Taraba State were evaluated in terms of Food (FD), Livestock Feeding (LF), Income and Employment Generation (IEG), Building and Energy Material Suppliers (BEMS) and Medicinal Herbs Collector (MHC) as indices of community livelihoods in Taraba State. The socio-economic characteristics of the respondents that influence their dependence on NTFPs for community livelihoods were also evaluated.

Table 3.6: Questionnaire administered and retrieved

Variables	(B)	(N) (30%)	(n)
Harvesters of NTFPs	1,450	435	310
Marketers of NTFPs	1,125	338	208
Building/energy material	1,090	327	207
Livestock managers	625	188	135
Medicinal collectors	205	62	48
Total	**4,495**	**1,350**	**908**

Source: Field survey 2014

B= Baseline

N= Total number of questionnaires administered

n= Number of questionnaires retrieved

Table 3.7: Selected Agro-ecological zones, Local Government Areas and Wards

AEZ	LGA	WARDS	RESPONDENTS
High forest	3	15	450
Guinea savanna	3	15	450
Sudan savanna	3	15	450
Total	**9**	**45**	**1,350**

Source: Field Survey, 2014.

3.7 Questionnaire Design and Validation

The questionnaire comprised of open and close ended questions. The open ended questions provided respondents the opportunity to propound their convictions and experiences as demanded by the questionnaire while the close ended questions with options guides confer quicker and more accurate sense of direction of the respondents on what was required of them in the questionnaire. The questionnaire consists of five (5) categories including:

1. Harvesters of NTFPs (HVTs).
2. Marketers of NTFPs(MKTs)
3. Building and Energy Materials Suppliers(BEMSr)
4. Livestock Managers(LMs)
5. Medicinal Herbs Collectors(MHCs)

The questionnaire was validated using the method of Adesoye, (2004). In this method, the questionnaire was subjected to content and face validity and pre-tested outside the study sample and the following issues were taken note of:

1. Time required to complete the questionnaire
2. Proportion of "I don't know" answers
3. Proportion of refusal to answer
4. Same response by respondents

Information obtained from the pre-testing was used to re-structure the questionnaire before they were finally administered in the study area.

3.8 Questionnaire Administration

Five sets of semi-structured questionnaire were prepared and administered to generate data for this study as follows:

- Harvesters of NTFPs(HVTs)
- Marketers of NTFPs(MKTs)
- Building and energy materials Suppliers(BEMSr)
- Livestock managers(LMs)
- Medicinal Herbs Collectors (MHCs).

3.9 Ranking and Prioritization of Non-Timber Forest Products used for community livelihoods in Taraba State.

Ranking and prioritization of NTFPs used for community livelihoods in Taraba State was done using the method of Jimoh *et al.* (2012). In this method, each respondent listed ten most important NTFPs used for community livelihoods over the years in Taraba State in their order of importance.

3.10.0 Data Collection

3.10.1 Compendium of NTFPs that are used for community livelihoods in the study area.

The survey team comprised of one plant taxonomist, six enumerators, the researcher, one hunter and one herbalist who supplies the names of the plants in Hausa language being the universal language in the state. All NTFPs used for community livelihoods as identified by the respondents, were pooled together according to their local names, scientific names, families and live forms. The parts of NTFPs used in solving human health challenges were also noted and this was followed by listing and ranking of the entire NTFPs used in the study area.

Five sets of questionnaires comprising: 435 for harvesters; 338 for marketers; 327 for building and energy material suppliers; 188 for livestock managers and 62 for Medicinal herbs collectors were used to generate data for the compendium and questions such as:

Do you use NTFPs for community livelihoods in Taraba State? List NTFPs used and for which purpose were asked to generate data for this objective (Appendix i).

3.10.2 Income and employment derived from NTFPs in the study area.

Questions such as: How much is your income per month? How much of this income is derived from NTFPs were asked to generate data for this objective, Do you employ labourers and how much were they paid? Are they permanent or casual workers? E.t.c. The above questions were asked to generate data for this study (Appendix i).

3.10.3 Level of dependence on NTFPs for community livelihoods in the study area.

Questions such as;

Do NTFPs contribute to food intake or dietary supplement?

Do NTFPs contribute to livestock nutrition?

Do NTFPs assist in the provision of building and energy materials?

Do NTFPs assist in solving human health challenges?

Which NTFPs do you depend on?

The above questios were asked to generate data for this objective.

3.10.4 Socio-economic characteristics that influence dependence on NTFPs for livelihoods in the study area.

Questions such as; Do socio-economic characteristics such as Age, Educational Status, Monthly income, AEZs, Main Forest Based Activity, Occupation, Household size, Number of meals per day, Monthly expenditure and Sex influence your dependence on NTFPs for livelihoods?

The above questions were asked to generate data for this objective.

3.11 Data Analysis

Data generated from the field survey were subjected to descriptive and inferential statistics. Descriptive statistical tools such as frequencies and simple percentages were used to present the findings of the study while inferential statistics such as t-test, chi-square and logistic regression were also used to present the findings of the study. Details of the analytical tools used in the data analysis are presented below:

3.11.1 Objective one:

Compendium of NTFPs used for livelihoods support in Taraba State.

This abjective was achieved by using descriptive statistics such as frquecies and simple percentages. Identified NTFPs were grouped according to local or vernacular names (Hausa), scientific names, family names and life forms. They were then presented in tables with their frequency of occurrence and this was followed by Ranking and prioritization using the method of Jimoh *et al.* (2012). In this method, each respondent listed ten most important NTFPs used for livelihood support over the years in their order of importance.

The list of the NTFPs was then scored in ascending order from one to ten. The first most important NTFP was scored one while the least was scored ten. The scores for all the respondents were then pooled for all the identified NTFPs. To establish the final position of a NTFP species in the ranking exercise, the following parameters were calculated:

- Number of times each NTFP was mentioned
- Mentioned value (MV)
- Ranked value (RV)
- Final Assigned value (FAV)

The Final Assigned value (FAV) was calculated by adding up the mentioned value (MV) and the ranked value (RV) divided by two

i.e. FAV = $\frac{MV + RV}{2}$ ----------1

Where;

FAV = Final Assigned value

MV = Mentioned value

RV = Ranked value

The decision rule: The ten NTFPs with the lowest Final Assigned Values were selected as priority species or species preferred by the communities in Taraba State for livelihood support.

3.11.2 Objective two: Income and employment generated from NTFPs.

Objective two was analyzed using student t- test at $\alpha_{0.05}$

The data on contributions of NTFPs to income and employment was analyzed using student t- test at $\alpha_{0.05}$ to compare income from NTFPs and income from other sources to find whether there was difference in the amount generated from NTFPs and that from other sources. The income from both sources were pooled together to obtain their means and standard deviation. The decision rule is that when $p<0.05$, significant difference exist between the income from the two sources and when $p>0.05$ means there is no significant difference between the income from the two sources.

The mathematical model is as follows:

$$t = \frac{\bar{X}_A - \bar{X}_B}{\sqrt{\frac{S^2(n_A + n_B)}{(n_A)(n_B)}}} \text{.....2}$$

Where;

A = First group (e.g. Income from other sources)

B = Second group (e.g. Income from NTFPs)

$\bar{X}_A$ = Mean of group A (Income from other sources)

$\bar{X}_B$ = Mean of group B (Income from NTFPs)

$\bar{X}_A$ and $\bar{X}_B$ = arithmetic means for groups A and B

n_A and n_B = number of observations in group A and B (note that n_A and n_B do not have to be the same)

S^2 = pooled within – group variance (for independent samples with equal variance)

3.11.3 Objective three: Level of dependence on NTFPs for community livelihoods.

Objective three was realized using chi-square.

The level of dependence on NTFPs for community livelihoods was evaluated using food, livestock feeds, income and employment generation, building and energy materials supplies and medicinal herbs utilization as indices for community livelihoods. The data was analyzed using Chi-square test at $\alpha_{0.05}$.

The mathematical model is as follows:

$$\sum_{i=1}^{c} \frac{(oi - Ei)^2}{Ei} \text{ ----------3}$$

Where;

Oi = observed frequency of NTFPs used for livelihood support

Ei = Expected frequency of NTFPs used for livelihood support

$\sum$ = Summation

C = Number of observations

3.11.4 Objective four:

Socio-economic characteristics that influence dependence on NTFPs for community livelihoods.

Data generated generated from this objective was analyzed using Logistic regression at $\alpha_{0.05}$. Details of the analytical tools used in the data analysis are presented below;

The binary logistic models are very useful in situations where the dependent or response variable is binary in nature. This implies that it can have only two possible values. The model therefore describes the relationship between one or more continuous independent variable(s) to the binary dependent variable. The two common binary models are the logistic and the probit models.

The logistic model is particularly preferred to the probit because of the unique information it provides. Distinct information provided by logistic model is the odd ratio. It is defined as the ratio of the odds of an event occurring in the group to the odds ratio of it occurring in other groups (Deeks, 1996: Bland and Altman, 2000). The logistic model also provides information on the consequences of one variable on the other. Hence, it will clearly indicate the variable(s) i.e. socio-economic characteristics of respondents that influence dependence on NTFPs for livelihoods support in Taraba State. The logistic model of a response P between 0 and 1 is given as:

Logit (P) = Log (P/l-P) = Log (P) – Log (l – P) ----------equation 4

The simplest form of logistic model is expressed as:

Logit (Pi) = a + bx_1 ……. equation 5

Pi = probability of dependence on NTFPs for community livelihoods in three Agro-ecological zones of Taraba State.

Xi = Vector of predictor or independent variables (socio-economic characteristics of the respondents that can influence their dependence on NTFPs for community livelihoods in Taraba State).

a and b = regression parameters.

In binary choice models, the two possible results were assigned values of "1" or "0". In this study, respondents that said "Yes" to dependence on NTFPs for community

livelihoods were assigned a value "1" and respondents that said "No" to dependence on NTFPs for community livelihoods were assigned a value of "0".

In this study, the binary logistic regression analysis was used to investigate the socio-economic, characteristics of the respondents that influence their dependence on NTFPs for community livelihoods in Taraba State.

The socio-economic characteristics of the respondents that can influence dependence on NTFPs for community livelihoods investigated were; Age, Sex, Educational status, Monthly expenditure, Agro-ecological zones, Meals per day, Monthly. Income occupation, Main Forest based activity and Household size of the respondents respectively.

The binary regression models obtained on dependence on NTFPs for community livelihoods are presented as follows;

$$\text{Logit}\left(\frac{p}{1-p}\right) = Y = \beta_o + \beta_1 X_1 + B_2 X_2 \ldots\ldots\ldots + B_n X_n \text{ ---------- 6}$$

Where;

$B_0, B_1, B_2 \ldots\ldots\ldots\ldots\ldots B_n$ = Regression coefficient or model Parameters

X_1 = Sex

X2 = Age

X3 =Educational status

X4 = AEZ

X5 = Monthly income

X6 = Monthly expenditure

X7 = Main activity

X8 = Meals per day

X9 = Occupation (Employment status)

X10 = Household size

Y = dependence on NTFPs (Binary variable)

Logistic Regression Equations; ---------- 7

$DONTFPs_{(HVTs)}$ =AGE+SEX+EDS+ME+AEZ+MPD+MI+OCCU+MFBA+HHS

$DONTFPs_{(LMs)}$ =AGE+SEX+EDS+ME+AEZ+MPD+MI+OCCU+MFBA+HHS

$DONTFPs_{(MKTs)}$ =AGE+SEX+EDS+ME+AEZ+MPD+MI+OCCU+MFBA+HHS

$DONTFPs_{(BEMS)}$ =AGE+SEX+EDS+ME+AEZ+MPD+MI+OCCU+MFBA+HHS

$DONTFPs_{(MHCs)}$ =AGE+SEX+EDS+ME+AEZ+MPD+MI+OCCU+MFBA+HHS

Where;

$DONTFPs_{(HVTs)}$ = Dependence on NTFPs by Harvesters for food

$DONTFPs_{(LMs)}$ = Dependence on NTFPs by Livestock Managers for livestock feeds

$DONTFPs_{(MKTs)}$ = Dependence on NTFPs by Marketers for income/employment

$DONTFPs_{(BEMS)}$ = Dependence on NTFPs by Building and Energy Materials Suppliers

$DONTFPs_{(MHCS)}$ = Dependence on NTFPs by Medicinal Herbs Collectors

Where;

AGE = Age of respondents

SEX = Sex of respondents

EDS = Educational status of respondents

ME = Monthly expenditure of respondents

AEZ = Agro-ecological zone of respondents

MPD = Meals per day of respondents

MI = Monthly income of respondents

OCCU = Occupation of respondents

MFBA = Main Forest Based Activity of the respondents

HHS = Household size of respondents

CHAPTER FOUR

RESULTS

4.1.1: Compendium of NTFPs for Community Livelihoods in Taraba State, Nigeria

A total of 206 categories of NTFPs used for community livelihoods support were identified in Taraba State. These comprised of 102 NTFPs species from 44 families (Table 4.1.1- Table 4.1.5). Out of this number, 46 were used as food, 12 were used for livestock feeding, 84 were used for income and employment generation, 24 were used both as building and energy materials while 29 were used as medicinal herbs.

The result on life forms of NTFPs that contributed to community livelihoods in the study area, showed that, 36 trees, 3 shrubs, 7 herbs were used as food while 10 trees, 1 shrub and 1 herb were used for livestock feeding. Similarly, 58 trees, 3 grass, 3 climbers, 5 shrubs, 15 herbs were used for income and employment generation while 17 trees, 1 grass, 3 shrubs, and 3 herbs were used for building and energy material respectively. On the other hand, 24 trees, 2 shrubs and 3 herbs were used as medicinal herbs in the study area. Nine dietary supplements such as bush meat, caterpillar, termites, snails, honey, mushroom, crickets, grasshopper/locust and fish were also recorded. The above result implies that, Taraba state is highly diverse in terms NTFPs composition (Table 4.1.1-4.1.1.5).

The result of the final assigned value on ranking and prioritization of NTFPs that contributed to community livelihoods indicated ten NTFPs with the lowest final assigned values. They include; *Afzelia africana* (35), *Balanites aegyptiaca* (34.5), *Vitellaria paradoxa* (34), *Parkia biglobosa* (33.5), *Irvingia gaboneensis* (33), *Xylopia aethiopica* (32.5), *Faidherbia albida* (32), *Adansonia digitata (*32), *Brachystegia eurycoma* (32), and *Elaeis guineensis* (31.5). This implies that, these NTFPs species are the species mostly preferred or used in the study area (Table 4.1.6).

Table 4.1.1: NTFPs used as food in Taraba State, Nigeria

S/N	Hausa name	Scientific name	Family	Live forms
NTFPs used as food in form of fruit, nut and seed				
1	Jambe	*Dacryodes edulis*	Burseraceae	Tree
2	Goron birii	*Irvingia gaboneensis*	Irvingiaceae	Tree
3	Wa'awan Kurmi	*pluckenetia conophora*	Euphorbiaceae	Tree
4	Kuka	*Adansonia digitata*	Bombacaceae	Tree
5	Tsage	*Amblygonocarpus androgenesis*	Mimosaceae	Tree
6	Aya'a	*Cyperus esculentus*	Cyperaceae	Herb
7	Ya'alo'o	*Solanum incanum*	Solanaceae	Herb
8	Gwandar daji	*Anona senegalensis*	Annonaceae	Shrub
9	Magarya'a	*Ziziphus mauritiana*	Rhamnaceae	Tree
10	Kimba	*Xylopia aethiopica*	Annonaceae	Tree
11	Aduwa	*Balanites aegyptiaca*	Zygophyllaceae	Tree
12	Giginya	*Borassus aethiopicum*	Palmae	Tree
13	Dorowa	*Parkia biglobosa*	Leguminosae	Tree
14	Atile	*Canarium schweinfurthis*	Burseraceae	Tree
15	Tsamiyar Kurmi	*Dialium guineense*	Leguminosae	Tree
16	Tsadar masar	*Spondias mombin*	Anacardiaceae	Tree
17	Tsamiya	*Tamarindus indica*	Leguminosae	Tree
18	Dinya	*Vitex doniana*	Verbenaceae	Tree
19	Kadanya	*Vitellaria paradoxa*	Sapotaceae	Tree
20	Barabutu	*Artocarpus communis*	Moraceae	Tree
21	Tuwon birii	*Parinari excelsa*	Chrysobalanaceae	Shrub
22	Tsada	*Ximenia americana*	Olacaceae	Tree
23	Attagar	*Cocos nucifera*	Palmae	Tree
24	Kwara	*Elaeis guineensis*	Palmae	Tree
25	Walnut	*Lovoa trichilioides*	Meliaceae	Tree
26	Wa'awan Kurmi	*Ricinodendron heudelotii*	Euphorbiaceae	Tree
NTFPs used as vegetables, soup, spices and condiments				
27	Kawo	*Afzelia bella*	Leguminosae	Tree
28	Bambami	*Alchornia cordifolia*	Euphorbiaceae	Shrub
29	Rimi	*Ceiba petandra*	Bombacaceae	Tree
30	Maje/kadaura	*Daniella oliveri*	Leguminosae	Tree
31	Baure	*Ficus spp*	Moraceae	Tree
32	Madobiyar	*Pterocarpus erinaceus*	Leguminosae	Tree
33	Kurya	*Bombax costatum*	Bombacaceae	Tree
34	Katsari	*Albizia zygia*	Leguminosae	Tree
35	Hantsar giwa	*Kigelia africana*	Bignoniaceae	Tree

Table 4.1.1: NTFPs used as food in Taraba State, Nigeria con…

S/N	Hausa name	Scientific name	Family	Live forms
NTFPs used as vegetables, soup, spices and condiments				
36	Zaki-banza	*Amaranthus viridis*	Amaranthaceae	Herb
37	Rama'a	*Hibiscus cannabinus*	Malvaceae	Herb
38	Dargaza'a	*Grewia venusta*	Tiliaceae	Herb
39	Wambo	*Brachystagia eurycoma*	Caesalpiniaceae	Tree
40	Konkoli	*Beilschimiedia mannii*	Lauraceae	Tree
41	Tafarnuwa	*Allium sativum*	Alliaceae	Herb
42	Zurma	*Ricinus communis*	Euphobiaceae	Tree
43	Kirya	*Prosopis africana*	Leguminosae	Tree
44	Masoro'o	*Piper guineensis*	Leguminosae	Climber
45	Borkono daji	*Aframomum letifolium*	Zingiberaceae	Herb
46	Kombi	*Mimosa pigra*	Mimosaceae	Herb
Dietary supplements				
47	Naman daji	Bush meat	Mammals	
48	Tsutsa	Caterpillar	Insect	
49	Gara	Termites	Insect	
50	Kodi	Snails	Analids	
51	Zuma	Honey	Insect	
52	Naman itace	Mushroom	Basidiomycetes	
53	Gya'are	Crickets	Insect	
54	Fa'ara	G/hoppers/Locust	Insect	
55	Kifi	Fish	Pisces	

Source: Field survey 2014

Table 4.1.2: NTFPs used for livestock feeding in Taraba State, Nigeria

S/N	Hausa name	Scientific name	Family	Live forms
1	Dogon yaro	*Azadirachta indica*	Anacardaceae	Tree
2	Gwanda daji	*Anona senegalensis*	Annonaceae	Shrub
3	Kuka	*Adansonia digitata*	Bombacaceae	Tree
4	Kalgo	*Pilliostigma thonningii*	Legumnosae	Tree
5	Kawo	*Afzelia africana*	Legumnosae	Tree
6	Dumshe	*Acacia spp*	Mmosaceae	Tree
7	Gawo	*Faidherbia albida*	Mimosaceae	Tree
8	Dorowa	*Parkia biglobosa*	Leguminosae	Tree
9	Kirya	*Prosopis africana*	Leguminosae	Tree
10	Giginya	*Borassus aethiopicum*	Palmae	Tree
11	Dinya	*Vitex doniana*	Verbenaceae	Tree
12	Zakaimii	*Datura metel*	Solanaceae	Herb

Source: Field survey 2014

Table 4.1.3: NTFPs that generate income and employment in Taraba State, Nigeria

S/N	Hausa name	Scientific name	Family	Live forms
NTFPs sold as fruit, nut and seed				
1	Jambe	*Dacryodes edulis*	Burseraceae	Tree
2	Goron birii	*Irvingia gaboneensis*	Irvingiaceae	Tree
3	Wa'awan kurmi	*Plukenetia conophora*	Euphorbiaceae	Tree
4	Kuka	*Adansonia digitata*	Bombacaceae	Tree
5	Tsage	*Amblygonocarpus androgenesis*	Mimosaceae	Tree
6	Aya'a	*Cyperus esculentus*	Cyperaceae	Grass
7	Ya'alo'o	*Solanum incanum*	Solanaceae	Herb
8	Gwandar daji	*Anona senegalensis*	Annonaceae	Shrub
9	Magarya'a	*Ziziphus mauritiana*	Rhamnaceae	Tree
10	Kimba	*Xylopia aethiopica*	Annonaceae	Tree
11	Aduwa	*Balanites aegyptiaca*	Zygophyllaceae	Tree
12	Giginya	*Borassus aethiopicum*	Palmae	Tree
13	Dorowa	*Parkia biglobosa*	Leguminosae	Tree
14	Atile	*Canarium schweinfurthii*	Burseraceae	Tree
15	Tsamiyar Kurmi	*Dialium guineense*	Leguminosae	Tree
16	Tsadar masar	*Spondias mombin*	Anacardiaceae	Tree
17	Tsamiya	*Tamarindus indica*	Leguminosae	Tree
18	Dinya	*Vitex doniana*	Verbenaceae	Tree
19	Kadanya	*Vitellaria paradoxa*	Sapotaceae	Tree
20	Barabutu	*Artocarpus communis*	Moraceae	Tree
21	Gwa'aba	*Psidium guajava*	Myrtaceae	Tree
22	Tuwon birii	*Parinari excels*	Chrysobalanaceae	Shrub
23	Tsada	*Ximenia americana*	Olacaceae	Tree
24	Attagar	*Cocos nucifera*	Palmae	Tree
25	Kwara	*Elaeis guineensis*	Palmae	Tree
26	Walnut	*Lovoa trichilioides*	Meliaceae	Tree
27	Kabaiwa	*Cucurbita pepo*	Cucurbitaceae	Herb
28	Ayaban daji	*Ensete gilletii*	Musaceae	Herb
29	Daddagu	*Momordica charantia*	Momordica	Climber

Table 4.1.3: NTFPs that generate income and employment in Taraba State con…

S/N	Hausa name	Scientific name	Family	Live forms
NTFPs sold as vegetables, oils, spices and condiments				
30	Kumbi	*Mimosa pigra*	Mimosaceae	Herb
31	Zaki-banza'a	*Amaranthus viridis*	Amaranthaceae	Herb
32	Rama'a	*Hibiscus cannabinus*	Malvaceae	Herb
33	Dargaza'a	*Grewia venusta*	Tiliaceae	Herb
34	Wambo	*Brachystegia eurycoma*	Caesalpiniaceae	Tree
35	Konkoli	*Beilschmiedia mannii*	Lauraceae	Tree
36	Tafarnuwa	*Allium sativum*	Alliaceae	Herb
37	Zurma	*Ricinus communis*	Euphorbiaceae	Tree
38	Kirya	*Prosopis africana*	Leguminosae	Tree
39	Citafo	*Zingiber officinale*	Zingiberaceae	Herb
40	Masoro	*Piper guineensis*	Leguminosae	Climber
41	Borkono daji	*Aframomum letifolium*	Zingiberaceae	Herb
NTFPs sold as cattle and chewing sticks				
42	Fasa kwari	*Zanthoxylum zanthoxyloides*	Rutaceae	Tree
43	Sanda kiwo'o	*Carpolobia lutea*	Polygaceae	Shrub
44	Sanda kiwo'o	*Randia spp*	Rubiaceae	Shrub
45	Itace brush	*Massularia acuminate*	Rubiaceae	Tree
46	Gawo	*Faidherbia albida*	Mimosaceae	Tree
NTFPs sold as fuel wood and charcoal				
47	Madaci	*Khaya senegalensis*	Meliaceae	Tree
48	Madobiya	*Pterocarpus erinaceus*	Leguminosae	Tree
49	Kojoli	*Anogeissus leiocarpa*	Combretaceae	Tree
50	Ice mai ci wuta	*Leucaena leucocephala*	Leguminosae	Tree
51	Kafafago	*Uapaca togoensis*	Euphorbiaceae	Tree
52	Ajenana	*Trema orientalis*	Ulmaceae	Tree
53	Kawo	*Afzelia africana*	Leguminosae	Tree
54	Kasfiya	*Crossopteryx febrifuga*	Rubiaceae	Tree
55	Kalgo	*Pilliostigma thonningii*	Leguminosae	Tree

Table 4.1.3: NTFPs that generate income and employment in Taraba State con…

S/N	Hausa name	Scientific name	Family	Live forms
NTFPs sold as wrapping leaves				
56	Katemfe	*Thaumatococcus danielli*	Marantaceae	Herb
NTFPs sold as weaving materials or rope				
57	Gwangwala'a	*Bambusa vulgaris*	Poaceae	Grass
58	Ramaa'a	*Hibiscus cannabinus*	Malvaceae	Herb
59	Kwagiri	*Ancistrophyllum opacum*	Arecaceae	Tree
60	Ma'ajigii	*Baphia nitida*	Fabaceae	Tree
NTFPs sold as sponge				
62	Soso	*Luffa cylindrica*	Cucurbitaceae	Climber
NTFPs sold as dyes				
63	Majigi	*Baphia nitida*	Papilionaceae	Tree
64	Talaki	*Lonchocarpus cyanescens*	Leguminosae	Tree
65	Fisa	*Blighia sapida*	Sapindaceae	Tree
66	La'ale	*Lawsonia inermis*	Lythraceae	Tree
NTFPs sold as palm wine, local magi, oils and soap				
67	Tukuruwa	*Raphia mambillensis*	Palmae	Tree
68	Kwara	*Elaeis guineensis*	Palmae	Tree
69	Kadanya	*Vitellaria paradoxa*	Sapotaceae	Tree
NTFPs sold as medicine				
70	Madachi	*Khaya senegalensis*	Meliaceae	Tree
71	Kirya	*Prosopis africana*	Leguminosae	Tree
72	Dogo yaro	*Azadirachta indica*	Meliaceae	Tree
73	Zakamii	*Datura metel*	Solanaceae	Herb
NTFPs sold as gum				
73	Dumshe	*Acacia seyal*	Mimosaceae	Tree
NTFPs sold as beads				
74	Idon Zakkara'a	*Coix lacryma*	Poaceae	Herb
NTFPs sold as building and construction materials				
75	Gwangwalaa	*Bambussa vulgaris*	Poaceae	Grass

Table 4.1.3: NTFPs that generate income and employment in Taraba State con…

S/N	Hausa name	Scientific name	Family	Live forms
NTFPs sold as dietary supplement				
76	Naman itace	Mushroom	Basidiomycetes	
77	Naman daji	Bush meat	Mammals	
78	Tsutsa	Caterpillar	Insect	
79	Gara	Termite	Insect	
80	Kodi	Snails	Analids	
81	Zuma	Honey	Insect	
82	Gya'are	Crickets	Insect	
83	Fara	G/hopper/Locust	Insect	
84	Kifi	Fish	Pisces	

Source: Field survey 2014

Table 4.1.4: NTFPs supplied as building and energy materials in Taraba State, Nigeria

S/N	Hausa name	Scientific name	Family	Live forms
1	Zindi/Baushe	*Terminalia spp*	Combretaceae	Tree
2	Kafafago	*Uapaca togoensis*	Euphorbiaceae	Tree
3	Gawo'o	*Faidherbia albida*	Mimosaceae	Tree
4	Kuka	*Adansonia digitata*	Bombacaceae	Tree
5	Dumshe	*Acacia spp*	Mimosaceae	Tree
6	Rama'a	*Hibiscus cannabinus*	Malvaceae	Herb
7	Kwaagiri	*Ancistrophyllum opacum*	Arecaceae	Tree
8	Magarya'a	*Ziziphus mauritiana*	Rhamnaceae	Tree
9	Aduwa	*Balanites aegyptiaca*	Zygophyllaceae	Tree
10	Aduruku	*Newbouldia leavis*	Bignoniaceae	Tree
11	Sanda kiwo	*Randia spp*	Rubiaceae	Shrub
12	Sanda kiwo	*Carpolobia lutea*	Polygalaceae	Shrub
13	Kalgo	*Pilliostigma thonningii*	Leguminosea	Tree
14	Gwangwala'a	*Bambusa vulgaris*	Poaceae	Grass
15	Wambo	*Brachystegia eurycoma*	Caesalpiniaceae	Tree
16	Kadanya	*Vitellaria paradoxa*	Sapotaceae	Tree
17	Kasfiya	*Crossopteryx febrifuga*	Rubiaceae	Tree
18	Kwara/kwakwa	*Elaeis guineensis*	Palmae	Tree
19	Gamba	*Panicum maximum*	Gramminae	Grass
20	Ciyawa	*Chloris gayana*	Gramminae	Grass
21	Ciyawa	*Pennisetum purpureum*	Gramminae	Grass
22	Tofa	*Imperata cylindrica*	Gramminae	Grass
23	Gamba	*Andropogon tectorum*	Gramminae	Grass
24	Kwari	*Anthocleista nobilis*	Gramminae	Tree

Source: Field survey 2014

Table 4.1.5: NTFPs used as medicinal herbs in Taraba State, Nigeria

S/N	Hausa name	Scientific name	Family	Liveform
1	Gawo	*Faidherbia albida*	Leguminosae	Tree
2	Kuka	*Adasonia digitata*	Bombacaceae	Tree
3	Dogonyaro	*Azadirachta indica*	Meliaceae	Tree
4	Adywa	*Balanites aegyptiaca*	Zygophyllaceae	Tree
5	Giginya	*Borassus aethiopum*	Palmae	Tree
6	Kadanya	*Vitellaria paradoxa*	Sapotaceae	Tree
7	Guadar daji	*Annona senegalensis*	Annonaceae	Shrub
8	Hantsar giwa	*Kigelia africana*	Bignoniaceae	Tree
9		*Melicia excelsa*	Meliaceae	Tree
10	Aduruku	*Newbouldia laevis*	Bignoniaceae	Tree
11	Dorowa	*Parkia biglobosa*	Leguminosae	Tree
12	Tsamiya	*Tamarindus indica*	Leguminosae	Tree
13	Kasfiya	*Crossopteryx februga*	Rubiaceae	Tree
14	Dinya	*Vitex doniana*	Verbenaceae	Tree
15		*Bidens pilosa*	Asteraceae	Tree
16	Fisa	*Blighia sapida*	Sapindaceae	Tree
17	Kirni/kisni	*Bridelia ferruginea*	Euphorbiaceae	Tree
18	Rimi	*Ceiba pentandra*	Bombacaceae	Tree
19	Maje/kadaura	*Daniella oliveri*	Leguminosae	Tree
20	Kwara	*Elaeis guineensis*	Palmae	Tree
21	Tawáatsáa	*Entada Africana*	Mimosaceae	Shrub
22	Baure	*Ficus spp.*	Tiliaceae	Tree
23	Láale	*Lawsonia inermis*	Lythraceae	Tree
24	Gwaaba	*Psidium guajava*	Myrtaceae	Tree
25	Fasa kwari	*Zanthoxyllum xanthoxyloides*	Rutaceae	Tree
26	Madobiya	*Pterocarpus erinaceus*	Leguminosae	Tree
27	Tukuruwa	*Raphia mambillensis*	Palmae	Tree
28	Tsadar masar	*Spondias mombin*	Anacardiaceae	Tree
29	Zakamii	*Datura metel*	Solanaceae	Herb

Source: Field survey 2014

Table 4.1.6: Ranking and Prioritization of NTFPs used for community livelihoods

S/NO	NTFPS	No. of times mentioned	Mentioned Value (MV)	Ranked Value (RV)	Final Assigned Value MV+RV/2
1	*Khaya Senegalensis*	28	168	38	103
2	*Habiscus Canabinus*	27	162	40	101
3	*Anacardium Occidentale*	30	165	35	100
4	*Thaumatococcus Danielli*	30	165	29	97
5	*Proposis Africana*	32	187	26	96.5
6	*Annona senegalensis*	36	171	21	96
7	*Tamarindus indica*	32	167	25	96
8	*Luffa cylindrica*	20	110	36	73
9	*Grewia venusta*	20	110	34	72
10	*Ziziphus mauritiana*	20	110	33	71.5
11	*Piper guineensis*	20	110	32	71
12	*Datura metel*	20	110	31	70.5
13	*Azadirachta indica*	20	110	30	70
14	*Borassus aethiopum*	21	111	27	69
15	*Treculia africana*	8	58	54	66
16	*Spondias mombin*	22	108	24	66
17	*Lawsonia inermis*	22	108	23	65.5
18	*Ximenia americana*	22	108	22	65
19	*Lonchocarpus cyanescens*	24	110	19	64.5
20	*Vitex doniana*	23	109	20	64.5
21	*Bambussa vulgaris*	25	111	16	63.5
22	*Parinar iexcelsa*	10	60	53	56.5
23	*Piliostigma thonningii*	10	60	50	55
24	*Imperata cylindrical*	10	60	50	55
25	*Leucaena leucocephala*	10	60	49	54.5
26	*Raphia mambillensis*	10	60	48	54
27	*Coix lacryma*	10	60	47	53.5

Table 4.1.6: Ranking and Priortization of NTFPs used for community livelihoods (continued)

S/NO	NTFPS	No of times mentioned	Mentioned Value (MV)	Ranked Value (RV)	Final Assigned Value MV+RV/2
28	*Carpolobia lutea*	10	60	46	53
29	*Massularia accuminata*	10	60	45	52.5
30	*Cyperus esculentus*	10	60	44	52
31	*Mimosa pigra*	10	60	43	51.5
32	*allium sativum*	10	60	43	51
33	*Solanum incanum*	10	60	41	50.5
34	*Newbouldia laevis*	10	60	39	49.5
35	*Ancistrophyllum opacum*	13	58	18	38
36	*Momordica charantia*	14	59	15	37
37	*Aframomum letifolium*	15	60	14	37
38	*Pluchenetia conophora*	15	60	12	36
39	*Ficus spp.*	15	60	11	35.5
40	*Afzelia africana*	15	60	10	35
41	*Balanites aegyptiaca*	15	60	10	34.5
42	*Vitellaria paradoxa*	15	60	8	34
43	*Parkia biglobosa*	15	60	7	33.5
44	*Irvingia gaboneensis*	15	60	6	33
45	*Xylopia aethiopica*	15	60	5	32.5
46	*Brachystegia eurycoma*	15	60	4	32
47	*Adansonia digitata*	16	61	3	32
48	*Faidherbia albida*	18	63	1	32
49	*Elaeis guineensis*	16	61	2	31.5

Source: Field survey 2014

4.2.0: Income generated from NTFPs in the study area.

4.2.1. Income generated from NTFPs and other sources by Harvesters of NTFPs in the study area.

Result (Table 4.2.1) revealed that average monthly income derived from NTFPs (₦2, 065.15 ±1197.43) was higher than that which was derived from other sources (₦ 1,895.77 ± 921.11) by the harvesters of NTFPs in the study area. Hence, t-test showed that, there was significant difference ($p<0.05$) between the amount from the two sources. Thus, NTFPs contributed more to income of the Harvesters of NTFPs than the other sources for community livelihoods in the study area. The decision rule is that when $p<0.05$, significant difference exist between the income from the two sources and when $p>0.05$ means there is no significant difference between the income from the two sources.

Table 4.2.1: Income generated from NTFPs and other sources by Harvesters of NTFPs in the study area.

Sources of Income	Average (₦)	±Sd	p-value
Income from NTFPs	2,065.15	±1197.43	0.049
Income from other sources	1,895.77	± 921.11	

Source: Field survey 2014

4.2.2: Income generated from NTFPs and other sources by Livestock managers in the study area.

An average monthly income of ₦1, 523.18 ±977.71 was derived from NTFPs, while an average monthly income of ₦1, 908.94 ± 959.69 was derived from other sources by the livestock managers (Table 4.2.2). T-test analysis also showed significant difference ($p<0.05$) between the two sources. Thus, other sources contributed more to the income of the livestock managers than NTFPs for community livelihoods in the study area. The decision rule is that when $p<0.05$, significant difference exist between the income from the two sources and when $p>0.05$ means there is no significant difference between the income from the two sources.

Table 4.2.2: Income generated from NTFPs and other sources by livestock managers in the study area

Sources of Income	Average (₦)	±Sd	p-value
Income from NTFPs	1,523.18	±977.71	0.001
Income from other sources	1,908.94	± 959.69	

Source: Field survey 2014

4.2.3: Income generated from NTFPs and other sources by Marketers of NTFPs in the study area.

Table 4.2.3 showed that, an average monthly income of ₦4, 882.06 ±3391.75 was derived from NTFPs compared to an average monthly income of ₦5, 708.07 ± 3427.39 derived from other sources by marketers of NTFPs in the study area. T-test showed that, there was no significant difference ($p>0.05$) between the income generated from NTFPs and that from other sources by the marketers of NTFPs for community livelihoods in the study area. It therefore implies that, the income from other sources and the income from NTFPs are almost similar. The decision rule is that when $p<0.05$, significant difference exist between the income from the two sources and when $p>0.05$ means there is no significant difference between the income from the two sources.

Table 4.2.3: Income generated from NTFPs and other sources by marketers of NTFPs in the study area

Sources of Income	Average (₦)	±Sd	p-value
Income from NTFPs	4,882.06	±3391.75	0.11ns
Income from other sources	5,708.07	± 3427.39	

ns = not significant at p = 0.05

Source: Field survey 2014

4.2.4: Income generated from NTFPs and other sources by Building/energy material suppliers in the study area.

The result of t-test analysis (Table 4.2.4) showed that average monthly income derived from NTFPs was not significantly different ($p>0.05$) from that derived from other sources by building and energy material suppliers. Although, the sum of ₦1, 268.47 ±2023.61 was derived from NTFPs which is a bit lower than the income (₦1, 304.50 ± 1960.96) derived from other sources. T-test result implies that, the income derived from the two sources by the building/energy material suppliers are almost the same. The decision rule is that when $p<0.05$, significant difference exist between the income from the two sources and when $p>0.05$ means there is no significant difference between the income from the two sources.

Table 4.2.4: Income generated from NTFPs and other sources by building/energy material suppliers in the study area

Sources of Income	Average (₦)	±Sd	p-value
Income from NTFPs	1,268.47	±2023.61	0.85ns
Income from other sources	1,304.50	± 1960.96	

Source: Field survey 2014

ns = not significant

4.2.5: Income generated from NTFPs and other sources by Medicinal herbs collectors in the study area.

The result of t-test on income derived from NTFPs by Medicinal herbs collectors (Table 4.2.5) and that from other sources were not significantly different ($p>0.05$). An average monthly income of ₦1, 553.23 ±1062.74 was derived from NTFPs while an average monthly income of ₦1, 419.35 ± 743.46 was derived from other sources by the medicinal herbs collectors in the study area. This implies that, the contributions from the two sources in terms of income to the medicinal herbs collectors in the study area are almost the same. The decision rule is that when $p<0.05$, significant difference exist between the income from the two sources and when $p>0.05$ means there is no significant difference between the income from the two sources.

Table 4.2.5.: Income generated from NTFPs and other sources by medicinal herbs collectors in the study area.

Sources of Income	Average (₦)	±Sd	p-value
Income from NTFPs	1553.23	±1062.74	0.42
Income from other sources	1419.35	± 743.46	

Source: Field survey 2014

4.2.5.1: Use of NTFPs by Medicinal herbs collector in Taraba State, Nigeria

Table 4.2.5.1 showed diseases treated using NTFPs and they include; Malaria, 10(20.8%), dysentery, 6(12.5%), diarrhea, 6(12.5%), measles, 8(16.6%), pneumonia 6(12.5%), typhoid5 (10.4%), cholera, 4(8.3%) and cerebrospinal meningitis, 3(6.3%). This implies that, medicinal herbs collectors depend on NTFPs for community livelihoods in the study area.

Table 4.2.5.1: Use of NTFPs by Medicinal herbs collector in Taraba State

Variables		Frequency	Percentage
1.	**Do you use NTFPs in treating human diseases?**		
	(a) Yes	48	100
	(b) No	0	0
	Total	**48**	**100**
2.	**Common human diseases in your area?**		
	(a) Malaria	10	20.8
	(b) Dysentery	6	12.5
	(c) Diarrhea	6	12.5
	(d) Measles	8	16.7
	(e) Pneumonia	6	12.5
	(f) Typhoid	5	10.4
	(g) Cholera	4	8.3
	(h) Cerebrospinal meningitis	3	6.3
	Total	**48**	**100**

Source: Field survey 2014

4.2.6: Employment derived from NTFPs in Taraba State, Nigeria

Table 4.2.6 and 4.2.7 showed employment status derived from NTFPs, as well as the amount paid per man-hour per day to the respondents in the study area. The result of the study indicated that 165(79.3%) of the respondents, hire labour to augment family labour while 43(20.7%) uses family labour.

Similarly, on the status of their labour, 151(72.6%) of the respondents are permanently engaged in the NTFP sector while 57(27.4%) are casual workers. The result on payment of the hired labour indicated that, 133 (63,9%) of the marketers of NTFPs that worked 1-3 hours are paid between ₦ 200- 600, 52(25%) that worked 4-6 hours are paid ₦ 800- 1,000 while 23 (11.1%) that worked above 6 hours are paid ₦ 1,000-1,500 (Table 4.2.6).

Table 4.2.6: Employment derived from NTFPs in Taraba State

Variables	Frequency	Percentages
1. Do you employ labourers to assist you in the collection, processing, buying and selling of NTFPs?		
Yes	165	79.3
No	43	20.7
Total	**208**	**100**
2. What is the status of the labourers?		
Permanent	151	72.6
Casual	57	27.4
Total	**208**	**100**

Source: Field Survey, 2014

Table 4.2.7: Payment for man- hours per day to permanent and casual workers

Main activity	Hours spent per day	No. Of respondents	Percentage	Amount (₦)
Marketers	1-3	133	63.9	₦ 200-600
	4-6	52	25.0	₦ 800-1000
	7-10	23	11,1	₦ 1000-1500
Total		208	100	

Source: Field Survey 2014

Table 4.2.8 showed NTFPs traded by marketers of NTFPs in Taraba State. The highest profit comes from the trade of fuel wood (₦ 1,500), charcoal (₦ 900) and *Tamarindus indica* (₦ 700). This was followed by the trade in mortar and pestle (₦ 500) mats and basket (₦ 500), honey (₦ 500), wrapping leaves (₦ 500) *Brachystagia eurycoma* (₦ 500) and *Belschmedia manii* (₦ 500) while the least profit of ₦ 200 comes from palm wine and cattle stick respectively(Table 4.2.8)

Table 4.2.8: NTFPs traded and amount in naira in Taraba State

S/No	NTFPs	Respondents	Cost price	Selling price	Profit
1	Fuel wood	30	7,000 x 1 van	8,500	1,500
2	Charcoal	20	600 x 50kg	1,500	900
3	Mortar and pestle	11	1000 x 1	1,500	500
4	Implement handles	10	200 x 1	500	300
5	Mats and basket	10	1000 x 1	1,500	500
6	Cattle stock	10	800 x 1	1000	200
7	Palm wine	10	150 x 1 litre	350	200
8	Palm oil	12	350 x 1 litre	600	250
9	Honey	10	1000 x1 litre	1,500	500
10	Wrapping leaves	10	500 x 1 wrap	1,500	500
11	*Brachystagia eurgcoma*	20	300 x 1 tier (2.8kg)	800	500
12	*Beilschmiedia manii*	18	300 x 1 tier (2.8kg)	800	500
13	*Parkia biglobosa*	12	300 x 1 tier (1.5kg)	600	300
14	*Adansonia digitata*	10	300 x 1 tier (2.4kg)	600	300
15	*Tamarindus indica*	15	800 x 1 tier (2.4kg)	1,500	700

Source: Field Survey, 2014.

4.3: Level of dependence on NTFPs for community livelihoods in Taraba State, Nigeria.

The result on the level of dependence on NTFPs for community livelihoods in Taraba State is presented in Table 4.3. Five livelihood options were tested using chi-square test of independence on NTFPs. The livelihood options were Harvesters of NTFPs for food, Livestock managers for livestock feeds, Marketers of NTFPs for income/employment, Building/energy material suppliers and Medicinal herbs collectors. The result of chi-square test of independence on NTFPs for community livelihoods in Taraba State revealed that, community livelihoods significantly depended on NTFPs ($\chi^2 = 94.83$; $p<0.05$).

The percentage dependence on NTFPs for livelihood by Harvesters was 34.1%. Similarly, the dependence on NTFPs by Livestock managers for livestock feeding was observed to be 14.9% while dependence on NTFPs for income/employment by marketers of NTFPs was 22.9%. In the same vein, dependence on NTFPs for the supply of building/energy materials was 22.8% while dependence on NTFPs for medicinal herbs utilization was observed to be 5.3% respectively in the study area.

Table 4.3:Chi-square test of independence by various livelihoods options in Taraba State

Dependence on NTFPs	Observed frequency	Expected frequency
Harvesters	310 (34.1%)	181.6 (20%)
Livestock managers	135 (14.9%)	181.6 (20%)
Marketers of NTFPs	208 (22.9%)	181.6 (20%)
Building/energy materials	207 (22.8%)	181.6 (20%)
Medicinal herbs collectors	48(5.3%)	181.6 (20%)
Total	**908 (100%)**	**908 (100%)**

Source: Field Survey, 2014.

Pearson chi-square (df = 4) is 94.83

p – value = 0.0000

4.4.0: Logistic binary nature of socio-economic characteristics that influenced dependence on NTFPs for community livelihoods in Taraba State, Nigeria

4.4.1: Logistic regression analysis of socio-economic characteristics that influenced dependence on NTFPs by Harvesters of NTFPs for food in Taraba State, Nigeria.

The result of logistic regression on socio-economic characteristics that influenced dependence on NTFPs by Harvesters of NTFPs as presented earlier in model 1 (equations 6 and 7) for community livelihoods gave significant fit to the data judging from χ^2 value that was significant at $p<0.05$. Occupation, Age and Monthly income had the highest odds-ratios of 518.35, 9.22 and 8.41 respectively, followed by Agro-ecological zone (5.84) and Sex (5.22) while Educational status and Main forest based activity had the lowest odds-ratio of 3.38 and 3.34 respectively. The above model presented for harvesters of NTFPs in Taraba State for community livelihoods indicated that, Occupation of the respondent was the most significant socio-economic characteristic that influenced dependence on NTFPs by the harvesters of NTFPs for community livelihoods in Taraba State with odds – ratio 518.35 followed by AGE (9.22), MI (8.41), AEZ (5.84), SEX (5.22), EDS (3.38), MFBA (3.34). The decision rule is that all socio-economic characteristics of the respondents that have odds-ratios with negative values or values lower than two may not influence dependence on NTFPs by the harvesters of NTFPs for community livelihoods in the study area. Only variables with odds-ratios two or greater than two may influence dependence on NTFPs for community livelihoods in the study area.

$DONTFPs_{(HVTS)} = 2.099 + 2.22AGE + 1.65SEX + 1.22EDS + 0.68ME + 1.77AEZ – 41.09MD + 2.13MI + 6.25OCCU + 1.21MFBA – 0.711HHS$ ……equation 8

n = 310, Final Loss = 18.78, Chi-square (df, 10) = 419.48, P = 0.00

Odd ratio (unit change): constant (1.31); AGE (9.22); SEX (5.22); EDS (3.38); ME (1.98);AEZ (5.85); MD (0.00); MI (8.41); OCCU (518.35); MFBA (3.34); HHS (0.49).

Table 4.4.1: Logistic binary nature of socio-economic characteristics that influenced dependence on NTFPs by Harvesters of NTFPs for food in Taraba State, Nigeria.

Dependent variable (HVTs): Dependence on NTFPs for community livelihoods

(Presence = 1; Absence = 0)

Independent variables	Coefficient	Odds-ratio
Whether AGE influence dependence on NTFPs for CLH	2.22	9.22*
Whether SEX influence dependence on NTFPs for CLH	1.65	5.22*
Whether EDS influence dependence on NTFPs for CLH	1.22	3.38*
Whether ME influence dependence on NTFPs for CLH	0.68	1.98 ns
Whether AEZ influence dependence on NTFPs for CLH	1.77	5.85*
Whether MPD influence dependence on NTFPs for CLH	-41.09	0.00 ns
Whether MI influence dependence on NTFPs for CLH	2.13	8.41*
Whether OCCU influence dependence on NTFPs for CLH	6.25	518.35*
Whether MFBA influence dependence on NTFPs for CLH	1.21	3.34*
Whether HHS influence dependence on NTFPs for CLH	-0.71	0.49 ns
Model χ^2 (df = 10) = 419.48*		

Note $p<0.05$ ns = Not significant

* = Significant

4.4.2: Logistic regression analysis of socio-economic characteristics that influenced dependence on NTFPs by Livestock managers for livestock feeds in Taraba State, Nigeria.

The result of logistic regression on socio-economic characteristics that influenced dependence on NTFPs by Livestock managers for livestock feeds as presented in model 2 (equations 6 and 7) presented earlier for Livestock managers gave significant fit to the data judging from χ^2 value that was significant at $p<0.05$. Agro-ecological zone had the highest odds-ratio of 975.74, followed by Sex (348.86) and Age (60.08) respectively. The above model presented for livestock managers in Taraba State indicated that, Agro-ecological zone of the respondent was the most significant socio-economic characteristic that influenced dependence on NTFPs by livestock managers followed by sex and age. The decision rule is that all socio-economic characteristics of the respondents that have odds-ratios with negative values or values lower than two may not influence dependence on NTFPs by the Livestock managers for livestock feeds in the study area. Only variables with odds-ratios two or greater than two may influence dependence on NTFPs for community livelihoods in the study area.

$DONTFPs_{(LMS)} = 2.77 + 4.09AGE + 5.85SEX - 3.85EDS - 36.42ME + 6.88AEZ - 0.63MPD - 5.03MI - 35.37OCCU - 16.68MFBA - 13.55HHS$ …… equation 9

n – 135, Final loss = 2.87, Chi-square (df, 10) = 191.17, P = 0.0000

Odd ratio (unit change): Constant (1.10); AGE (60.08); SEX (348.86); EDS (0.02); ME (0.00); AEZ (975.74); MPD (0.53); MI (0.01); OCCU (0.00); MFBA (0.00); HHS (0.00).

The above model presented for livestock managers in Taraba State gave significant fit to the data judging from χ^2 value that was significant at $p < 0.05$. Sex of the respondents (348.86), AEZ (975.74) and Age of the respondents were the socio-economic variables that influence the dependence on NTFPs for community livelihoods by livestock managers in Taraba State. The possession of high odds-ratio above 2, implied that, the variables were significant.

Table 4.4.2: Logistic binary nature of socio-economic characteristics that influenced dependence on NTFPs by livestock managers for livestock feeds in Taraba State, Nigeria.

Dependent variable (LMs): Dependence on NTFPs for community livelihoods (Presence = 1; Absence = 0)		
Independent variables	Coefficient	Odds-ratio
Whether AGE influence dependence on NTFPs for CLH	4.09	60.08*
Whether SEX influence dependence on NTFPs for CLH	5.85	348.86*
Whether EDS influence dependence on NTFPs for CLH	-3.85	0.02 ns
Whether ME influence dependence on NTFPs for CLH	-36.42	0.00 ns
Whether AEZ influence dependence on NTFPs for CLH	6.88	975.74*
Whether MPD influence dependence on NTFPs for CLH	-0.63	0.53 ns
Whether of MI influence dependence on NTFPs for CLH	-5.03	0.01 ns
Whether OCCU influence dependence on NTFPs for CLH	-35.37	0.00 ns
Whether MFBA influence dependence on NTFPs for CLH	-16.68	0.00 ns
Whether HHS influence dependence on NTFPs for CLH	-13.55	0.00 ns
Model χ^2 (df = 10) = 191.17*		

Note $p<0.05$ ns = Not significant
* = Significant

4.4.3: Logistic regression analysis of socio-economic characteristics that influenced dependence on NTFPs by Marketers of NTFPs for income/employment in Taraba State, Nigeria.

The result of logistic regression on socio-economic characteristics that influenced dependence on NTFPs by Marketers of NTFPs for income/employment as presented in model 3 (equations 6 and 7) presented earlier for Marketers of NTFPs gave significant fit to the data judging from χ^2 value that was significant at $p<0.05$. Monthly income and Agro-ecological zone had the highest odds-ratio of 2955.74 and 531.71 followed by Sex (7.49) and Educational status (5.10) respectively. The model indicated that, Monthly income, Agro-ecological zone, Sex and Educational status of the respondent were the most significant socio-economic characteristic that influenced dependence on NTFPs by Marketers of NTFPs in Taraba State. The decision rule is that all socio-economic characteristics of the respondents that have odds-ratios with negative values or values lower than two may not influence dependence on NTFPs by the Marketers of NTFPs for income/employment in the study area. Only variables with odds-ratios two or greater than two may influence dependence on NTFPs for community livelihoods in the study area.

$DONTFPs_{(MKTS)} = 2.74 – 38.42AGE + 2.01SEX + 1.63EDS – 28.81ME + 6.28AEZ – 2.56MPD + 7.99MI – 3.99OCCU – 2.52MFBA + 0.37HHS$ …… equation10

n = 208, Final loss = 5.41, Chi – square (df, 10) = 298.29.

Odds ratio (unit change): Constant (8.07); AGE (0.00); SEX (7.49); EDS (5.10); ME (0.00); AEZ (531.71); MPD (0.08); MI (2955.74); OCCU (0.02); MFBA (0.08); HHS (1.45).

Table 4.4.3: Logistic binary nature of socio-economic characteristics that influenced dependence on NTFPs by Marketers of NTFPs for income/employment in Taraba State, Nigeria.

Dependent variable (MKTs): Dependence on NTFPs for community livelihoods (Presence = 1; Absence = 0)		
Independent variables	Coefficient	Odds-ratio
Whether AGE influence dependence on NTFPs for CLH	-38.42	0.00 ns
Whether SEX influence dependence on NTFPs for CLH	2.01	7.49*
Whether EDS influence dependence on NTFPs for CLH	1.63	5.10*
Whether ME influence dependence on NTFPs for CLH	-28.81	0.00 ns
Whether AEZ influence dependence on NTFPs for CLH	6.28	531.71*
Whether MPD influence dependence on NTFPs for CLH	-2.56	0.08 ns
Whether MI influence dependence on NTFPs for CLH	7.99	2955.74*
Whether OCCU influence dependence on NTFPs for CLH	-3.99	0.02 ns
Whether MFBA influence dependence on NTFPs for CLH	-2.52	0.08 ns
Whether HHS influence dependence on NTFPs for CLH	0.37	1.45 ns
Model χ^2 (df = 10) = 298.29*		

Note $p<0.05$ ns = Not significant
* = Significant

4.4.4: Logistic regression analysis of socio-economic characteristics that influenced dependence on NTFPs by Building/energy material suppliers in Taraba State, Nigeria.

The result of logistic regression on socio-economic characteristics that influenced dependence on NTFPs by Building/energy materials suppliers as presented in model 4 (equations 6 and 7) presented earlier for Building/Energy material suppliers of NTFPs gave significant fit to the data judging from χ^2 value that was significant at $p<0.05$ The model indicated that, Agro-ecological zone and Monthly income with odds-ratios of 7.21 and 3.71 influenced the dependence on NTFPs for community livelihoods by building/energy material suppliers in Taraba State. The decision rule is that all socio-economic characteristics of the respondents that have odds-ratios with negative values or values lower than two may not influence dependence on NTFPs by the Building/energy material suppliers for community livelihoods in the study area. Only variables with odds-ratios two or greater than two may influence dependence on NTFPs for community livelihoods in the study area.

$DONTFPs_{(BEMS)} = 33.71 – 3.97AGE – 40.40SEX – 8.99EDS – 0.32ME + 1.98AEZ – 11.02MPD +1.31MI – 26.16OCCU – 5.77MFBA + 0.30HHS$ …… equation 11

n = 207, Final loss = 6.18, Chi-square (df, 10) = 295.37,

Odds-ratio (unit change): Constant 33.71; AGE (0.02); SEX (0.00); EDS (0.00); ME (0.72); AEZ (7.21); MPD (0.00); MI (3.71); OCCU (0.00); MFBA (0.00); HHS (1.36).

Table 4.4.4: Logistic binary nature of socio-economic characteristics that influenced dependence on NTFPs by Building and energy material supplier's inTaraba State, Nigeria.

Dependent variable (BEMS): Dependence on NTFPs for community livelihoods (Presence = 1; Absence = 0)		
Independent variables	Coefficient	Odds-ratio
Whether AGE influence dependence on NTFPs for CLH	-3.97	0.02 ns
Whether SEX influence dependence on NTFPs for CLH	-40.40	0.00 ns
Whether EDS influence dependence on NTFPs for CLH	-8.99	0.00 ns
Whether ME influence dependence on NTFPs for CLH	-0.32	0.72 ns
Whether AEZ influence dependence on NTFPs for CLH	1.98	7.21*
Whether MPD influence dependence on NTFPs for CLH	-11.02	0.00 ns
Whether MI influence dependence on NTFPs for CLH	1.31	3.71*
Whether OCCU influence dependence on NTFPs for CLH	-26.16	0.00 ns
Whether MFBA influence dependence on NTFPs for CLH	-5.77	0.00 ns
Whether HHS influence dependence on NTFPs for CLH	0.30	1.36 ns
Model χ^2 (df = 10) = 295.37*		

Note $p<0.05$. ns = Not significant
* = Significant

4.4.5: Logistic regression analysis of socio-economic characteristics that influenced dependence on NTFPs by medicinal herbs collectors in Taraba State, Nigeria.

The result of logistic regression on socio-economic characteristics that influenced dependence on NTFPs by Medicinal herbs collectors as presented in model 5 (equations 6 and 7)presented earlier for Medicinal herbs collectors gave significant fit to the data judging from χ^2 value that was significant at $p<0.05$. The model indicated that, Age, Agro-ecological zone and Sex with odds-ratios of 130.66, 72.87 and 6.84 respectively influenced the dependence on NTFPs for community livelihoods by Medicinal herbs collectors in Taraba State. The decision rule is that all socio-economic characteristics of the respondents that have odds-ratios with negative values or values lower than two may not influence dependence on NTFPs by the Medicinal herbs collectors for community livelihoods in the study area. Only variables with odds-ratios two or greater than two may influence dependence on NTFPs for community livelihoods in the study area.

$$DONTFPs_{(MHC)} = 31.04 + 4.88AGE + 1.92SEX - 31.65EDS - 3.08ME + 4.3AEZ - 37.35MPD - 10.46MI - 3.70OCCU - 2.26MFBA - 8.57HHS \quad \ldots\ldots \text{equation12.}$$

n = 48, Final loss = 7.21, Chi-square (df, 10) = 71.47.

Table 4.4.5: Logistic binary nature of socio-economic characteristics that influenced dependence on NTFPs by Medicinal herbs collectors for medicinal herbs utilization in Taraba State, Nigeria.

Dependent variable (MHC): Dependence on NTFPs for community livelihoods (Presence = 1; Absence = 0)		
Independent variables	Coefficient	Odds-ratio
Whether AGE influence dependence on NTFPs for CLH	4.87	130.66*
Whether SEX influence dependence on NTFPs for CLH	1.92	6.84*
Whether EDS influence dependence on NTFPs for CLH	-31.65	0.00 ns
Whether ME influence dependence on NTFPs for CLH	-3.08	0.05 ns
Whether AEZ influence dependence on NTFPs for CLH	4.29	72.87*
Whether MPD influence dependence on NTFPs for CLH	-37.35	0.00 ns
Whether MI influence dependence on NTFPs for CLH	-10.46	0.00 ns
Whether OCCU influence dependence on NTFPs for CLH	-3.70	0.02 ns
Whether MFBA influence dependence on NTFPs for CLH	-2.26	0.10 ns
Whether HHS influence dependence on NTFPs for CLH	-8.57	0.00 ns
Model χ^2 (df = 10) = 71.47*		

Note $p<0.05$ ns = Not significant
* = Significant

CHAPTER FIVE

DISCUSSION

5.1: Compendium of NTFPs used for community livelihoods in the study area.

A total of 206 categories of NTFPs used for community livelihoods were later reduced to 102 NTFPs species. This was because some of the NTFPs have multiple uses and was classified under two or more uses. These uses include; food, livestock feeds, income/employment generation, building/energy material supplies and medicinal herbs utilization. The fact that its utilization and knowledge cut across all the Agro-ecological zones in the study area, implied a strong affirmation that the communities in Taraba State relied to some extent on the NTFPs.

The high number of NTFPs recorded in the study area implied that, Taraba State is diverse in terms of NTFPs composition. This diversity can be seen in terms of the high number of the different species and different families of the NTFPs recorded in the study area. The identification of the NTFPs by their vernacular names was very difficult as only few Hunters and Medicinal herbs collectors could do so. Most of these NTFPs are not documented in Taraba State and the indigenous knowledge of their relevance is steadily being lost, particularly now that, children who are supposed to inherit this knowledge now spend most of their times in schools than on farms or forest. Also, medicinal herbs collectors normally hide the identity of NTFPs used for different ailments largely for fear of lack of patronage, should the sufferer learn to cure himself. In order to mystify their trade, cultivation of NTFPs are not encouraged, thus, all the collections of the NTFPs for the treatment of various ailments in the study area are virtually from the wild. If these medicinal herbs collectors and the hunters pass away with their wealth of plant knowledge, a huge loss and a large vacuum will be created in the body of plant knowledge dealing with plants that heals. There is therefore the need to harness and document this indigenous knowledge of NTFPs and their relevance in the study area.

Ayodele (2005) challenged Nigerian taxonomist and conservation biologist to rise up to the task of properly identifying and conserving plants. I extend this challenge to all stakeholders in the forestry sector of Taraba State of the need to properly document both timber and NTFPs resources of the State.

Similarly, the 10 NTFPs with the lowest final assigned values indicated that, they are mostly preferred by the communities in Taraba State and this may also implied that, these NTFPs are priority or target NTFPs for community livelihoods in the study area. Since the communities preferred these NTFPs species, they may likely depend more on these NTFPs and this may lead to heavy pressure on these species in the wild due to incessant use and this may lead to the depletion of such NTFPs in the study area.
This may have management implication because no cultivated or plantation of any of the priority or target NTFPs species were sighted anywhere in the study area. It should be noted here that, the strength of a given livelihood is measured both by its productive outcomes and its resilience to shocks. Already inhabitants now travel far distances before sighting these NTFPs that were hitherto very close them. There is therefore the need for management strategies to be put in place to ensure the continous presence and availability of these NTFPs species that are used for community livelihoods in the study area.

5.2: Income and employment generated from NTFPs in the study area.

The harvesting of NTFPs generates income. This income contributed significantly to community livelihoods thereby putting such NTFPs under use pressure. NTFPs provided a range of goods and services that support life on earth. Harvesting or collection of NTFPs for sales generated income. To meet livelihood challenges, men and women engaged in the harvesting of NTFPs and its conversion to saleable products in the study area. Males engaged in strenuous activities such as felling and uprooting of trees for fuel wood and charcoal, tapping palm wine, harvesting palm fruits etc. while females performed less strenuous activities such as collection of wild vegetables and tree branches for firewood from nearby farms and processing of NTFP products. NTFPs such as fruits, nuts, seeds vegetables wrapping leaves, *Brachystagia eurycoma*, *Beilschmiedia manii* etc were harvested and sold for money in the study area. Also fuel wood were harvested and sold either as fire wood or converted to

charcoal before being sold for money. Most of the people involved in the trade of NTFPs do it as a principal form of business in the study area while a very few of them are casual workers.

The findings of the study indicated that, NTFPs contributed either less than, similar or more to the income of the respondents than that from other sources. Commercial NTFP collectors normally collect NTFPs in large quantities for sale or trade either to provide supplemental income or as a principal form of employment or business in the study area with no attention paid to the NTFP resource base. The income profile shows that less than ₦3, 000.00 was generated monthly from NTFPs. This suggest that majority of those that depended on NTFPs are the rural poor. The income generated is used to meet numerous needs of the rural communities in the study area. Livelihoods activities such as collection of NTFPs and it's conversion to saleable products provided supplemental income to the community in the study area. The findings of the study indicated that, the income generated from NTFPs trade in Taraba State is significant. Also the engagement of high number of the inhabitants in the supply of labour needed for harvesting, processing and marketing of NTFPs as well as their payment for such labour implies that, NTFPs do not only generate income but it is also an employer of labour in the study area.

This means that, NTFPs contributed significantly to community livelihoods in terms of income and employment generation. This significant contribution agrees with the findings of FAO, (2007) in the Mediterranean region of Rome that, reported that, forest based activities provided supplementary sources of family income apart from agriculture as well as the report by Jumbe *et al.* (2007) in a study in Zambia that, NTFPs contributed 34% to household income in rural Zambia. The findings of the study corroborated Anon (2000) that reported in Zimbabwe, that, 237,000 people were gainfully employed in NTFPs related activities. The findings of the study affirmed the submission ofTewari (1998) that, NTFPs provided 50% of the income of about 30% of the rural people in India. The findings of the study also agreed with the findings of FAO (1992) that, charcoal making constuted a major source of household cash income in Ghana.

The findings of the study also corroborated the findings of FAO (2005) that, the gathering of NTFPs is a major economic and more important economic activity for the poor in Botswana. The findings of the study agreed with Bahru *et al.* (2012) that

reported fuel wood and charcoal as a major source of income for most households in Ethiopia. The intensity of the harvesting of these NTFPs for income calls for caution as emphasis is on cash and not the resource base and this may lead to the destruction of some NTFPs in the study area. This is true because the commercial NTFPs collectors normally collects NTFPs in large quantities for sale or trade either to provide supplemental income or as a principal form of employment or business and may also lead to extinction of some NTFPs particularly those which command high prices in the market. It should be noted here that, not all trade in NTFPs are monitored. Some NTFPs can be linked to illegal trade activities. In addition, they are a number of trade constraints for the trade of NTFPs, These constraints include; high tarrif, difficulty to penetrate the interntional markets, lack of business networks, limited or no access to relevant market information, absence of standard yardstick for measurement and price fluctuation makes it very difficult to properly value the products and these constraints has given room for illegal trade in NTFPs in the study area.

5.3: Level of dependence on NTFPs for community livelihoods in the study area.

NTFPs assisted communities in Taraba State by the provisions of Forest foods, supplemental income from the sales of forest products, building/energy materials, livestock feeds and herbs for solving human health challenges. NTFPs are part of community livelihoods, providing carbohydrates, fats, proteins vitamins and minerals.

In many communities in Taraba State, people are losing acess to NTFPs either through over exploitation and habitat destruction or loss of access as former harvesting areas is included with in national parks or forest reserves. The communities in Taraba State consume NTFPs, heal themselves with it, build temporary and permanent shelters, make tools out of them, produce charcoal from trees, and harvest fire wood e.t.c. which they sell in rural and urban markets. Infact, they depended on NTFPs in much the same way, western consumers depended on supermarkets as the source of their diverse necessities of everyday life.

The population of communities in Taraba State which are predorminantly farmers has increased over years leading to less agricultural land with majority of them, turning to NTFPs exploitation to supplement their income. NTFPs are being removed from the forest faster than they can grow thus leading to the depletion of some NTFPs. The findings of the study indicated that, community livelihoods significantly depended on

NTFPs with the highest level of dependence on food and this was followed by income/employment generation, building/energy material supplies, livestock feeding and medicinal herbs utilization respectively. The high percentages of the level of dependence recorded for food and income explained the relative importance of NTFPs to community livelihoods in terms of food and income. NTFPs provided supplemental income and are an employer of labour for those surviving on them. The income generated from NTFPs is used to meet the numerous needs of the rural communities in the study area. The findings of the study also indicated that, temporary shelters made from NTFPs, fodder for livestock, fire wood, charcoal and herbs obtained from NTFPs benefited the respondents. This implies that, community livelihoods in the study area also depended on NTFPs in terms of building/energy materials, livestock feeding and medicinal herbs respectively. The hiring of labour to assist in the collection, processing, buying and selling of NTFPs and the payment for such labour, portrays NTFPs not only as an income generating enterprise but also as an employer of labour. Also, the preponderance of diseases like malaria, measles, typhoid e.t.c. and their cure using NTFPs in the study area, showed that, community livelihoods depended on medicinal herbs utilization in the study area.

A high dependence on NTFPs for community livelihoods can lead to the depletion of such NTFPs and this calls for serious concern because of it's implication on the ecosystem. This is because the emphasis of the harvesters, are on quantities required to get high amount of money with no attention paid to the natural resource base.

The findings of the study agreed with Okafor *et al.* (1994) that, NTFPs provided food, medicines, fibres and cash income for rural households in Nigeria. The findings also corroborated FAO, (1989) that stated in a study in Tanzania that, *Sandawe* (People living in Tanzania) had 45% of their meals from NTFPs and that atleast 2-3 NTFPs are consumed as vegetables on a monthly basis. The findings of the study is also similar with the findings of Anorld *et al.* (2011) that, NTFPs contributed significantly to food security in a study carried out in Bogor, Indonesia. Also, it was affirmed in Tanzania that, NTFPs provided forest foods to rural communities in a study carried out by Msuya *et al.* (2010) in Tanzania. In same vein in India, it was also affirmed that, NTFPs provided 50% of the income of about 30% of the rural people in India in a study carried out by Tewari, (1998) in India.

The findings of the study agreed with the submission of Jimoh *et al.*, (2007) that stated in a study in Oyo, Nigeria that, NTFPs contributed to household food security and income in a study carried out in Onigambari Forest Reserve Oyo State, Nigeria. The findings of the study are similar to the findings of Olawoye (1996) in Ghana in which he opined that, NTFPs provided food sources when other food sources are un-available. The findings of the study agreed with the findings of FAO, (2008) that estimated that, up to 80% of the population in Rome relies on traditional medicines, mostly plant-based drugs, for their primary health care in a study carried out in Rome on Non-wood forest products.

In same vein, in Ethiopia, it was also affirmed that, NTFPs provided firewood and charcoal for the rural communities in Ethiopia in the study carried out by Bahru *et al*., (2012). The findings of the study agreed with the findings of Lyimo and Kangalawe, (2010) that, all ethnic group in Tanzania depended on mushrooms for consumption with 85% relying on wood based energy. The findings of the study also corroborated Lyimo and Kangalawe, (2010) and (Musterlin, *et al.*, 2010) that, over 80% of the rural people in Tanzania depended on medicinal herbs for their primary health care needs. They also observed that, farmers quit farming to trade in charcoal which is a NTFP in Tanzania.

This significant contribution agreed with the findings of FAO, (2007) in the Mediterranean region of Rome that, reported that, forest based activities provided supplementary sources of family income apart from agriculture as well as the report by Jumbe *et al.* (2007) in a study in Zambia that, NTFPs contributed 34% to household income in rural Zambia. The findings corroborated Msuya *et al.* (2010) that reported in a study in Tanzania that NTFPs provided livestock nutrition in lean periods as well as Arnold *et al.* (2011) that reported in another study in Bogor, Indonesia that, NTFPs provided fodder for lives tocks. All these point to the fact that, community livelihoods depended on NTFPs in terms of food, livestock nutrition, income/employment, building/energy materials and medicinal herbs collection. There is high level dependence on some NTFPs considered to be priority species for community livelihoods and this can lead to the depletion of such NTFPs in the study area. This is because these priority NTFP species may be under use pressure due to incessant use.

5.4.0: Socio-economic characteristics that influenced dependence on NTFPs for community livelihoods in Taraba State, Nigeria

5.4.1: Socio-economic characteristics that influenced dependence on NTFPs by Harvesters of NTFPs for food in Taraba State, Nigeria

The socio-economic characteristics of the Harvesters that influenced their dependence on NTFPs for community livelihoods in Taraba State showed: occupation, Age, Monthly income, Agro-ecological zone, Sex, Educational status and Main forest based activity as socio-economic characteristics that may influence Harvesters dependence on NTFPs in the study area. This is because, the estimated co-efficient for the above mentioned variables were not zero, negative values or less than two but were above two. This implied that, the regression parameters in the model were statistically significant.The higher the value of the odd-ratios of the socio-economic variables of the Harvesters, the higher the likelihood of such variables to influence dependence on NTFPs by the Harvesters of NTFPs for food in the study area. The findings of the study corroborated Deeks 1996: Bland and Altman (2000), that the logistic model provides information on the consequence of one variable on the other.

The occupation of the harvesters may likely influence their dependence on NTFPs. This is because occupations such as farming, fishing etc. are faced with shocks compared to occupations such as motorist driver okada, riders, Artisans, civil servants etc. Civil servant, Artisans, motorist, okada riders etc. are less likely to depend on the harvesting of NTFPs for livelihood support because they have alternatives that generate daily income to them and this can cushion the effect of any shock that might come their way, compare to the farmer who has only one farming activity. The findings of the study corroborated Deeks 1996: Bland and Altman (2000), that the logistic model provides information on the consequence of one variable on the other.

Athough, NTFPs benefited all ages of the harvesters. The Age of the harvesters may likely influence Harvesters' dependence on NTFPs because they too young and the too old may not find it easy to enter the forest to harvest NTFPs. They may not have the physical, strength to engage in strenuous activities involved in the harvesting of NTFPs for livelihoods e.g. felling or uprooting a tree for conversion to charcoal or cutting and loading a pick up van with fire wood to be sold in a rural market. Age is also an indication of the active working life of the respondents. Age also dictate access

to relevant community networks where information on NTFPs can be accessed. The findings of the study corroborated Deeks 1996: Bland and Altman (2000), that the logistic model provides information on the consequence of one variable on the other.

The monthly income of the harvesters may likely influence their dependence on NTFPs. This is because when there is a shock, the poorer harvesters are worst affected. There is a positive relationship between poverty and reliance on NTFPs. The findings of the study corroborated Deeks 1996: Bland and Altman (2000), that the logistic model provides information on the consequence of one variable on the other.

Similarly, the Agro-ecological zone (AEZ) of the harvesters may likely influence their dependence on NTFPs. This is because NTFPs are location specific. People living near forest are prone to exploitation of the NTFPs than those living further away. The AEZs differ in their composition of NTFPs and so do NTFPs that will be harvested. Some NTFPs are high forest species while some are savannah species. So NTFPs to be harvested by the harvester depends on the location of the harvester and vice versa. The findings of the study corroborated Deeks 1996: Bland and Altman (2000), that the logistic model provides information on the consequence of one variable on the other.

Similarly, sex of harvesters may also influence harvester's dependence on NTFPs. This is because the harvesting of some NTFPs are sex specific, may be because of the traditional beliefs and the physical strength involved in the harvesting of such NTFPs e.g. Females are restricted from entering the forest and are also denied access to own land. They merely collect fire wood, vegetables and fruits from nearby farms and wait at home to process NTFPs harvested and brought home by male harvesters. Also strenuous activities such as felling trees or uprooting a tree for charcoal production and lateral roots collection for medicine, palm tapping, hunting etc are exclusively done by male NTFPs harvesters. Perhaps because of the skills and the physical strength involved in the harvesting of such NTFPs in the study area. The findings of the study corroborated Deeks 1996: Bland and Altman (2000), that the logistic model provides information on the consequence of one variable on the other.

Nevertheless, the educational status of the respondents may likely influence the dependence of the harvesters of NTFPs for food. This is because those respondents that are not learned are more likely to fall back on the harvesting of NTFP during shocks than those that are learned, because they learned may afford a wider range of

income generating opportunities while those that are not Learned, have only one alternative which is farm works. This is because they are largely un-skilled and as such can only limit themselves to farming which is freely accessible and has low technical entry requirement The findings of the study corroborated Deeks 1996: Bland and Altman (2000), that the logistic model provides information on the consequence of one variable on the other.

The main forest based activity of the harvester may likely influence their dependence on NTFPs. For instance, main based forest activity such as livestock manager, medicinal herbs collector's e.t.c. perform different activities. Livestock managers will harvest NTFPs for livestock feeds; medicinal herbs collectors will collect leaves, barks, root e.t.c. for medicinal utilization. Similarly fire wood collectors will cut branches of trees for fire wood while charcoal producers will fell an entire tree before converting it into charcoal. This implied that each harvester of NTFPs depends entirely on their main forest based activity. The findings of the study corroborated Deeks 1996: Bland and Altman (2000), that the logistic model provides information on the consequence of one variable on the other.

5.4.2: Socio-economic characteristics that influenced dependence on NTFPs by Livestock managers for livestock feeds in Taraba State, Nigeria

The socio-economic characteristics of the Livestock managers that influenced their dependence on NTFPs for livestock feeding in Taraba State showed Agro-ecological zone, Sex and Age. The estimated co-efficient for the mentioned variables were not zero, negative values or less than two but were above two. This implied that, the regression parameters in the model were statistically significant. The higher the values of the odd-ratios of the mentioned variables, the more the likelihood of such variables to influence dependence on NTFPs. The possession of high odds-ratios above two implied that, such variables may influence dependence on NTFPs. The findings of this study corroborated Deeks 1996: Bland and Altman (2000), that the logistic model provided information on the consequence of one variable on the other.

The Agro-ecological zone (AEZ) of the livestock managers may influence their dependence on NTFPs. This is because NTFPs are location and site specific. While some are forest species others are savanna species. Livestock managers in the savanna zone depended more on grasses as it is the dominant species while those in the High

forest have varieties of NTFPs (both grasses and leaves of tree species) to depend on. This explained why livestock managers moved away from the North when the grasses have withered to the Southern part of Nigeria for livestock nutrition. The findings of the study corroborated Deeks 1996: Bland and Altman (2000), that the logistic model provides information on the consequence of one variable on the other.

Similarly, sex of the livestock managers may also influence their dependence on NTFPs for livestock nutrition. Sex affects livestock managers involvement in harvesting NTFPs for livestock feeds e.g. Lopping and girdling of NTFPs for livestock nutrition is restricted to the males, perhaps because the females are restricted from entering the forest and the skills or strength involved in such activity and most importantly in this era of cattle rustling in which every livestock manager is supposed to be moving with a gun to protect himself and his livestocks The findings of the study corroborated Deeks 1996: Bland and Altman (2000), that the logistic model provides information on the consequence of one variable on the other.

The age of livestock managers may also influence their dependence on NTFPs. This is because age is an indication of the active working life and ability to migrate with livestocks to where available NTFPs can be located or sought for. Pastoralist moved from the North to the South in search of NTFPs. Those that are too young or too old may not have the physical strength needed for this journey. Sometimes the livestock managers would have to lop or girdle a tree and this required climbing to the top of the tree and this of course cannot be done by this category of people. Younger household heads have the physical strength to engage in these strenuous activities. The findings of the study corroborated Deeks 1996: Bland and Altman (2000), that the logistic model provides information on the consequence of one variable on the other.

5.4.3: Socio-economic characteristics that influenced dependence on NTFPs by Marketers of NTFPs for income/employment generation in Taraba State, Nigeria

The socio-economic characteristics of the Marketers of NTFPs that influenced their dependence on NTFPs for income and employment generation in Taraba State showed monthly income, agro-ecological zone, sex and educational status. There were enough evidence that the estimated co-efficient for the mentioned variables were not zero, negative values or below two but were above two. This implied that, the regression parameters in the model were statistically significant. The higher the values of odds-

ratios, the more the socio-economic factors can influence the dependence on NTFPs for income and employment generation by marketers of NTFPs. The findings of the study corroborated Deeks 1996; Bland and Altman (2000), that, the logistic model provides information on the consequence of one variable on the other.

The monthly income of the marketers of NTFPs may as well influence their dependence on NTFP trade. This is because the more money a marketer of NTFP has the more he can purchase NTFPs and the more varieties of NTFPs he can trade in the market and consequently, the more profit he may generate. How much an individual marketer earns in a month determines how much NTFPs he can buy to trade with. This is important because marketers with low income tend to buy less of NTFPs to trade with compared to marketers with higher income who could buy larger quantities of NTFPs for trade and hence makes much profit in the process. The findings of the study corroborated Deeks 1996; Bland and Altman (2000), that, the logistic model provides information on the consequence of one variable on the other.

Also, the Agro-ecological zone (AEZ) of the marketers of NTFPs may as well influence their dependence on NTFPs for trade. This is because NTFPs compositions are location specific. While marketers of NTFPs in the Forest Zone trade on Forest NTFP species readily abundant, those from the savanna zone equally trade with savanna species also readily abundant in the area. Although smaller quantities of both forest and savanna species of NTFPs can be traded together, they are more dominant in their zones of origin. The findings of the study corroborated Deeks 1996; Bland and Altman (2000), that, the logistic model provides information on the consequence of one variable on the other.

The sex of the marketers of NTFPs may also influence their dependence on NTFPs for livelihood support. Sex of marketers affects the trade activities of the respondents. In Taraba State, trade in NTFPs are done by both males and females, however, there are restrictions in activities e.g. strenuous activities such as felling a tree, charcoal production, tapping palm wine, logging and hunting are exclusively carried out by males in Taraba State perhaps because of the skills, physical strength and the lack of trust or fear of allowing the female partner to know monthly income generated from NTFPs. The females are restricted to trade in fire wood, wild vegetables, fruits, nuts and seeds of NTFPs. This is because such trades are less cumbersome. The findings of

the study corroborated Deeks 1996; Bland and Altman (2000), that, the logistic model provides information on the consequence of one variable on the other.

Similarly, the educational status of the marketers of NTFPs may also influence their dependence on NTFPs for trade. This is because the learned have wider range of income generating opportunities compared to the un-learned. The un-learned categories of people are merely farmers and so when there is agricultural shock, they are worst affected and can only fall back on NTFPs for subsistence and trade. This is because, they are largely un-skilled, besides, trade in NTFPs does not require any special skill and so they become easy recruits. The findings of the study corroborated Deeks 1996; Bland and Altman (2000), that, the logistic model provides information on the consequence of one variable on the other.

5.4.4: Socio-economic characteristics that influenced dependence on NTFPs for Building/energy material supplies in Taraba State, Nigeria

The socio-economic characteristics of the Building/energy material suppliers that influenced their dependence on NTFPs in Taraba State showed Agro-ecological zone and Monthly income as the only socio-economic variables that influenced their dependence on NTFPs for community livelihoods. There were sufficient evidence that the estimated co-efficient for the two variables were not zero, negative values or lower than two but were above two. This implied that, the regression parameters in the model were statistically significant. In other words, the higher the values of odds-ratios, the more the socio-economic factors can influence dependence on NTFPs for community livelihoods. The implication was corroborated by Deeks (1996); Bland and Altman (2000) that, the logistic model provides information on the consequence of one variable on the other.

The Agro-ecological zone of the Building and energy material suppliers of NTFPs may influenced their dependence on NTFPs particularly on the type of NTFPs to supply for either building or as energy materials.This is because the Agro-ecological zones differ in the composition of NTFPs and hence the building or energy materials to be supplied. For instance, while those in the high forest will used palm fronds, bamboo leaves as thatch materials for temporary shelter, those in the savanna zones used purely grasses and stalks of maize, millet or sorghum as thatch materials for roofing. Similarly forest species such as *Brachystagia eurycoma, carpolobia lutea. Bambusa*

vulgaris, Ancistrophyllum opacum etc. are supplied by those in forest zones of Taraba State as building/energy materials while savanna species such as *Faidherbia albida, Adansonia digitata, vitellaria paradoxa Balanites aegyptiaca* and all grasses are supplied by those from the savanna zones as building/energy materials. Although both forest and savanna species may be supplied together, their supplies are more dominant in their zones of origin. The findings of the study corroborated Deeks 1996; Bland and Altman (2000), that, the logistic model provides information on the consequence of one variable on the other.

The monthly income of the building/energy material suppliers may influence their dependence on NTFPs. This is because, the more income a supplier has, the more, he can supply in large quantities of either building or energy materials to those that needed them and the same will apply where the income is low. The findings of the study corroborated Deeks 1996; Bland and Altman (2000), that, the logistic model provides information on the consequence of one variable on the other.

5.4.5: Socio-economic characteristics that influenced dependence on NTFPs by Medicinal herbs collectors in Taraba State, Nigeria

The socio-economic characteristics of the Medicinal herbs collectors that influenced their dependence on NTFPs in Taraba State showed Age, Agro-ecological zone and Sex as the socio-economic variables that influenced their dependence on NTFPs for community livelihoods. There were sufficient evidence that the estimated co-efficient for the mentioned variables were not zero, negative values, below two but were above two. This implied that, the regression parameters in the model were statistically significant. In other words, the higher the values of odds-ratios, the more the likelihood of the socio-economic factors to influence dependence on NTFPs for community livelihoods. The implication was corroborated by Deeks (1996): Bland and Altman, (2000) that, the logistic model provides information on the consequence of one variable on the other.

The age of medicinal herbs collectors may influence their dependence on NTFPs. This is because the elderly stays mostly in rural areas and relies more on medicinal herbs as medicine for treating a lot of ailment than the younger household heads. This is because, they are cheap to afford and are readily available in the rural areas. The younger household heads stays mostly in the cities and had more money and access to

modern health care than the elderly that stays mostly in rural areas.The findings of the study corroborated Deeks 1996; Bland and Altman (2000), that, the logistic model provides information on the consequence of one variable on the other.

Similarly, the Agro-ecological zone of the medicinal herbs collectors may influence their dependence on NTFPs to be utilized as medicinal herbs in the study area. This is because NTFP compositions are location specific. While some are confined to the forest zone such as *Tamarindus Indica, Datura metel, Borassus aethipum, melicia excelsa, Raphia mambillensis* etc. others such as *Faidherbia albida, Adansonia digitata, Balanites aegyptiaca, vitellaria paradoxa, vitex doniana* are found mostly in the Guinea and sudan sevanna zones respectively. Their harvesting and utilization are also location specific. Although, some of them could also be seen or utilized in other zones they are dominantly utilized in their zones of origin. The findings of the study corroborated Deeks 1996: Bland and Altman (2000), that, the logistic model provides information on the consequence of one variable on the other.

The sex of the medicinal herbs collectors may also influence their dependence on herbs to be utilized as medicine. For instance, in the harvesting of lateral roots to be used as medicine, the collection process is strenuous and will be better done by their males counterpart perhaps because of the skills and physical strength involved in the lateral root extraction in which roots are dug out and sometimes even an entire tree can be fell or uprooted to get roots. The findings of the study corroborated Deeks 1996; Bland and Altman (2000), that, the logistic model provides information on the consequence of one variable on the other.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1: Summary and Conclusion

NTFPs assisted community livelihoods in Taraba state by providing forest foods, livestock feeding, income/employment generation, supply of building/energy materials and medicinal herbs utilization. The findings of the study showed divergence in the use of NTFPs for community livelihoods in Taraba State. The followings were the major findings of the study;

- A total of 206 categories of NTFPs used for community livelihood support were identified in Taraba State. These comprised of 102 NTFPs from 44 families of plants.
- Ten (10) NTFPs that are under use pressure were identified.
- Empirical evidence on the significant contributions of NTFPs to community livelihoods in Taraba State was established.
- Socio-economic characteristics that influenced dependence on NTFPs for community livelihoods in Taraba State were determined

6.2 Recommendations

Actionable project, programs, policies and research on NTFP management, that is community driven with opportunity for livelihoods and which will improve rural livelihoods should be vigorously pursued. Such research or project should target conservation and management of NTFPs that contributed to community livelihoods in Taraba State.

Based on the above, the following recommendations are made;

- The identification of the NTFPs by their vernacular names was very difficult as only few hunters and medicinal herbs collectors could do so. This was further worsening by medicinal herbs collectors that hide the identity of NTFPs used for treating different ailments. Also to mystify their trade, they donot encourage

the planting of these NTFPs and so all their collections were from the wild. The indigenous knowledge and relevance of these NTFPs are steadily being lost in the study area. There is therefore the need to document the indigenous knowledge of these NTFPs and their relevance in the study area to give room for continuity in this knowledge and relevance.

- There is lack of market information on NTFPs and this is futher worsening by trade barriers such as excessive tarrif on some NTFPs in the study area. This encourages illegal trade in some NTFPs particularly those with high tarrif thereby affecting income/employment generated from NTFPs. This makes it very difficult to quantify the monetary value of many NTFPs and to prevent illegal trade in NTFPs in the study area. There is therefore the need to reduce trade barriers on NTFPs and to formulate institutional framework for the management, support and regulation of the NTFP sector.
- The high level dependence on some NTFPs for community livelihood may lead to the depletion of such species in the study area. The contribution of NTFPs to improving community livelihoods can best be assured through a process of gradual domestication of NTFPs in human modified forest types. This can be done through intensive management and domestication of priority NTFPs through small holder cultivation in farms and gardens, commercial plantation and enrichment planting in forest reserves in the study area.

  Similarly, Government and Non-governmental organizations can come together with the inhabitants of Taraba state to mount a program of sustenance and conservation of the priority NTFPs. Taraba State government should also liaise with the state department of forestry to raise seedlings of the priority NTFPs and should supply same to the inhabitants of the State for on-ward planting by them. This is because if communities in Taraba State raise seedlings of NTFPs that contributed to community livelihoods, around their houses and on their farms, the pressure on the wild species will be reduced.

6.3 Contributions to knowledge

- A compendium of 206 categories of NTFPs used for community livelihood support was identified in Taraba State. These comprised of 102 NTFPs from 44 families of plants.
- Ten (10) NTFPs that are under use pressure were identified.
- Empirical evidence on the significant contributions of NTFPs to community livelihoods in Taraba State was established.
- Socio-economic characteristics that influenced dependence on NTFPs for community livelihoods in Taraba State were determined.

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APPENDIX I

FACULTY OF AGRICULTURE AND FORESTRY
DEPARTMENT OF FOREST RESOURCES MANAGEMENT,
UNIVERSITY OF IBADAN, IBADAN, NIGERIA

Questionnaire on the contributions of selected NTFPs to community livelihoods in Taraba state.

Dear Sir/Ma,

I thank you in advance for taking part of your productive time to complete this questionnaire. The questions provided below are to be used for research purpose alone. Kindly respond to them. You are assured of the confidentiality of your responses.

Yours faithfully,

Zaku Sabo

INSTRUCTION: Fill or tick as appropriate.

SECTION A
(HARVESTERS OF NTFPs)

1. What is your total monthly income in naira per month? ----------
2. How much of your income in naira (₦) per month comes from NTFPs? ---------
3. Do you use NTFPs as food for community livelihoods? (a) Yes [ ] (b) No [ ]
4. If Yes to (3) above, List NTFPs used as food for community livelihoods?

(LIVESTOCK MANAGERS)

INSTRUCTION: Fill or tick as appropriate

1. How much do you spend on buying livestock feeds per month in Naira? ----------
2. How much of this income in naira per month comes from NTFPs? ----------
3. Do you use NTFPs in feeding your livestock?

   (a) Yes [ ] (b) No [ ]
4. If Yes to (3) above, List NTFPs used in feeding your livestock's ?----------

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SECTION B
(MARKETERS OF NTFPs)

INSTRUCTION: Fill or tick as appropriate.

1. What is your total monthly income in naira per month? ----------
2. How much of this income comes from the sales of NTFPs? ----------
3. Are you engaged in NTFPs trade? (a) Yes [ ] (b) No [ ]
4. If Yes to (3) above, List NTFPs traded, quantities and their amounts in Naira?.

S/NO	NTFPs	QUANTITY	AMOUNT (#)

5. Do you employ labourers to assist in the collection, buying and selling of NFFPs?
   (a) Yes [ ] (b) No [ ]
6. If yes to (5) above, are the labourers permanent or casual? (a) Permanent [ ] (b) Casual [ ]
7. How much do you pay the labourers in naira?

Main Activity	Man-hours spent	Amount Paid (N)

SECTION C
(BUILDING AND ENERGY MATERIAL SUPPLIERS)

INSTRUCTION: Fill or tick as appropriate.

1. Do you use domestic sources of energy for cooking? (a) Yes [ ] (b) No [ ]
2. If yes to (1) above, List the various domestic sources of energy used?

   ---

3. Reasons for the preference charcoal in cooking
   (a) Cheap and always available [ ]
   (b) Does not give odour [ ]
   (c) It is fast in cooking [ ]
4. Estimate in percentages your various use of these domestic sources of energy?
   (a) 25% [ ] (b) 50% [ ] (c) 75% [ ]
5. How much do you spend on the supply of building/ energy materials in Naira per month?----------

. 5. How much of this amount comes from NTFPs? ----------

6. Do you supply NTFPs as building and energy materials? (a) Yes [ ] (b) No [ ]
7. If yes to (6) above, List NTFPs supply as building and energy materials----------

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SECTION D

(MEDICINAL HERBS COLLECTORS)

INSTRUCTION: Fill or tick as appropriate

1. Do you use NTFPs in treating human diseases? (a) Yes [ ] (b) No[ ]

2. If Yes to (1) above, List NTFPs that are used to cure such diseases and part used?

Diseases	NTFPs used	NTFPs Part used

3. How much do you spend in treating such diseases in hospitals per household member in Naira per month? ----------

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4. How much of this income comes from NTFPs in Naira per month? ----------

SECTION E

Socio-economic characteristics of respondents that can influence dependence on NTFPs in the study area.

1. Does your age influence your dependence on NTFPs?
   (a) Yes [ ] (b) No [ ]
2. Does sex influence dependence on NTFPs?
   (a) Yes [ ] (b) No [ ]
3. Does your educational status influence your dependence on NTFPs?
   (a) Yes [ ] (b) No [ ]
4. Does monthly expenditure influence dependence on NTFPs?
   (a) Yes [ ] (b) No [ ]
5. Does your AEZ influence your dependence on NTFPs?
   (a) Yes [ ] (b) No [ ]
6. Does your number of meals per day influence your dependence on NTFPs?
   (a) Yes [ ] (b) No [ ]
7. Does your monthly income influence your dependence on NTFPs?
   (a) Yes [ ] (b) No [ ]
8. Does your occupation influence your dependence on NTFPs?
   (a) Yes [ ] (b) No [ ]
9. Does your main forest based activity influence your dependence on NTFPs?
   (a) Yes [ ] (b) No [ ]
10. Does your household size influence your dependence on NTFPs?
    (a) Yes [ ] (b) No [ ]

APPENDIX 1I

NTFPs used as Food in Taraba State.

NTFPs used as Food in form of Fruit, nut and seed.

S/No	Hausa name	Scientific name	Respondents	Family
1	Jambe	*Dacryodes edulis*	2	Burseraceae
2	Goron birii	*Irvingia gaboneensis*	4	Irvingiaceae
3	Wa'awan kurmi	*pluckenetia conophora*	2	Euphorbiaceae
4	Kuka	*Adansonia digitata*	5	Bombacaceae
5	Tsage	*Amblygonocarpus androgenesis*	3	Mimosaceae
6	Aya'a	*Cyperus esculentus*	2	Cyperaceae
7	Ya'alo'o	*Solanum incanum*	3	Solanaceae
8	Gwandar daji	*Anona senegalensis*	5	Annonaceae
9	Magarya'a	*Ziziphus mauritiana*	3	Rhamnaceae
10	Kimba	*Xylopia aethiopica*	4	Annonaceae
11	Aduwa	*Balanites aegyptiaca*	7	Zygophyllaceae
12	Giginya	*Borassus aethiopicum*	7	Palmae
13	Dorowa	*Parkia biglobosa*	17	Leguminosae
14	Atile	*Canarium schweinfurthis*	6	Burseraceae
15	Tsamiyar kurmi	*Dialium guineense*	4	Leguminosae
16	Tsadar masar	*Spondias mombin*	6	Anacardiaceae
17	Tsamiya	*Tamarindus indica*	8	Leguminosae
18	Dinya	*Vitex doniana*	7	Verbenaceae
19	Kadanya	*Vitellaria paradoxa*	8	Sapotaceae
20	Barabutu	*Artocarpus communis*	4	Moraceae
21	Gwa'aba	*Psidium guajava*	4	Myrtaceae
22	Tuwon birii	*Parinari excels*	3	Chrysobalanaceae
23	Tsada	*Ximenia Americana*	5	Olacaceae
24	Attagar	*Cocos nucifera*	6	Palmae
25	Kwara	*Elaeis guineensis*	5	Palmae
26	Walnut	*Lovoa trichilioides*	3	Meliaceae
27	Kabewa	*Cucurbita pepo*	2	Cucurbitaceae
28	Wa'awan kurmi	*Ricinodendron heudelotii*	2	Euphorbiaceae

	NTFPs used as vegetables, soup, spices and condiments.			
29	Kawo	*Afzelia bella*	2	Leguminosae
30	Bambami	*Alchornia cordifolia*	3	Euphorbiaceae
31	Rimi	*Ceiba petandra*	4	Bombacaceae
32	Maje/kadaura	*Daniella oliveri*	5	Leguminosae
33	Baure	*Ficus spp*	6	Moraceae
34	Madobiyar	*Pterocarpus erinaceus*	3	Leguminosae
35	Shiwa'aka'a	*Vernonia amygdalina*	7	Compositae
36	Kurya	*Bombax costatum*	4	Bombacaceae
37	Katsari	*Albizia zygia*	2	Leguminosae
38	Hantsar giwa	*Kigelia Africana*	3	Bignoniaceae
39	Rama'a	*Hibiscus cannabinus*	2	Malvaceae
40	Dargaza'a	*Grewia venusta*	4	Tiliaceae
41	Wambo	*Brachystegia eurycoma*	7	Caesalpiniaceae
42	Konkoli	*Beilschmiedia mannii*	8	Lauraceae
43	Tafarnuwa	*Allium sativum*	2	Alliaceae
44	Zurma	*Ricinus communis*	3	Euphobiaceae
45	Kirya	*Prosopis Africana*	5	Leguminosae
46	Masoro'o	*Piper guineensis*	7	Leguminosae
47	Borkono daji	*Aframomum letifolium*	3	Zingiberaceae
48	Kombi	*Mimosa pigra*	8	Mimosaceae
	NTFPs consume as dietary supplements			
49	Naman daji	Bush meat	5	
50	Tsutsa	Caterpillar	3	
51	Gara	Termites	2	
52	Kodi	Snails	5	
53	Zuma	Honey	5	
54	Naman itace	Mushroom	4	
55	Gya'are	Crickets	3	
56	Fa'ara	G/hopper/Locust	4	
57	Kifi	Fish	5	

Source: Field survey 2014

APPENDIX III

NTFPs used for livestock feeding in Taraba state.

NTFPs	
1. Annona senegalensis	13
2. Vitex donina	10
3. Acacia spp	8
4. Faidherbia albida	20
5. Prosopis africana	5
6. Azadirachta indica	7
7. Afzelia africana	15
8. Parkia biglobosa	12
9. Adansonia digitata	14
10. Datura metel	6
11. Borassus aethiopicum	15
12. Pilliostigma thonningii	10

Source: Field survey 2014

APPENDIX IV

NTFPs that generate income and employment in Taraba State.

NTFPs sold as Fruit, nut and seed

S/No	Hausa name	Scientific name	Respondents	Family
1	Jambe	*Dacryodes edulis*	2	Burseraceae
2	Goron birii	*Irvingia gaboneensis*	3	Irvingiaceae
3	Wa'awan kurmi	*pluckenetia conophora*	2	Euphorbiaceae
4	Kuka	*Adansonia digitata*	3	Bombacaceae
5	Tsage	*Amblygonocarpus androgenesis*	2	Mimosaceae
6	Aya'a	*Cyperus esculentus*	1	Cyperaceae
7	Ya'alo'o	*Solanum incanum*	2	Solanaceae
8	Gwandar daji	*Anona senegalensis*	2	Annonaceae
9	Magarya'a	*Ziziphus mauritiana*	1	Rhamnaceae
10	Kimba	*Xylopia aethiopica*	2	Annonaceae
11	Aduwa	*Balanites aegyptiaca*	2	Zygophyllaceae
12	Giginya	*Borassus aethiopicum*	2	Palmae
13	Dorowa	*Parkia biglobosa*	3	Leguminosae
14	Atile	*Canarium schweinfurthis*	1	Burseraceae
15	Tsamiyar kurmi	*Dialium guineense*	2	Leguminosae
16	Tsadar masar	*Spondias mombin*	2	Anacardiaceae
17	Tsamiya	*Tamarindus indica*	3	Leguminosae
18	Dinya	*Vitex doniana*	2	Verbenaceae
19	Kadanya	*Vitellaria paradoxa*	3	Sapotaceae
20	Barabutu	*rtocarpus communis*	1	Moraceae
21	Gwa'aba	*Psidium guajava*	2	Myrtaceae
22	Tuwon birii	*Parinari excels*	3	Chrysobalanaceae

23	Tsada	*Ximenia Americana*	2	Olacaceae
24	Attagar	*Cocos nucifera*	3	Palmae
25	Kwara	*Elaeis guineensis*	3	Palmae
26	Walnut	*Lovoa trichilioides*	2	Meliaceae
27	Kabewa	*Cucurbita pepo*	1	Cucurbitaceae
28	Ayaban daji	*Ensete gillettii*	1	Musaceae
29	Daddagu	*Momordica charantia*	2	Cucurbitaceae
	NTFPs sold as vegetables, oils, spices and condiments.			
30	Kombi	*Mimosa pigra*	3	Mimosaceae
31	Rama'a	*Hibiscus cannabinus*	1	Malvaceae
32	Dargaza'a	*Grewia venusta*	2	Tiliaceae
33	Wambo	*Brachystegia eurycoma*	4	Caesaipiniaceae
34	Konkoli	*Beilschmiedia mannii*	4	Lauraceae
35	Tafarnuwa	*Allium sativum*	2	Alliaceae
36	Zurma	*Ricinus communis*	2	Euphobiaceae
37	Kirya	*Prosopis Africana*	3	Leguminosae
38	Citafo	*Zingiber officinale*	2	Zingiberaceae
39	Masoro	*Piper guineensis*	2	Piperaceae
40	Borkono daji	*Aframomum letifolium*	1	Zingiberaceae
	NTFPs sold as cattle and chewing stick			
41	Fasa kwari	*Zanthoxylum zanthoxyloides*	1	Rutaceae
42	Sanda kiwo'o	*Carpolobia lutea*	2	Polygaceae
43	Sanda kiwo'o	*Randia spp*	1	Rubiaceae
44	Itace brush	*Massularia acuminate*	2	Rubiaceae
45	Gawo	*Faidherbia albida*	2	Mimosaceae

	NTFPs sold as Fuel wood and charcoal			
46	Madaci	*Khaya senegalensis*	3	Meliaceae
47	Madobiya	*Pterocarpus erinaceus*	2	Leguminosae
48	Kojoli	*Anogeissus leiocarpus*	1	Combretaceae
49	Ice mai ci wuta	*Leucaena leucocephala*	3	Leguminosae
50	Kafafago	*Uapaca togoensis*	2	Uapaca
51	Ajenana	*Trema orientalis*	1	Ulmaceae
52	Kawo	*Afzelia Africana*	2	Leguminosae
53	Kasfiya	*Crossopteryx febrifuga*	2	Rubiaceae
54	Kalgo	*Pilliostigma thonningii*	2	Leguminosae
	NTFPs sold as wrapping leaves			
55	Katemfe	*Thaumatococcus danielli*	4	Marantacea
	NTFPs sold as weaving materials or rope			
56	Gwangwala'a	*Bambusa vulgaris*	3	Poaceae
57	Ramaa'a	*Hibiscus cannabinus*	2	Malvaceae
58	Kwagiri	*Ancistrophyllum opacum*	2	Arecaceae
59	Ma'ajigii	*Baphia nitida*	2	Papilionaceae
	NTFPs sold as sponge			
60	Soso	*Luffa cylindrical*	3	Luffa
	NTFPs sold as dyes			
61	Majigi	*Baphia nitida*	3	Papilionaceae
62	Talaki	*Lonchocarpus cyanescens*	2	Leguminosae
63	Fisa	*Blighia sapida*	1	Sapindaceae
64	La'ale	*Lawsonia inermis*	1	Lythraceae
	NTFPs sold as palm wine, local magi, oils and soap			
65	Tukuruwa	*Raphia mambillensis*	2	Palmae
66	Kwara	*Elaeis guineensis*	4	Palmae
67	Kadanya	*Vitellaria paradoxa*	3	Sapotaceae
	NTFPs sold as medicine			
68	Shiwaaka	*Vernonia amygdalina*	3	Compositae
69	Madachi	*Khaya senegalensis*	3	Meliaceae
70	Kirya	*Prosopis Africana*	1	Leguminosae
71	Dogo yaro	*Azadirachta indica*	3	Meliaceae
72	Zakamii	*Datura metel*	1	Solanaceae
	NTFPs sold as gum			
73	Dumshe	*Acacia seyal*	2	Mimosaceae

	NTFPs sold as beads			
74	Idon Zakkara'a	*Coix lacryma*	2	Poaceae
	NTFPs sold as building and construction materials			
75	Gwangwalaa	*Bambussa vulgaris*	2	Poaceae
	NTFPs sold as dietary supplements			
76	Naman itace	Mushroom	2	
77	Naman daji	Bush meat	3	
78	Tsutsa	Caterpillar	2	
79	Gara	Termite	1	
80	Kodi	Snails	1	
81	Zuma	Honey	3	
82	Gya'are	Crickets	2	
83	Fara	G/hopper/Locust	2	
84	Kifi	Fish	3	

Source: Field survey 2014.

APPENDIX V

NTFPs used as Building and Energy materials in Taraba state.

NTFPs	
1.	Terminalia schimperiana 6
2.	Uapaca togoensis 8
3.	Faidherbia albida 10
4.	Adansonia digitata 4
5.	Corn stalks 7
6.	Parkia biglobosa -
7.	Ziziphus mauritiana 11
8.	Balanites aegyptiaca 5
9.	Newbouldia laevis 10
10.	Elaeis guineensis 6
11.	Hibiscus cannabinus 8
12.	Crossopteryx febrifuga 4
13.	Pilliostigma thonningii 7
14.	Bambussa vulgaris 10
15.	Imperata cylindrica 10
16.	Pennisetum purpureum 20
17.	Brachystegia eurycoma 4
18.	Vitellaria paradoxa -
19.	Andropogon tectorum 12
20.	Chloris gayana 18
21.	Carpolobia lutea 3
22.	Randia species 6
23.	Ancistrophyllum opacum 7
24.	Anthocleista nobilis 8

Source: Field survey 2014

APPENDIX VI

NTFPs used as medicinal herbs in Taraba state

NTFPs used	Respondents	Diseases	Parts
Faidherbia albida	1	Pneumonia	Leaves Bark and Root
Adansonia digitata	1	Pneumonia, Malaria, Diarrhea and Dysentery	Leaves, Bark and Fruit
Azadirachta indica	3	Malaria and Typhoid	Leaves, Bark and Fruit
Anacardium occidentale	3	Malaria, Measles and Typhoid	Leaves, Bark and Fruit
Balanites aegyptiaca	1	Measles	Seed, Bark, Root and Fruit
Borassus aethiopium	1	Pneumonia	Root
Vitellaria paradoxa	2	Pneumonia	Seeds
Carica papaya	2	Malaria and Dysentery	Leaves, Seed and Fruit
Annona senegalensis	1	Dysentery	Leaves, Bark, Root and Seed
Khaya ivorensis	1	Malaria	Root and Bark
Kigelia africana	1	Malaria and Dysentery	Leaves, Bark, Root and Fruit
Mangifera indica	1	Malaria and Diarrhea	Leaves, Bark and Root
Melicia excels	1	Malaria	Root and Bark
Moringa oleifera	3	Diarrhea	Leaves, Bark, Root and Fruit
Newbouldia laevis	2	Malaria and Dysentery	Leaves, Bark and Root

Parkia biglobosa	3	Malaria	Leaves, Bark, Seed and Fruit
Tamarindus indica	4	Malaria and Diarrhea	Leaves, Bark and Fruit pulp
Xylopia aethiopica	2	Pneumonia	Leaves, Bark, Seed and Fruit
Zingiber officinale	1	Malaria and Typhoid	Rhizome
Crossopteryx februga	1	Pneumonia	Leaves and Bark
Hibiscus sabdarifa	1	Malaria and Pneumonia	Leaves
Vernonia amygdalina	1	Malaria and Pneumonia	Leaves, Stem and Root
Vitex doniana	1	Malaria and Diarrhea	Leaves, Bark and Root
Albizia ferruginea	1	Dysentery	Leaves, Bark and Root
Ceiba pentandra	1	Malaria	Leaves, Bark and flowers
Citrus spp.	2	Malaria, Measles, Dysentery and Typhoid	Leaves, Bark, Root and Fruit
Elaeis guineensis	1	Malaria, Measles and Diarrhea	Root, Bark, Palm oil nd Kernel
Ficus spp.	2	Dysentery	Leaves, Bark and Seed
Lawsonia inermis	1	Malaria	Leaves, Bark and Flowers
Psidium guajava	1	Malaria, Dysentery and Diarrhea	Leaves, Bark and Fruit
Zanthoxyllum Xanthoxyloides	1	Pneumonia	Root and Bark
Pterocarpus erinaceus	1	Dysentery and Diarrhea	Leaves and Bark
Raphia mambillensis	1	Measles	Leaves Bark and Root
Spondias mombin	1	Measles and Diarrhea	Leaves, Bark and Root
Datura metel	1	Diarrhea	Fruit

Source: Field survey 2014

APPENDIX VII

Families of NTFPs used for community livelihoods in Taraba state.

S/No	Families	FD	IEG	BEMS	LF	MHC
1	Albizia	0	0	0	0	1
2	Allanblackia	0	0	0	0	1
3	Allium	1	1	0	0	0
4	Anacardaceae	3	3	0	1	3
5	Annonaceae	2	2	0	1	2
6	Beilschimiedia	1	1	0	0	0
7	Bignoniaceae	1	0	1	0	2
8	Bombacaceae	3	1	1	1	2
9	Brachystagia	1	1	1	0	0
10	Burseraceae	2	2	0	0	1
11	Cannabinaceae	0	0	0	0	1
12	Combretaceae	0	1	0	0	1
13	Compositae	1	2	0	0	1
14	Cucurbitaceae	2	2	0	0	1
15	Cyperaceae	1	1	0	0	0
16	Euphobiaceae	3	1	1	0	1
17	Irvingiaceae	1	1	0	0	0
18	Leguminosae	9	11	1	4	6
19	Lythraceae	0	1	0	0	1
20	Malvaceae	3	3	1	0	2
21	Marantaceae	0	1	0	0	0
22	Meliaceae	1	4	0	0	4
23	Mimosaceae	1	3	2	2	0
24	Momordica	0	1	0	0	0
25	Moraceae	2	1	0	0	1
25	Myrtaceae	1	1	0	0	1
26	Olacaceae	1	1	0	0	0
27	Palmae	3	5	1	1	3
28	Papilionaceae	0	2	0	0	0
29	Poaceae	0	2	1	0	1
30	Polygaceae	0	1	1	0	0
31	Rhamnaceae	1	1	1	0	1
32	Rubiaceae	0	2	1	0	2
33	Rutaceae	1	2	0	0	2
34	Sapindaceae	0	1	0	0	1
35	Sapotaceae	1	2	1	0	1
36	Solanaceae	1	1	0	0	0
37	Sterculiaceae	0	1	0	0	2
38	Tiliaceae	1	1	0	0	2
39	Ulmaceae	0	1	0	0	1

40	Verbenaceae	1	1	0	1	1
41	Zingiberaceae	1	2	0	0	1
42	Zygophyllaceae	1	1	1	0	1
43	Animal kingdom	8	8	0	0	0
44	Basidiomycetes	1	1	0	0	0
	Total	34	32	17	10	20

Source: Field survey 2014

Key:

FD: Food

IEG: Income/Employment

BEMS: Building and energy Materials supplies

LF: Livestock feeds

MHC: Medicinal herbs collectors