

Evaluation of Charcoal Processing, Utilization and Challenges in Ikole Local Government Area, Ekiti State, Nigeria

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Abstract- The survey on evaluation of charcoal production was carried out in Ikole Local Government, Ekiti State, Nigeria, with a view to assessing the mode of production, utilization and challenges. Purposive sampling technique was adopted to select both the study area and the respondents used for the study. Seventy (70) copies of a semi-structured questionnaire were administered on respondents in the selected study area. The data collected were analyzed using simple descriptive statistics (Tables, frequency, percentage and chart). The results obtained from the study revealed that charcoal production is by traditional/earth kiln method. The majority (85.7%) of the producers were male, 82.9% fell within the age range of 20-50 years. The result also confirmed that 68.6% of the producers got their wood supply from the wild; 85.0% used *Anogeissus leiocarpus* (Ayin) for production. Majority (61.4%) of the producers were engaged in charcoal production for income generation; 64.3% were aware of the effect of charcoal production on their environment and 58.6% revealed deforestation as the major environmental effect. Production is bedeviled by challenges ranging from high transportation cost; inadequate wood supply; poor road network to labour shortage. Charcoal is mainly (100%) used for domestic cooking in the study area. Consequently, the results thereby recommend adequate education on afforestation; awareness campaign on effects of deforestation, and promoting the use of alternative feed-stock for wood charcoal.

Index Terms— Challenges, Charcoal, Ikole Ekiti, Production, Utilization

I. INTRODUCTION

The forest area of Africa according to [5] was estimated close to 675million hectares corresponding to almost 17 percent of the global forest area and approximately 23 percent of the regions' total land area. Forest products utilization, including timber and non-timber forest products has played a fundamental role in several Sub-Saharan African countries in alleviating poverty through provision of employment [1]. The uniqueness of Nigeria forests has driven it as great source of timber, pulpwood, fuel and non-timber forest products and as tool for sustainable development strategies [3]. Deforestation is a global problem which threatens environmental sustainability with more impact on Nigeria due to its high rate [9]. The [7] asserted that Nigeria is faced with high deforestation rate in the world as a result of competing use due to increasing population of approximately 162 million people which is expected to continue to grow to about 239 million by 2025 and 440 million by 2050 [13].

According to [5], between 1990 and 2010, nearly half amount of Nigeria's primary forest cover was removed due to deforestation. Though, deforestation cannot be tagged to a singular factor but the major cause can be connected to charcoal production among inhabitant of Ikole local government Area of Ekiti State, Nigeria. The assertion of [12] that the possibility of the forest meeting the demand for fuelwood as predicted in the 1970s have proved speculative because of shifted attention to charcoal.

Charcoal production has led to over-exploitation and loss of several indigenous tree species and wanton destruction of flora and fauna habitats in the study area in which the effects has taken its toe on the people and the environment. This situation has given rise to the following research question; a. what are the major trees collected/extracted for charcoal production? b. what are the factors encouraging charcoal production? and c. what factors affect the production of the produce in the study area? Since Oke-ako and Irele Ekiti people are known as the major processor of charcoal in Ikole Local Government Area of Ekiti state, it is of paramount importance and worthwhile to carry out a study to evaluate the production, utilization and identifying the motivating factors and the challenges experienced in the study area.

II. METHODOLOGY

The study was conducted in Ikole local government area of Ekiti State, Nigeria. Data for the study were collected using multi-stage and purposive sampling techniques. These stages involved the selection of Ikole local government area in Ekiti North Senatorial district, followed by the selection of two sampled communities (Oke-Ako and Irele) where charcoal production are prevalent. The final stage was the administration of a semi structured questionnaire to elicit information on respondent's socio demographic characteristics as well as processing, utilization and challenges involved in charcoal production in the study area. Focus Group Discussions (FGDs) and interviews were also conducted on the key respondents (producers) in order to assess the production techniques and its impact on the people and the communities. Thirty-five (35) questionnaires were administered to respondents in each of the two selected communities. A total of seventy (70) respondents were sampled and used for the study.

III. DATA ANALYSIS

Data collected were analyzed using descriptive statistical tools such as frequency tables, and flow chart for the presentation of data gathered on processing stages, while the

challenges encountered was ranked as major (3), mild (2) and no (1) based on the respondents perceptions.

IV. RESULT AND DISCUSSION

The results of the respondent’s disposition on gender, age, marital status, and religion presented in Table 1 based on their perceived influence on charcoal production and utilization in the study area revealed that the majority (85.7%) of the respondents were male, while 14.3% were female. Results on age distribution of the of the respondent shows that 34.3% were between 20-30 years, 28.6% were between 31-40years, while 20% and 17% were between 41-50years and 50years and above respectively. This implies that production ranging from logging and extraction of logs is majorly carried out by male, while female are concerned with fetching water and charcoal packaging. As the producers aging the fewer their proportion since production is relative to age. The age distribution indicated that the majority (82.9%) of the producers were between age 20 and 50years which was asserted by [2] as the active age group when people were more productive and able to contribute meaningfully to the economy.

Results on marital status revealed that 62.9% were married 28.6% were single, and 8.6% were widowed. This implies that the majority of the respondents will be involve in other household responsibilities such as payment of their wards school fees, hospital bill and feeding the family. The result also showed that 78.6% of the respondents were Christians while 21.4% were Muslims. Education status of the respondents revealed that 11.4% had no formal education, 27.1% had primary education, 54.3% had secondary education and 7.1% had tertiary education. This also implies that charcoal production is not influenced by both the religion and educational status.

Table 1: Socio-economic Characteristics of Respondents

Variables	Frequency	Percentage %
Gender		
Male	60	85.7
Female	10	14.3
Total	70	100
Age (years)		
20-30	24	34.3
31-40	20	28.6
41-50	14	20.0
51-above	12	17.1
Total	70	100
Marital Status		
Single	20	28.6
Married	44	62.9
Widowed	6	8.6
Total	70	100
Religion		

Christianity	55	78.6
Islam	15	21.4
Traditional	0	0
Total	70	100
Educational Background		
No formal education	8	11.4
Primary	19	27.1
Secondary	38	54.3
Tertiary	5	7.1
Total	70	100

Source: Field survey, 2019

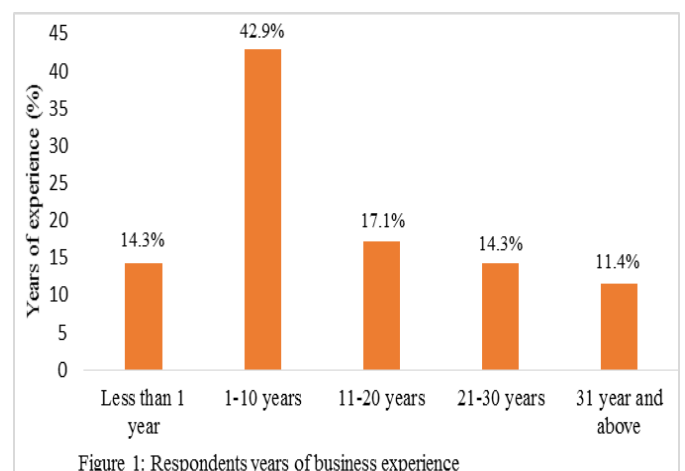
Table 2 showed that 100% of charcoal producers principally used the traditional kiln method which is the Earth kilns for production. This finding agreed with the report of [10] who noted that almost all of the charcoal produced in Kenya was made using Earth kiln.

Table 2: Charcoal production methods

Production methods	Frequency	Percentage %
Earth kilns	70	100
Brick Kilns	0	0
Metal kilns	0	0
Total	70	100

Source: Field survey, 2019

Figure 1 revealed that 14.3% of the respondents had less than one year of the business experience, 42.9% had between 1 and 10years, 17.1% had between 11and 20 years, while 14.3% and 11.4% of the respondents had between 21 to 30years and 31years and above of the business experiences respectively.



Result on Table 3 revealed that five tree species were identified as raw materials for charcoal production in the study area. The majority (85.0%) of the respondents used *Anogeissus leiocarpus* (Ayin), this was followed by - *Albizia coriaria* (Ayinre) and *Acacia seyal* (Kasia) with 6.0% of the respondents each, while 3.0% used *Terminalia glaucescens* (Idi-odan). The high use of *Anogeissus leiocarpus* (Ayin) by

the respondents can be connected to its availability in the study area.

Table 3: Identified Tree species mainly used for charcoal production in the Study Area

Tree Species	Local name	Frequency	Percentage %
<i>Anogeissus leiocarpus</i>	Ayin	60	85.0
<i>Albizia coriaria</i>	Ayinre	4	6.0
<i>Terminalia glaucescens</i>	Idi-odan	2	3.0
<i>Acacia seyal</i>	Kasia	4	6.0
Total	4	70	100

Source: Field survey, 2019

The result of tree species sources used in the study area for charcoal production presented in Table 4 revealed that 68.6% of the respondents got their supply from the wild, 10.0% from debris derive from farmlands and construction site, while 21.4% got their supply through purchase.

Table 4: Sources of Tree species used in the Study Area

Sources of Tree Species	Frequency	Percentage %
Wild	48	68.6
Debris from farmland and construction sites	7	10.0
Through Purchase	15	21.4
Total	70	100

Source: Field survey, 2019

Figure 2 shows the reasons why the respondents decided to remain involved in charcoal production activities. The result showed that 61.4% of the respondents were into charcoal production for source of income, 15.7% as source of employment, 12.9% of the respondents were involved in charcoal activities on the ground of personal interest, and 10.0% based on inheritance.

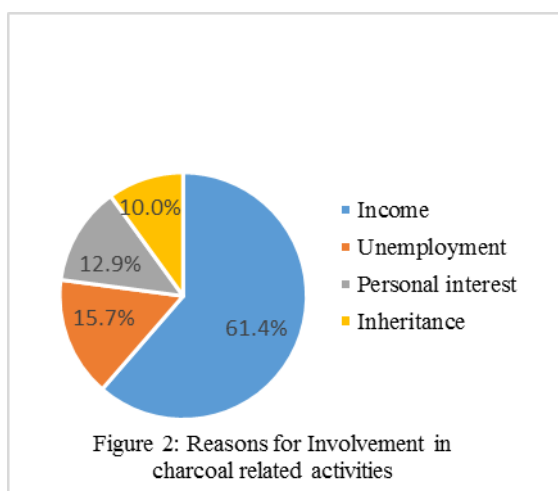


Figure 2: Reasons for Involvement in charcoal related activities

Result on awareness of the effects of charcoal production in Figure 3 showed that 64.3% of the respondents were aware of the consequential effect of charcoal on the human and the

environment, while 35.7% were unaware of the effects. The result indicated that the majority of those involved in charcoal production and other related activities were aware of the negative impact of the production on them and their environment. This is in agreement with the report of [6] in a charcoal scoping study conducted in Zambia, who reported that most people were getting to be aware of the negative effects of charcoal production on the environment and forest in particular. The result however disagreed with the findings of [11] who reported that most of the charcoal users and producers were not aware of the effects of their activities on the environment and their wellbeing.

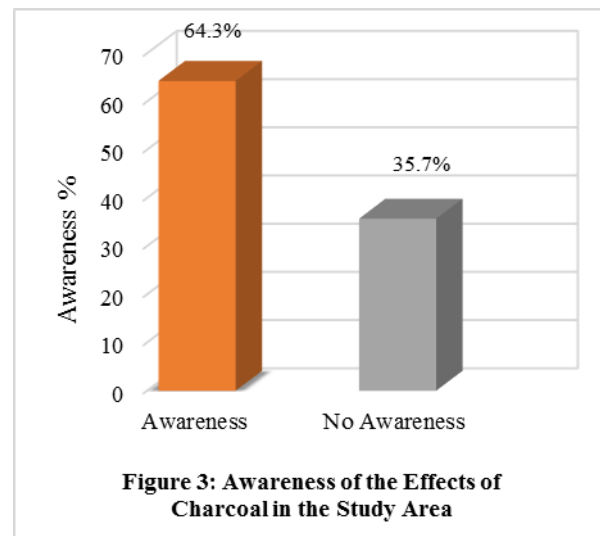


Figure 3: Awareness of the Effects of Charcoal in the Study Area

The result of effects of charcoal production in the study area presented in Table 5 showed that 41.4% of the respondents indicated pollution as an effect of charcoal production, While 58.6% revealed deforestation as the major effect in the study area. This study is in support of the findings of [8] who reported production of Charcoal as one of the activities leading to destruction of forest cover in Nigeria.

Table 5: Effects of Charcoal production in the Area

Effects of Charcoal	Frequency	Percentage %
Pollution	29	41.4
Deforestation	41	58.6
Total	70	100

Source: Field survey, 2019

The challenges encountered by the respondents on charcoal production in Table 6 indicated that 29.4% of the respondents were faced with frequent high transportation cost, 26.9% reported poor road network, 15.1% indicated shortage of labour, 28.6% revealed inadequate wood supply as problems encountered, while all (100%) the respondents revealed that charcoal production is round the year and not influenced by season. This is in contrast to the opinion of [4] on production seasonality, who opined that charcoal business is seasonal.

Table: 6 Respondents challenges on charcoal production activities

Problems	Frequency	Percentage %	Rating
Poor road network	64	26.9	+++
High transportation cost	70	29.4	+++
Shortage of Labour	36	15.1	++
Seasonality	0	0	+
Inadequate wood supply	68	28.6	+++
Total	238*	100	

Source: Field survey, 2019

Note: +++ = Major, ++ = Mild, + = No Effect, * = Multiple response

Table 7 shows the result of various uses of charcoal in the study area. The result indicated that 44% utilized charcoal for cooking, 36.5% used it for roasting of crops/fruits such as corn, plantain etc., 19.5% used it for press ironing of clothing materials, and none of the respondents used it in locomotive engine.

Table 7: Uses of Charcoal in the Study Area

Various Uses	Frequency	Percentage %
Cooking	70	44.0
Roasting	58	36.5
Locomotive Engine	0	0
Press ironing of clothing	31	19.5
Total	159*	100

Source: Field survey, 2019

Note * = Multiple response

V. CONCLUSION

The study on evaluation of production, utilization and challenges of charcoal conducted in Ikole Local Government, Ekiti state revealed that charcoal production is one of the major occupations in Oke-Ako and Irele Ekiti, Ikole Local Government, Ekiti state. It constitute the primary source of fuel in the rural as well as most urban areas. Charcoal production from trees derived from the wild especially *Anogeissus leiocarpus* (Ayin) is by traditional kiln and its utilization had constituted a great cataclysm to the environment and the people of in the study area. The heavy reliance of the respondents on charcoal production and other related activities could be as a result of some interplaying factors such as, abundant availability of wood in the forested area of the communities as well as income generation, unemployment, personal interest and inheritance. Respondents' level of awareness on effects of charcoal production on the environment is relatively high, however, charcoal production and timber extraction from the forest still remained on the high side. The situation if not checked may further aggravate the experienced pollution, deforestation and land degradation which may step toward deterioration of the peoples' health conditions.

Therefore, job creation and use of alternative energy sources rather than charcoal as well as policy framework that guard against indiscriminate felling will go a long way at reducing these environmental impacts and also project sustainable forest. Congruently, it is exigent to sensitize the people on the negative effects of environmental distortion to avoid on-going deforestation and environmental pollution rate in order to achieve a sustainable forest.

VI. RECOMMENDATION

Based on the findings of the study, the following policy directions are recommended;

- i. Producers should be educated on tree planting in order to replace the harvested ones gotten from the wild to revitalize the forest and avoid deforestation.
- ii. There should be awareness campaign in many of our rural communities on the effects of deforestation on both the people and the environment
- iii. Modern production techniques of charcoal that accommodate alternative feedstocks such as harvest residues should be encouraged in other to reduce deforestation.
- iv. Policy and programmes that will discourage indiscriminate tree felling and encourage tree planting should be formulated, properly implemented and monitored.

REFERENCES

[1] Akpan, P.L. and Ofiong, M.O. (2007). Effective forest resources management in Nigeria: A panacea for sustainable development, <http://ssm.com/abstract=144785>.

[2] Alabi, O.F., Aaro, J.A., Omodaona, S., Aloko, A.B., and Aasa, O.S. (2011): Determining factors in improved Maize Technology Usage among selected farmers in Kaura Local Government Area of Kaduna State Nigeria. *International Journal of Agriculture and Development Economics* 1(2), 30-38.

[3] Boon, E. and Ahenkan, A. (2011, April). Assessing climate change impacts on ecosystem services and livelihoods in Ghana: Case study of communities around Sui Forest Reserve. *J. Ecosyst Ecogr* S3:001. doi:10.4172/2157-7625.S3-001

[4] Dayo, F.B. (2007). "Nigerian energy balances: 1990-2005" Technical paper, triple —E systems inc. [13].

[5] FAO. (2011). State of World's Forest 2011. Food and Agricultural Organization of the United Nations, Rome, 2011.

[6] Gumbo, D.J., Moombe, K.B., Kandulu, M.M., Kabwe, G., Ojanen, M., Ndhlovu, E., & Sunderland, T.C.H. (2013). Dynamics of the charcoal and indigenous timber trade in Zambia: A scoping study in Eastern, Northern and Northwestern provinces. *Occasional Paper 86*. CIFOR, Bogor, Indonesia

[7] IITA. (2011). Deforestation: Nigeria ranked worst in the World. Retrieved from <http://www.thisdaylive.com/articles/deforestation-nigeria-ranked-worst-in-the-world/103321/>

[8] Jamala, G. Y, Abraham, P, Joel, L and Asongo A, (2013, Sep - Oct). Socio-economic implications of charcoal production and marketing in Nigeria. *Journal of Agriculture and Veterinary Science* 5, (4). 41-45

[9] Mfrekemfon, P.I. and Konwea, P.E. (2014). Deforestations, environmental sustainability and health implications in Nigeria: A review. *International Journal of Science, Environment and Technology*, 3, (2): 502 – 517

[10] Njenga, M., Karanja, N., Munster, C., Iiyama, M., Neufeldt, H., Kithinji, J., & Jamnadass, R. (2013). Charcoal production and strategies to enhance its sustainability in Kenya. *Development in Practice*, 23(3), 359-371 DOI: 10.2307/23469243

- [11] Pawar, K.V., and Rothkar, R.V. (2015). Forest conservation and environmental awareness. *Procedia Earth and Planetary Science* 11: 212 – 215.
- [12] Philippe. G, (2002). Charcoal production and use in Africa: what future? *Unasylva* 211, Vol. 53, 30-31.
- [13] United Nations (2012). World population prospects: The 2012 revision. Population division of the Department of Economic and Social

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