

NON-WOOD FOREST PRODUCTS (NWFPs) FOR ENHANCING RURAL LIVELIHOOD: THE CASE OF GUM ARABIC COLLECTION IN ADAMAWA STATE, NIGERIA

DENGLE YUNIYUS GIROH¹; NDAGHU, A. ANTHONY² AND FAKUTA NAIWA MARKUS³

1. Rubber Research Institute of Nigeria, P.M.B1049, Benin City, Nigeria
Email: girohydengle@yahoo.com

2. Department of Agricultural Economics and Extension, Federal University of Technology, PMB 2076, Yola, Nigeria

3. Rubber Research Institute of Nigeria, Gum Arabic Sub-Station, Gashua, Yobe State, Nigeria

ABSTRACT

The study examined the collection of gum arabic as non-wood forest products for enhancing rural livelihood in Adamawa State through a questionnaire survey administered on a sample of 100 gum arabic collectors obtained through a multi stage sampling technique. Data collected were analyzed using descriptive and inferential statistics (general entropy class of measures). Results of the analysis revealed that gum collectors were educated and had one form of formal education or the other. Minimum and maximum quantities of gum collection were 182.56 kg and 748.68 kg with corresponding income of N10,223.36 and N41,906.48. Findings also indicated total income and expenditure among collectors were N2, 137,139.20 and N 977,141.76. Empirical results of the analysis of the general entropy class of measures result showed significance in income inequality and expenditure among respondents as computed general entropy (GE) values for income (1850.60) and expenditure (2092.96) were significantly greater than zero. The study recommends that government and non governmental agencies support farmers in the cultivation of gum arabic in organized plantations by providing them with improved seedlings and other production inputs.

Keywords: non- wood, forest, livelihood, gum collection, guinea savanna, Adamawa, Nigeria

INTRODUCTION

Forests and woodlands cover about 650 million hectares (or 21.8%) of the total land area of the African continent. About 99% of the forests are natural and only 1% classified as plantations. These forests are said to be undergoing high levels of deforestation in the world with an estimated annual net loss of 5.3 million hectares (or 0.78%). The above prognosis does not augur well for Africa given the significance of forests/trees in combating desertification, providing basic human necessities, protecting

biological diversity, watersheds and moderating climate change (FAO, 2000;.FAO, 2003).

The dry forests of Africa are home to almost 235 million rural people and the forests cover over 43% of the land surface. Forest-based economic activities, such as making charcoal and selling forest products often contribute to over 25% of rural household income and reduce the impacts of droughts and lean times. The fact that so many people depend on the dry forests make them unique and important. Non-timber forest products can offer options for improving people's

livelihoods while at the same time conserving the forest resources. Sustainable management of the dry forests can thus contribute to meeting the UN Millennium Developmental Goals regarding poverty alleviation and protection of the environment. It emphasized the need to eradicate extreme poverty and hunger by half the proportion of people living on less than \$1 a day (*Proportion of population below \$1 per day (PPP values)*). Poverty refers to the condition of not having the means to afford basic human needs such as clean water, nutrition, health care, education, clothing and shelter. Poverty can be classified as absolute poverty (or destitution) and relative poverty. Absolute poverty refers to a set standard which is consistent over time and between countries. The World Bank defines extreme poverty as living on less than US \$1.25 (PPP) per day, and *moderate poverty* as less than \$2 a day. It estimates that in 2001, 1.1 billion people had consumption levels below \$1 a day and 2.7 billion lived on less than \$2 a day. Relative poverty views poverty as socially defined and dependent on social context, hence relative poverty is a measure of income inequality. Usually, relative poverty is measured as the percentage of population with income less than some fixed proportion of median income.

The distribution of extreme poverty by occupation category further revealed that agriculture and forestry contributed the highest percentage (64.7%) of national poverty in Nigeria. This millions of small scale farmers are entrapped in self-reinforcing cycle of poverty, low income leading to low savings which in turn leads to low investment and consequent low consumption, low health status, low productivity and eventual persistence of poverty (World Bank, 1996).

This makes dry forests a key resource in the convergence of interest between development and conservation objectives. New developments in Africa such as New Partnership for African Development (NEPAD) are creating new and better opportunities for poor rural people to engage

in and benefit from forest based enterprises and markets. The increasing rates of urbanization are creating markets for traditional forest products. Global demand for forest products such as organic honey and Body-Shop type natural products are increasing (estimated at over US\$11 billion). Fair trade systems are some of the positive trends that can stimulate forest enterprises and benefit rural producers. Natural gums and resins are among dry land resources in Sub-Saharan Africa that contribute to improved livelihoods of local communities in terms of food security, income generation and foreign exchange earnings. These resources also contribute to the amelioration of the environment. The increasing health consciousness among consumers internationally also favors their increased use (Centre for International Forest Research, CIFOR, 2007).

FAO has adopted a working definition in which “Non-Wood Forest Products (NWFPs) consist of goods of biological origin other than wood, derived from forests, other wooded lands and trees outside forests” (FAO, 1999). Many NWFPs have both social and economic benefits to rural communities. Some of these commodities also play an economic role to the national and international economies. Meanwhile, various services from forests and allied ecosystems provide many social benefits to rural people, and some also provide economic benefits. Plant gums are usually water soluble compounds made up of polysaccharides and small quantities of protein and mineral salts (cations). Plant gums from trees are of two types: exudates (ooze from the tree/shrub as a result of injury) and seed gums (isolated from the endosperm portion of some seeds). Exudate gums are the main forms produced in Africa. One of such most important commodities is Gum *arabic*, a dried exudate obtained from the stems and branches of *Acacia senegal* or *A. seyal* (FAO, 1998). The two species are native to the hot and dry regions of Africa. *A. senegal* is found in a belt some 300 km wide immediately south of the Sahara desert from Mauritania and Senegal in the West to the

Horn of Africa. From the Horn of Africa, it extends southwards through Tanzania to the Southern Africa countries of Angola, Namibia, Zimbabwe, Botswana and South Africa (Natal and Transvaal). *A. seyal* extends from Dakar in Senegal to the Horn of Africa and southwards to Tanzania. *Gum arabic* is an ancient product that has been obtained from the African dry lands for several millennia. It has also remained an important article of commerce to the present day.

In terms of production, Sudan is the principal producer accounting for over 50% of the world production followed by Chad and Nigeria, which account for the bulk of exported volume, are putting in place aggressive programmes at the level of production and post harvest handling to improve quality and value of the traded commodity. Many NWFPs are articles of commerce and have indeed contributed to the economic development of some local communities and national economies. Gums (especially *gum arabic*) are one of good examples. They are ancient commodities that have remained important articles of commerce on the international market to the present day. For example, *gum arabic* accounts for about 10% of the approximately 500,000 MT hydrocolloid trade on the international market. With improved production, post harvest handling and aggressive marketing, the traded volume is bound to increase from the current 55,000 60,000 MT to 100, 000 MT by 2010 (Dondain, 2001). An example from Nigeria illustrates the initiatives being undertaken to ensure long-term viability of the *gum arabic* sub-sector. In 1996, the national gum association was re organized to form the National Association of Gum Arabic Producers, Processors and Exporters of Nigeria (NAGAPPEN). The latter is devoted to enhancing Nigeria's share of the international *gum arabic* market through active discussions of marketing strategies and best practices (USAID/NAGAPPEN, 2002). Since the formation of the association, the sub-sector has undergone vital reorganization by establishing and

strengthening *gum arabic* producers and exporters associations in the country. Through the USAID/Nigeria Gum Arabic programme, the Association has prepared a workbook and organized a series of workshops, which are held throughout northern Nigeria designed to help Nigerian producers and small traders of Grade one *gum arabic* strengthen their share of the international market. Recent inquiries show that a lot has changed for the better and Nigeria is now firmly placed in position three among *gum arabic* exporters, after Sudan and Chad. The association has a programme with a target of generating foreign exchange earnings of US \$ 6 billion in the next four years. The long-term viability of the gum and resins sector is still constrained in some dozen other countries. There is no information available to producers on best practices concerning production and quality control and limited access to knowledge on national and global markets. To overcome some of these constraints, a coordinated strategy has been initiated among producer countries and partners to enable them to have a better control of international trade and share experiences in the area of production, processing, quality and marketing. This initiative includes the establishment of the Network for Natural Gums and Resins in Africa (NGARA), which is initially supported by FAO (Dondain, 2001).

Management of the resources for gum production is well developed and clearly demonstrates how forests can be sustainably managed. Over the years farmers have developed an agro forestry system known as gum gardens in which gum trees are grown on farm plots at a spacing of 4 x 4 meters. During the first 4-5 years agricultural crops are planted between the lines thereby supplying the farmers with food (Giroh *et al.*, 2008). Gum production begins after the fourth year of planting and continues annually until the trees are twenty to twenty five years. Meanwhile, animals are allowed to graze under the trees when they have grown big thereby providing fodder. The trees are then harvested for wood fuel and other farm activities, the land left fallow for

sometime and the cycle repeated. This system ensures optimum and sustainable use of natural resources since crop production during the initial years and gum production and livestock grazing form productive components.

The use of gum arabic has been widely reported in industrial application (food and beverages, pharmaceuticals, cosmetics, textiles). The Acacia trees are also Nitrogen-fixing and hence improve soil fertility. Other uses include provision of pods for livestock feed, shelter belt planting to control desertification and provision of timber. It is an important revenue earner for the country and employer of labour for rural people who are engaged in production and gum collection. *Chikamai and Odera (2002)* reported that gums provide both social and economic benefits to rural populations at the subsistence level. The social benefits are reflected in the many local uses they offer to the communities: the use of *gum arabic* as a food by children or herdsmen in the bush; myrrh as ink in some schools or burnt in houses to repel snakes or dangerous insects; chewing of frankincense as a gum and burning as incense among local populations. Gum collection is carried out as parts of livelihood strategies at household level, e.g. to secure provision of food and other essential subsistence goods and social security (*Arnold, 1995; Wuranti et al., 2005*).

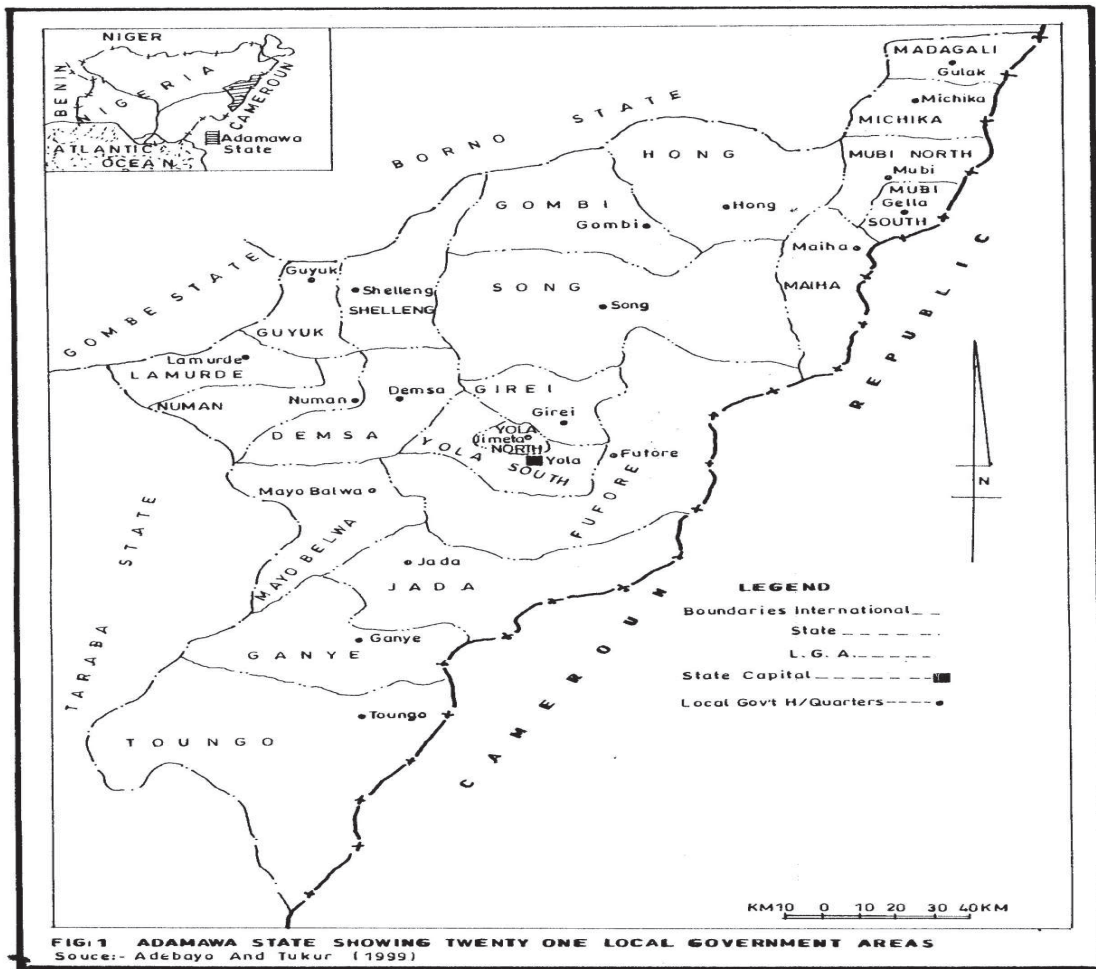
Akosim et al., (1999) reported that 7 out of the 19 species of gum arabic reported in Nigeria were found in the northern Guinea and Sudan savanna areas of Adamawa State. The rainfall regime of these zones ranged from 900 1100 mm and 700 900 mm per annum with rainfall duration of 4- 5 and 3-

4months respectively. Gum arabic production in Nigeria has been low arising from lack of capital to boost production, use of unimproved planting materials amongst other factors. To harness the current potentials for gum arabic production and export, its production must be improved. Production must shift from the traditional form to the use of cultivation in organized plantation with intercrop based combination for maximum economic benefit. Considering the importance of gum arabic production, the study was conducted to examine the collection of gum arabic as a means of enhancing rural livelihood among collectors in Northern Guinea Savanna Zone of Adamawa. The specific objectives were to describe the socio-economic characteristics of respondents and to estimate cost and returns on gum arabic collection.

METHODOLOGY

The study area and data collection

The study was conducted in the Northern Guinea Savanna Zone of Adamawa State purposively selected for concentration of Acacia species and large collectors of gum arabic. Data were collected using multi stage and random sampling technique. Three local government areas noted for gum arabic collection namely Demsa, Numan and Lamurde were selected from the Zone (Northern Guinea Savanna). Two villages were selected from each of the Local Government Areas. From the selected villages, 20 gum arabic collectors were randomly selected giving a sample of 120 respondents on which were administered structured questionnaire to elicit relevant economic data such as quantities collected and other socio-economic variables.



To evaluate whether there is inequality in income and expenditure among gum arabic collectors, Static Decomposition Method using General entropy class of measures were adopted and formulae stated as follows: Static Decomposition method between group inequalities given by:

$$I_b = \frac{1}{\alpha^2 - \alpha} \left[\sum f_j \left(\frac{\bar{y}_j}{\bar{y}} \right)^\alpha - 1 \right]$$

Where: I_b = between group inequality, = Parameter which represents the weight given to distance between incomes at different parts of the income distribution, y_j = mean income of each partition, \bar{y} = mean income of total population and f_j = population share

Static Decomposition method within group inequality using the General Entropy class measures (GE) given by the formula:

$$I_w = \frac{1}{\alpha^2 - \alpha} \left[\frac{1}{n} \sum_{j=1}^k \left(\frac{y_j}{\bar{y}} \right)^\alpha - 1 \right]$$

Where: GE = General Entropy class of measures, I_w = within inequality, = Parameter which represents the weight given to distances between incomes at different levels, n = number of individuals in the sample, y_j = mean income of each partition and \bar{y} = mean income of total population. The value of GE ranges from 0 to , with zero representing an equal distribution (all incomes identical), and higher levels of inequality (Datt, 1998) as used by Salvia, (2007).

RESULTS AND DISCUSSION

Personal Characteristics of Gum Arabic collectors

Gum arabic collection was dominated by males, married people, educated and experienced collectors. Collectors were also in their economically active years and are characterized by large family sizes and are experienced in gum collection (Table 1). Collection, a male dominated activity, indicated that women participation might be constrained by socio- cultural factors and the fact that gum collection is in the wild and such wild plantations were scattered and far

apart. Large family sizes of respondents put pressure on family heads in the search of means of income to meet family needs. Large family size is a reservoir for farm labour and for collection activities especially at lean periods. Gum collection characterized by the preponderance of the educated and young people also suggests that majority are school leavers without jobs and the collection of gum is for the active and young population. As young as they are the wild and far plantations pose no difficulty in terms of distance for these energetic collectors to cover.



Plate 1: Grade two of gum arabic



Plate 2: Grade three of gum arabic

Socio- economic analysis of gum arabic collection.

Data in Table 1 is the summary of selected personal characteristics of gum collectors. Respondents had 3 and 5 people as minimum and maximum implying that family size is a propelling factor for family heads to devise means of livelihood. There are new entrants in the business of gum arabic collection based on experience and age of the respondents. There was also the preponderance of the educated collectors with a mean of primary education while ordinary national diploma was the highest educational qualification attained. Total quantities of gum collection are proportionate to revenue generation. This

implies that the more the quantities collected, the more the revenue. It could be inferred from Table 1 that gum collectors earn additional income from gum collection at lean periods of farming activity. The additional income could lead to the propensity to save and consume. Experts have advocated that with solvency, farmers are likely to expand their scope of production and adoption of farm innovations.

The result shows that gum collection is a profitable venture and employer of labour in the study area. This study is in conformity with earlier studies conducted which revealed that Non- Wood Forest Products (NWFPs) contributed to the economic

development of some local communities and national economies (FAO, 2003; Giroh *et al.*, 2005.). Grades 2 and 3 are types collected in the study area despite potentials for the cultivation of grade one (*A. senegal*). In the mid 1990s, Nigeria was the second largest producer and exporter of *gum arabic* after Sudan. However, inspite of the fact that the country has the best type of *gum arabic* (from *A. senegal var. senegal*, like the Sudan), the quality of the commodity entering the international market was poor to the extent that reputable importers avoided buying from the country. Studies have shown that production was highly fragmented, with a plethora of producers and traders all competing to do business and no

coordinating body to ensure consistency of production methodologies or product quality. Quality was variable with consignments always being mixed. There was no extension advice to collectors and, although the Nigerian Gum Arabic Association existed, it did not go beyond that of simply acting as a forum for discussion and airing of grievances. This happened against a backdrop of unreliable supply, high (though unstable) prices and variable quality of *gum arabic* entering the international market. This was hurting the *gum arabic* trade giving leverage to competitors, mostly of synthetic substitutes. The FAO mission strongly recommended improved production and quality control.



Plate3: Local measure (Mudu)



Plate 4: Weighing balance



Plate5: Gum arabic in bags of 50 kg Kpasham ready for transport to Kano



Plate 6: Buyers at Kpasham in a group at photograph

Source: Field survey, 2010

Table 1: Summary of selected variables(means)

Variable	Minimum	Maximum
Household size	3	10
Experience(years)	5	16
Age(years)	21	51
Education	Primary certificate	OND
Quantity of gum collected	182.56 kg	748.68 kg
Income from gum collection	₦10,223.36	₦41,906.48
Expenditure from gum collection	₦4,381.44	₦17,959.92

Source: Field survey, 2010

Annual income and expenditure from gum collection for the determination of inequality of respondents and implication for poverty alleviation.

Data in Table 2 indicate a total income and expenditure of N2,137,139.20 and N977,141.76 respectively. Mean income and expenditure of total population (Table 3) also revealed N115, 419.20 and N46,625.76, respectively, among gum collectors in the study area. Computed values of general

entropy of class measure for income between group (1850.60) and expenditure between group(2092.96) were both greater than zero and are significant which implied variation in income and expenditure among respondents. Income and expenditure from gum collection differed with collectors based on a number of factors such as experience, age, family size amongst others. Analysis also showed no significant differences in income and expenditure within respondents as computed values were not greater than one.

Table 2: Decomposed annual income and expenditure from gum collection for the determination of inequality between & within respondents

Income from gum collection(₦)	Freq.	Total income(₦)	Expenditure range (₦)	Freq.	Total expenditure(₦)
≤ 20,000	39(39)	569,587.20	≤ 20,000	39(39)	170,876.16
20001– 30,000	23(23)	817,217.60	20001– 30,000	23(23)	245,165.28
3001– 40,000	28(28)	151,670.40	30001– 30,000	28(28)	381,501.12
> 40,001	10(10)	598,664.00	> 40,001	10(10)	179,599. 20
Total	100	2,137,139.20	Total	100	977,141.76

Source: Data analysis 2010.*Figures in parentheses are percentages.

Inferences could be drawn from this study. Gum collection has been found to enhance income of collectors from gum arabic production countries of the world (Sudan and Nigeria). Obtaining additional income from collection at off farm season will reduce poverty levels of farmers. The extra income could be channeled through savings, consumption and expansion of their scope of

production whose multiplier effect could be felt in increase hectares of land cultivated, petty trading and payment of fees for their children and wards. Giroh *et al.*, (2005) found out in their studies that gum collectors channeled their additional income towards saving, purchase of food stuff, livestock and payment of fees for their children. A proportion meant for educating their children is a positive signal in alleviating poverty. Education has been found to reduce poverty.

Table 3: Result of General entropy of class measures

Variable	Value
Income	
Mean income of total population	₦115,419.20
Total income	₦2,137,139.20
Population share	100
Income between group(ib)	1850.60
Income within group(iw)	0.8149
Expenditure	
Mean expenditure of total population	₦ 46,625.76
Total expenditure	₦977,141.76
Population share	100
Expenditure between group(ib)	2092.96
Expenditure within group(iw)	0.7906

Source: Data analysis 2010

CONCLUSION AND RECOMMENDATIONS

Gum collection was found to increase income of collectors especially during agricultural off-season. It is therefore recommended that farmers be encouraged to form cooperative societies to enable them have access to production inputs (commercially exploited species of gum arabic, production credit from commercial banks). Government should liaise with Rubber Research Institute of Nigeria Gum Arabic Sub-Station at Gashua, Yobe State, for technical assistance and production of improved seedlings for farmers in the State.

REFERENCES

- Arnold, J.E.M. and M. Ruiz Pérez, 1998. The role of non-timber forest products in conservation and development. In: *Incomes from the Forest*. E. Wollenberg and A. Ingel, Editors. CIFOR/IUCN. pp. 1-16.
- Arnold, J.E.M., 1995. Social economic benefits and issues in NWFPs use. In: *Report of the international expert consultation on NWFPs*. FAO, Rome.
- Barrow, E and Mogaka, H. 2007. Kenya's Drylands Wastelands or an Undervalued National Economic Resource. The World Conservation Union, p44.
- Chikamai, B.N. and J. Odera . 2002. Gums and gum resins in Kenya: Sources of alternative livelihood and economic development of the drylands. English Press, Nairobi.
- CIFOR, 2007. Achieving the Millennium Development Goals in African DryForests : from local action to national forest policy reforms, p5
- Dondain, G., 2001. International market in Acacia Gum: trends and perspectives. In: *Acacia gum: A foodingredient for the future*. Nefta, Tunisia.
- FAO, 1995. Non-Wood Forest Products for rural income and sustainable forestry. NWFPs No. 7. FAO, Rome
- FAO, 1996. A review of production, market and quality control of *Gum Arabic* in Africa. FAO, Rome.
- FAO, 1998. Food and Nutrition Paper No. 52. FAO, Rome.
- FAO, 1999. Towards a harmonised definition of non-wood forest products. *Unasylva*, 198:63-64.
- FAO, 2000. Global forest resources assessment 2000. Main Report. *FAO Forestry Paper 140*. FAO, Rome.
- FAO, 2003. Forestry outlook study for Africa: regional report for opportunities and challenges towards 2020. *FAO Forestry Paper 141*. FAO, Rome.
- Giroh, D.Y., Wuranti, V., Abubakar, M and Ogwuche, P (2008): Adoption of Gum arabic production technologies among farmers in Gum arabic belt of Nigeria.

- Journal of Science and Technology Research* 7(2): 48- 52
- Giroh, D.Y., Hamid, M.Y., Fintan, J.S and Mamman, G.S (2005): The role of Gum arabic in poverty alleviation among farmers in Demsa Local Government Area, Adamawa State. *Nigeria Journal of Tropical Agriculture* 7: 50 55
- Giroh, D.Y., Wuranti, V., Abubakar, M and Ogwuche. (2008): Analysis of the Technical inefficiency in Gum arabic based cropping patterns among Farmers in the Gum arabic belt of Nigeria. *Journal of Agriculture and Social Sciences* 4(3):125 128
- Giroh, D.Y, Waizah E.F and H.Y. Umar (2010): Technical Efficiency and Cost of Production among Gum Arabic Farmers in Jigawa State, Nigeria. *Report and Opinion* 2(1): 52 57.
- USAID/NAGAPPEN, 2002. Best practices, best markets: Training the Nigerian *gum arabic* producer and small trader.
- Wuranti, V and Giroh, D.Y (2005): Economic Analysis of Gum Arabic production in Yobe State. *Nigeria Journal of Tropical Agriculture* 7: 55 61
- Wuranti, V., Giroh, D.Y., O. Aghughu and Nasiru I. (2007): Efficiency of Resource Use in Gum Arabic Production in Yobe, Nigeria. *ChemTech Journal* 3:565 -570
- Umar, H.Y., Ojo, S.O., Giroh, D.Y and Ugwa, I.K. (2007): Economic Analysis of Acacia Species (Gum arabic) Marketing in Borno State. *Nigeria Journal of Tropical Agriculture* 9: 126 - 131
- Wuranti, V., Giroh, D.Y., Abubakar, M and Ogwuche, P (2008): Analysis of the Technical efficiency of Gum arabic production in Nigeria. *Journal of Scientific and Industrial Studies*. 6(1): 79 84.
- World Bank (1996). Poverty Amidst Plenty: Nigeria's poverty assessment Washington D.C
- World Bank (1999). Poverty and Welfare in: Nigeria. A report by African Writing Corporation Washington D.C 20433.P25.
- World Bank (2004). Millenium Development Goals. The World Bank Group Washington D.C.
- Zanna, B.G. (2000). The status of poverty alleviation in Nigeria. A paper presented at the Annual conference of NERA, University of Nigeria, Nsukka. Pp1-23.