# ECONOMIC ANALYSIS OF PLANT SPECIES UTILIZED FOR INFANT AND MATERNAL HEALTH CARE (IMHC) IN OGUN STATE, NIGERIA

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**Abstract**
Economic analysis of plant species utilized for Infant and Maternal Health Care (IMHC) in Ogun State was investigated. Multi-stage sampling procedure with three stages design was adopted for this study. Data were obtained with structured questionnaire administered to two categories of respondents; plant species collectors (30); plant species traders (70) giving a sample size of 100. Descriptive and inferential statistical tools were used to analyze the data. The result showed that the mean age of categories of the respondents were 46 years and 44 years for plant species collectors and traders respectively. The two categories of respondent were literate. There were more men (93.3%) in collection activities while there are more women in the trading activities (62.86%). The sales of the plant species were profitable with an average net profit of N60,309.21 and N 58,571.09/month/respondent for plant species collectors and traders respectively. Household size and years of experience in the business significantly affect the net returns of the plants species collectors and traders at $p<0.01$ respectively. Improve on skill in entrepreneurship of trade in herbal sells has been suggested to promote and increase the income from the sales of the plant species.

**Key Words:** Plant species utilization, Health Care, Profitability, Ogun State, Nigeria

## Introduction

Forests are important repositories of medicinal compounds from wild plants and organisms (Van Seters 1997; Bryant 2002), including foods and drinks. Wild plants have always been an important component of healthcare throughout human history. Since time immemorial, people have gathered plant and animal resources for their needs from nature (Schippmann *et al.*, 2002). In some West African countries, about 60% of children with high fever resulting from malaria are given herbal medicine as first line of treatment (Oluwatoyin and Njideka, 2007) while Idowu, (2012) reported that 44% of respondents traded on forest plant leaves utilized for various medicinal purposes in Ogun State, South-west, Nigeria.

The use of traditional medicine among Nigerians has been on the upward trend and varies greatly depending on several factors which span from socio-demographic and economic pattern. According to Bishop (1999), the prices of these plants collected do not in most cases reflect their real values. Only some of their values are reflected in market prices due to widespread imperfections and policy failures. Thus both the free forest land areas users and government policy makers typically focus on tangible marketed uses and often neglected the non-market environmental, socio-economic and cultural benefits

in the process of extracting timber and other goods. A major concern is the quantification of the non-tangible forest resources especially the medicinal plants in monetary terms as these resources are not well reflected in the Gross Domestic Products (GDP) of most developing countries. Moreover, most funding agencies in developed world such as United Nation International Children Emergency Fund UNICEF, Food and Agriculture Organization FAO and World Health Organization WHO among others requires a firm indication of the net positive returns with respect to the monetary values of resources and projects for sponsorship (Kengen, 1997). The lack of adequate data and information on the socio-economic values of bio-resources such as the medicinal plants poses a great barrier to decision makers, forest managers and other user groups to utilize the resources sustainably. The needs for a global response to this problem call for economic analysis of plants species utilized for infant and maternal health care in Ogun State, Southwest Nigeria. Thus, the specific objectives of this study were to; describe the socio-economic characteristics of the different categories of respondents, determine the economic returns from the collections and trades in the plant species used for IMHC as well as determine the factors that affect these returns in the study areas.

**Methodology**

The Study Area:

Ogun State was created in February, 1976 from the Old Western State of Nigeria; it is one of the 36 states in Nigeria. It covers an area of 16,762km$^2$ (NBS, 2007). This includes a total area of 2,371.48km$^2$ of forest reserve (MANR, Department of Forestry, 1984). The state lies between latitudes 6° and 8°N and longitudes 2°31 and 5°E. It is situated in the moist tropical rain forest zone, with a population of 3,728,098 million people (NBS, 2007).Ogun State has 20 Local Government Areas. The State is divided into three divisions: Egba, Yewa and Ijebu as sub-ethnic divisions. The divisions were based on ecological and climatic factors having political characteristics that fall along sub-ethnic divisions in the state. Egba and Yewa division have forest and derived savanna vegetation types while Ijebu division is in the rainforest region.

Sampling Techniques, Sample Size and Methods of Data Collection:

Multistage sampling procedure was adopted in this study. In the first stage ten (10) Local Government Areas LGAs were randomly selected out of twenty (20) LGAs in the State. In the second stage, from each of these LGAs, a market where forest plant species parts: roots, stem, bark and leaves are sold was purposively sampled. In the third stage, in each of the market, three (3) forest plant collectors and seven (7) forest plant traders were randomly sampled from the list of forest plant collectors and forest plant traders available in the market for that day. A total number of one hundred (100) respondents were selected in all the markets sampled. The mode of data collection was by the administration of questionnaire to the randomly selected respondents. Alongside the administration of questionnaires to the respondents in each of the stratum; Quantity of the most commonly plant species utilized for Infant and Maternal Health Care (IMHC) in the study area were obtained by weighing the quantity marketed daily with weighing scale at selling point of various markets. Also, plant species samples were collected and identified at Forest Herbarium Ibadan (FHI), Forest Research Institute of Nigeria (FRIN), where plant voucher numbers were obtained.

Methods of Data Analysis:

Descriptive statistics such as frequency distribution tables were used to present the socio-economic characteristics of the respondents in the study area. Budgetary analyses were used to determine the economic benefit or loss from plant species sales in the study area. The various factors affecting or influencing the returns from collection and trades of forest plants used for infants and maternal health care were determined by using Ordinary Least Square (OLS) regression. Following Williams *et al*.,(2012), the observation of the variables were used to determine the least square regression estimates of b's, $R^2$ (coefficients of determination) and the standard errors of the estimated parameters. The significance of the coefficients, the overall magnitude of F-value and the adjusted $R^2$ indicate the overall significance of the relationship between the unexplained/regressor (dependant) and explanatory/regressand (independent) variables. The OLS regression was fitted using linear functional form because it is the only functional form shown by the literature in expressing the marginal magnitude

of change in the returns (Williams *et al*., 2012). The OLS regression function for forest plant used for infants and maternal health care in the study areas were stated as: In implicit form, the linear functional form

$Y_{ic,\ t} = \beta Xi + \Sigma i$ …… (1)

Where: $Y_{ic,\ t}$ = Collectors and Traders Income (Naira), β = Parameters Unknown, ε = Error Terms and $X_i$ = Explanatory Variables. In explicit form, the linear functional form (Collectors);

$Yic, = \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \ldots\ \beta_8X_8 + \varepsilon_n$……..…….. (2)

$Y_{ic}$= Income earned by the collector (Naira)/Month while the explanatory variables estimating the factors affecting the collectors' returns are: $X_1$ = Age (Numbers of Years)
$X_2$ = Education level of the respondents (number of years spent in school);
$X_3$ = Household size (Number of person)
$X_4$ = Years of Experience in the sales of forest plants species (Years)
$X_5$= Occupation (Traditional Herbalist / farmer =1, 0 otherwise)
$X_6$=Market Location Dummy (Rural area = 1, 0 otherwise)
$X_7$ = Nearness of respondents to forest plants/reserves (Distance in Km)

In explicit form, the linear functional form (Traders)

$Yit = \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4\ \ldots\ \beta_5X_5 + \varepsilon_n$……...…... (3)

$Y_{it}$ = Income earned by the trader (Naira)/Month while the explanatory variables estimating the factors affecting the traders returns are: $X_1$ = Age (Numbers of Years);
$X_2$ = Education level of the household head (Number of Years spent in School);
$X_3$ = Dependency ratio (Number of Non-working Members/ Total Household Size);
$X_4$ = Years of Experience in the sales of forest plants species (Years);
$X_5$ = Gender (Male =1; 0 Otherwise). The estimated β revealed the effect of each variable on returns from collection and trades of forest plants species utilized for infants and maternal health care in the study area.

**Results and Discussion**

Socioeconomic Characteristics of Species Plant Collectors and Traders in the Study area:
Table 1 reveals that the average age of the plant species collectors was 46 years while the traders were 44 years. This shows that majority of the respondents in the study area were within the working age (active age). Also, there was a substantial percentage to replace the ageing workforce. This is in line with the study of Oghogho *et al.*, (2014) which revealed that majority (44.44%) of the marketers of perishable agricultural products were between the ages of 41-50. Not all the respondents have formal education. The table reveals that a total of 63.30% and 70.0% of the plant species collectors and traders respectively are educated beyond primary level. Such respondents are imbued with the ability to access and appreciate the use of improved technology and best practices in their enterprises. The result also reveals that there are more males (93.30%) in plant species collection activities than females (6.7%) while there are more females (62.86%) in trading activities than males (37.14%) in plant species marketing in the study area. This is in line with the study of Apata, (2014) who reported that male are more involve in rural farming activities in southwest Nigeria. Also, Olawumi *et al.*, 2013 reported that there was female gender dominance in the processing and marketing of non-timber forest products NTFPs among households in southwest, Nigeria. Twenty per cent of the respondents were married while 13.30 per cent were widowed, 33.33 per cent, 30.0 per cent and 3.30 per cent were divorced, separated and single respectively. Average household size of the plant species collectors was 7 persons while the traders were 6 persons. Household size is an important factor in resource allocation as it measures level of dependency. Households with large family sizes are usually associated with low per

capita income especially in resource-constrained economies. In other words, large family size in turns affects returns made from the sale of the plant species by the respondents. Plant species collectors had 18 years of marketing experience while the traders were 15 years. This indicated that business in plant species marketing for such long has been means to sustain the livelihood of the respondents. Also, 60%and 80% of the plant species collectors and traders respectively entered the business through inheritance while 40%and 18.60% respectively learnt from past experience. None of the plant species collectors entered the business through apprenticeship while few traders (1.40%) entered the business through apprenticeship. This reveals that knowledge on the uses of plant species were transferred from generation to generation based on assurance that the plant species can cure a particular ailment. This knowledge was in turn used in the sales of plant species. The table also indicated that 73.30% and 60.0% of the plant species collectors and traders respectively were native of the area while 26.70% and 40% of the plant species collectors and traders respectively were non-native. This implies that a native respondent makes use of resources within their area while the non-natives respondents searching for more plant species or knowledge about it and even markets on it for sustainability. Also, Yorubas of various sub-ethnic groups are involved in collection and trading activities of plant species. These include Egbas (37.14%), Ijebu (22.86%), Remo (15.71%), Egun (12.86%) and (Yewa/Awori 11.43%). This confirms that various sub-ethnic groups' moves about to market the plant species for sustainability. The results further revealed that plant species collectors had an annual mean income of ₦812,000.00 while the plant species traders had an annual mean income of ₦780,578.05. Income from trading of plant species by marketers' respondents (plant species collectors and traders) is expected to have direct relationship with concentration and continuity in marketing activities because an individual that makes more income might definitely concentrate and continue in the business to meet up with their daily needs. The description of the socioeconomic characteristics such as age, educational level, and gender among others are key determinants in efficient, judicious and sustainable management of natural resources (Vasquez *et al.*, 2009).

Estimated Quantity of the Plant Species Marketed in the Study Area per Year**:**
In total, averages of 3,203.19kg plant species (Table 2) were purchased directly for use by the consumers in the market sampled in the study area per annum. *Euphorbia deightonii* Croizat, were mostly marketed (12%) while *Carica papaya* L., were the least plant marketed (2.23%). This might be due to domesticated nature of the plant.

Costs and Returns Analysis from Collection and Trades in Plants Species in the Study Area:
Table 3 revealed the breakdown of the costs and return to collection and trade in plant species utilized for infants and maternal health care in the study area. The result revealed that an average total variable cost of N9,733.33 and a total fixed cost of N7,357.46 were expended with average revenue of N67,666.67 realized. This gives an average net profit of N60,309.21 monthly by the collectors. From the results, the rate of return on investment of352.88 means that for every N1.00 invested in plant species utilized for infants and maternal health care in the study area returns a net profit of N352.88 to the collectors, that is, 352 percent rate of returns on investment.

Similarly, average total variable cost of N17,916.67 and a total fixed cost of N6, 477.08 were expended with average revenue of N65,497. 22 earned. This gives an average net profit of ₦58,571.09 monthly by the traders. From the results, the rate of return on investment value of 240.11 means that for every N1.00 invested in forest plant species utilized for infants and maternal health care in the entire study area returns, a net profit of N240.11 to the traders, that is, 240 percent rate of returns on investment. The differences in net profit and rate of return on investments of both the collectors and traders explained the challenges they face, as there are no adequate storage facilities for the plants species supplied in bulk by the collectors to the traders. Their variable cost increases as they pay for rent and so on which the collectors did not pay for, as they supplied the harvested forest plants species directly.

Factors Affecting Returns from the Collection and Trades in Plant Species:
The result of ordinary least square (OLS) regression analysis of the factors affecting the net returns of the collectors of plant species utilized for infants and maternal health care in the study area are presented

in Table 4. In the results, the adjusted R-square value of 0.828 implies that about 82% of the total variations in net profit are explained by the explanatory variables included in the model. Three (3) variables positively and significantly affected the net returns of the plants species collectors in the study area at $p<0.01$; these are household size, years of experience in the business and occupation, while a variable (age) positively and significantly affected the net returns at $p<0.05$.

The more the household size members, the more the plant species collection in the study area and this translates to higher net returns. This indicates that members of the household were involved in the collection activities. An increase in numbers of years of experience of the plant species collectors might increase their net returns by ₦63.18/month. This may be due to the fact that plant species collectors who had already known a particular location where the plant species exist might regularly get the plant species for their customers. Occupation, being an herb marketer, the net returns of the respondents will increase by ₦729.18/month as all other factors are held constant. A year increase in the collectors' age increases the net returns by ₦164.43/month; this might be due to an increase in collections' experience and the tendency of being patient to devote more time to collection.

Similarly, the result of ordinary least square (OLS)regression analysis of the factors affecting the net returns of the traders of plant species utilized for infant and maternal health care in the study are also presented in the table. The result reveals that the adjusted R-square value of 0.906 implies that 91% of the total variations in net profit are explained by the explanatory variables included in the model. A variable years of experience ($p<0.01$)) significantly and positively affect the net returns of the plants species traders while gender negatively affect the net returns of the plants species traders in the study area at $p<0.01$. Also, two variables; education status ($p<0.05$) and dependency ratio ($p<0.05$) significantly and positively affect the net returns of the plants species traders in the study area.

An increase in numbers of years of experience of the plant species traders in the business might increase their net returns by ₦33.61/month. This may be due to the fact that traders who had already been known in a particular location in the market might be regularly patronized by customers. The negative coefficient of gender observed in this study is not far from *a priori* expectations. Females are more likely to settle down for trading activities relative to their male counter parts. This indicates that females had more marketing experience that could yield higher net returns than their male counter parts. If the number of years of formal education of the plant species traders is increased by one year, the net returns might increase in the study area by ₦33.69/month. This may be due to putting the educational experience into the marketing of the plant species. The more the dependent of the plant species traders in the study area the more the traders might actively involve in the trading business to meet up with the domestic needs.

## Conclusion and Recommendation

It has been established in the study that marketers of plant species recorded an average net profit of N60,309.21 and N 58,571.09/month/respondent for plant species collectors and traders respectively. The regression analysis reveals that household size and years of experience in the business significantly affect the net returns of the plants species collectors and traders at $p<0.01$ respectively. Based on the findings, a skill in entrepreneurship on trade in herbal sells was been suggested to promote and increase the income from the sales of the plant species.

## References

Apata O. M (2014): Assessment of youths' participation in rural development intervention in southwestern, Nigeria. *International Journal of Agricultural Economics and Rural Development* 6 (1): 7 – 19

Bryant, P. J. (2002): *Value of biodiversity. Hypertext book in biodiversity and conservation*, School of Biological Sciences, University of California, Irvine

Bishop, J. T (1999): *Valuing Forest: A review of methods and application in developing countries*. International Institute for Environment and Development, London pp 123

National Bureau of Statistic, NBS (2007): *Federal Republic of Nigeria official gazette No 2415th. May 2007* 94, Federal Government Printer Lagos, Nigeria. FGP71/5/2007/2500 (OL24) pB192-193

Idowu, S. D. (2012): Indigenous utilization and determinants of participation in the collection and sales of forest plant leaves in Ogun state, Nigeria. Unpublished Master of Forestry (M.F) dissertation submitted to the Department of Forestry and Wildlife Management, Federal University of Agriculture, Abeokuta, Ogun state, Nigeria. 169pp.

Kengen, S (1997): Linking forest valuation and financing, *Unsylva*, 188:48pp 44-49.

Olarewaju, T. O., Shittu, A. M., Olubanjo, O. O., Dipeolu, A. O. and Sodiya, C. I. (2015): Assessment of willingness to pay for management of inland waters in Southwestern Nigeria *International Journal of Agricultural Economics and Rural Development 7* (1): 15 - 23

Olawumi, A. T., Oluwalana, S. A., Momoh, S and Aduradola, A. M (2013): Cost and return on chewing stick retail marketing in southwest, Nigeria. *Journal of Economics and Sustainable Development,* 4 (3) 58 – 65

Oluwatoyin, C. A. and Njideka, U. O. (2007): Frequency of complementary and alternative medicine utilization in hypertensive patients attending an urban tertiary care centre in Nigeria. *BMC Complementary and Alternative Medicine*, 2007; 7(1): 30.

Oghogho, I. A., Nwawe, C. N., Okere, R.A., and Oyaide, W. J (2014): Marketing of perishable agricultural products in benin city: A case study of tomatoes, bananas and pineapples. *International Journal of Agricultural Economics & Rural Development* 6 (1): 102 – 109pp. http://www.ijaerd.lautechaee-edu.com

Schippmann, U., J.D. Leaman and A.B. Cunningham (2002): Impact of cultivation and gathering of medicinal plants on biodiversity: *Global trends and issues*, Inter-Departmental Working Group on Biological Diversity for Food and Agriculture Organisation, Rome.

Vasquez, W. S, Pallab, M., Jesus, H.C, and Berrens R.D (2009): Willingness to pay for safe drinking water: Evidence from Parral, Mexico, *Journal of Environmental Management* 90: 3391–3400

Van Seters, A.P (1997): Forest based medicines in traditional and cosmopolitan health care. medicinal plants for forest conservation and health care, *Non- Wood Forest Products* 11. Food and Agriculture Organisation, Rome

Williams S. B., Kareem, R. O., Adiegu and Dipeolu, A.O (2012): Resource-use efficiency among selected fish farms in Lagos State, Nigeria. *Journal of Agricultural Science,* 3 (2): 85-94

Table 1: Socioeconomic characteristics of plant species collectors and traders

| Socio-economic Variables | Plant Species Collectors (N) = 30 | | Plant Species Traders (N) = 70 | | Socio-economic Variables | Plant Species Collectors (N) = 30 | | Plant Species Traders (N) = 70 | |
|---|---|---|---|---|---|---|---|---|---|
| **Age (Years)** | **No** | **%** | **No** | **%** | **Marketing Experience** | **No** | **%** | **No** | **%** |
| < 30 | - | - | 2 | 2.90 | < 10 | 9 | 30.00 | 35 | 50.00 |
| 31-40 | 10 | 33.30 | 27 | 38.60 | 11- 15 | 1 | 3.30 | 1 | 1.40 |
| 41-50 | 9 | 30.00 | 27 | 38.60 | 16-20 | 1 | 3.30 | 3 | 4.30 |
| 51-60 | 11 | 36.70 | 12 | 17.10 | > 21 | 19 | 63.30 | 31 | 44.30 |
| 61-70 | - | - | 2 | 2.90 | Mean | 18 | - | 15 | |
| Mean | 46 | | 44 | | **Mode of Entry** | | | | |
| **Educational Status** | | | | | Apprenticeship | - | - | 1 | 1.40 |
| No Formal Education | - | - | - | - | Inherited | 18 | 60.00 | 56 | 80.00 |
| Primary Education | 11 | 36.70 | 21 | 30.00 | Past experience | 12 | 40.00 | 13 | 18.60 |
| Junior Secondary Education | - | - | 3 | 4.20 | **Nativity** | | | | |
| Senior School Education | 19 | 63.30 | 44 | 62.90 | Yes | 22 | 73.30 | 42 | 60.00 |
| Tertiary Education | - | - | 2 | 2.90 | No | 8 | 26.70 | 28 | 40.00 |
| **Gender** | | | | | **Sub-Ethnicity Group** | | | | |
| Male | 28 | 93.30 | 26 | 37.14 | Egba | 9 | 30.00 | 26 | 37.14 |
| Female | 2 | 6.70 | 44 | 62.86 | Egun | 4 | 13.30 | 9 | 12.86 |
| **Marital Status** | | | | | Ijebu | 9 | 30.00 | 16 | 22.86 |
| Married | 6 | 20.00 | 45 | 64.29 | Remo | 3 | 10.00 | 11 | 15.71 |
| Divorced | 10 | 33.30 | 7 | 10.00 | Yewa/Awori | 5 | 16.60 | 8 | 11.43 |
| Single | 1 | 3.30 | 5 | 7.14 | **Annual Income (₦)** | | | | |
| Widower | 4 | 13.30 | 10 | 14.28 | ≤ 365,000 | - | - | 1 | 1.40 |
| Separated | 9 | 30.00 | 3 | 4.29 | ≤ 730, 000 | 12 | 40.00 | 26 | 37.14 |
| **Household size** | | | | | ≤ 1,095,000 | 18 | 60.00 | 36 | 51.43 |
| < 5 | 10 | 33.30 | 68 | 97.10 | ≤ 1,460,000 | - | - | 6 | 8.57 |
| 6-10 | 20 | 66.70 | - | - | ≤ 1,825,000 | - | - | 1 | 1.4 |
| 11-15 | - | - | 2 | 2.90 | Mean | 812,000.00 | - | 780,578.05 | - |
| Mean | 7 | - | 6 | - | | | | | |

Table 2: Estimated quantity of the plant species marketed in the study area per year

| S/N | Plant Species | | Plant Species Voucher Number | Uses | Pooled | |
|---|---|---|---|---|---|---|
| | Scientific Name/Plant Growth Form | Local Name | | | Quantity (KG) | % |
| 1 | *Bidens pilosa* Linn. (Herb) | Abere-oloko, Abu-Oloko | FHI 110196 | Easy labour delivery care, Anticonvulsants, Lactation Failure, Menstrual /Abdominal Disorder, Cough | 354.32 | 11.06 |
| 2 | *Blighia sapida* K.D. Koenig (Tree) | Isin | FHI 110199 | Easy labour delivery care, Malaria, Dysentery, Diabetes | 465.56 | 14.53 |
| 3 | *Boerhaavia diffusa* Linn. (Herb) | Etiponla, Olowojeja | FHI 110203 | Gonorrhoea (STD), Test for pregnancy, Smallpox, Jaundice, Treatment of skin rashes, Antipyretics, Cough | 234.14 | 7.31 |
| 4 | *Carica papaya* Linn. (Tree) | Ibepe, Seyinbo | FHI110340 | Intestinal worms (Roundworms), Menstrual disorder, Lactation failure, Jaundice, Pile, Bronchitis, Headache, Backache, Chest and waist pains, Malaria, Ringworm infection | 71.45 | 2.23 |
| 5 | *Culcasia scandens* P. Beauv. (Climber) | Agunmona | FHI 110174 | Pregnancy booster, Stomach ache, Skin diseases. | 164.67 | 5.14 |
| 6 | *Discorea bulbifera* Linn. (Spiny Climber) | Emina-Esi | FHI 110243 | Antimicrobial, Anthelmintic, Breast enlargement, Diarrhoea, Dysentery, Constipation, Malaria, Cough | 262.87 | 8.21 |
| 7 | *Euphorbia deightonii* | Oro agogo | FHI 110343 | Woman Sterility | 384.54 | 12.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Croizat. (Shrub) | | | | | |
| 8 | *Momordical charantia*Linn. (Climber) | Ejinrin, Ejinrin-weere | FHI 110342 | To Improve on fertility and fecundity, Painful menstruation, Antimicrobial, Anthelmintic, Anti-emetics, Diabetes, Anticonvulsants, Jaundice, Temperature control, Malaria, Pile, Cholera treatment, Stomach ache | 182.67 | 5.70 |
| 9 | *Newbouldia laevis* (P.Beauv.) Seem. (Tree) | Akoko | FHI 110195 | Infertility care, Anthelmintic, Cough, Anti-convulsants, Dysentery, Malaria, Earache, Skin diseases, Stomach ache | 254.98 | 7.96 |
| 10 | *Paullinia pinnata* Linn. (Climber) | Itakun-okere, Obi-aiye, Kaka kinsekinla | FHI 110171 | Menstrual disorder, For Prolapsed of the Frontals treatment, Jaundice, Black tongue, Sore throat, Malaria | 184.51 | 5.76 |
| 11 | *Ricinodendron heudelotii* (Baill.) Heckel(Tree) | Erinmado/Erimado/Erinado | FHI 110244 | Infertility care, Malaria | 286.23 | 8.94 |
| 12 | *Spondias mombin* Linn. (Tree) | Akikan/Ekikan, Iyeye Okikan, Olosan | FHI 110341 | Anthelmintic, Backache, Ease labour, Placenta cure, Diarrhoea, Diabetes, Dizziness, Malaria Fever treatment, Cough, Sore throat, Cold, Toothache | 357.25 | 11.15 |
| | Total | | | | 3,203.19 | 100.0 |

FHI- Forest Herbarium Ibadan

**Table 3:** Average costs and returns analysis from collection and trades in plants species per month

| Item Description | Plant Species Collection | | Plant Species Trade | |
|---|---|---|---|---|
| | **Amount (₦)** | **% of Total Cost** | **Amount (₦)** | **% of Total Cost** |
| No of Observation | 30 | - | 70 | - |
| Gross Monthly Revenue | 67,666.67 | - | 780,578.05/12= 65,048.17 | - |
| Gross Volume Used (kg) | 320.32 | - | | - |
| **Variable Cost** | | | | |
| Transportation Cost | 8,500 | 49.73 | 8,541.67 | 35.01 |
| Permit | 1,000 | 5.85 | 4,000.00 | 16.40 |
| Rent | - | - | 2,000.00 | 8.20 |
| Packaging/Sack | 233.33 | 1.37 | 3,375.00 | 13.84 |
| Total Variable Cost | 9,733.33 | 56.95 | 17,916.67 | 73.45 |
| **Fixed Cost** | | | | |
| Cutlass | 208.33 | 1.22 | 208.33 | 0.85 |
| Imputed Interest on Capital | 149.13 | 0.87 | 268.75 | 1.10 |
| Imputed Salary of the Operators | 7,000.00 | 40.96 | 6,000.00 | 24.60 |
| Total Fixed Cost | 7,357.46 | 43.05 | 6477.08 | 26.55 |
| **Total Cost** | 17,090.79 | 100.00 | 24,393.75 | 100.00 |
| **Gross Margin** | 57,933.34 | - | 47,131.50 | - |
| **Net Profit** | 60,309.21 | - | 58,571.09 | - |
| **RORI** | 352.88 | - | 240.11 | - |

Source: Field Survey (2016) Keys: RORI = Rate of return on investment

Table 4: Factors affecting returns from the collection and trades in plant species

| **Factors affecting returns from the collection of plant species** | | | **Factors affecting returns from trades in plants species** | | |
|---|---|---|---|---|---|
| **Variables** | **Parameter Coefficient** | **Z Values** | **Variables** | **Parameter Coefficient** | **Z Values** |
| Constant | -501.785 (318.442) | -1.58 | Constant | -970.972** (386.192) | -2.51 |
| Age | 16.433** (7.274) | 2.26 | Age | -3.532 (4.708) | -0.75 |
| Education Status | -42.457 (27.180) | -1.56 | Education Status | 33.691** (14.123) | 2.39 |
| Household Size | 92.670*** (22.169) | 4.18 | Dependency Ratio | 412.548** (158.666) | 2.60 |
| Years of Experience in the Business | 63.177*** (17.230) | 3.67 | Years of Experience in the Business | 33.609*** (9.241) | 3.64 |
| Occupation (Traditional Herbalist/Farmer = 1) | 729.175*** (120.862) | 6.03 | Gender (Male = 1) | -254.082*** (90.949) | -2.79 |
| Market Location (Rural area = 1) | -39.083 (50.095) | -0.98 | - | - | - |
| Nearness to the Forest (Km) | -34.261 (28.891) | -1.19 | - | - | - |
| Number of Observation | 30 | - | - | 70 | - |
| R-Square Function | 0.875 | - | - | 0.918 | - |
| Adj. R-Square Function | 0.828 | - | - | 0.906 | - |
| Root MSE | 106.33 | - | - | 215.87 | - |

Keys: Values in parentheses are standard error. Significant levels are denoted as *, **, *** for 10%, 5% and 1% respectively.