



Perceived Environmental and Health Impact of Charcoal Production in Ibarapa Central Local Government Area, Oyo State, Nigeria

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ABSTRACT

This research work investigated the perceived environmental and health impact of charcoal production in Ibarapa central local government area, Oyo State, Nigeria. Fifty-three charcoal producers were selected through Purposive sampling method with snowball. Data was collected with the use of structured questionnaire. The findings showed that 49.06 % of the respondents were between the ages 36 and 40 years. 94.34 % males, 75.47 % married and 52.83% had secondary education. Majority of the respondents (62.26%) have been practicing charcoal production for 6-10 years. 54.72 % of the respondent use family labour, 15.09 % use hired labour while 30.19 % use both with an average annual income of ₦228,000. Respondents perceived that charcoal production may have environmental and health impact. The perceived environmental impact of charcoal production are, timber shortage (98.11 %), climatic change (88.68 %), environmental pollution (77.36 %), loss of beneficial medicinal plants (71.69 %), soil erosion 62.26 %, forestland depletion and degradation (50.94 %) and reduction and extinction of wildlife species (41.50%). While, the health impact of charcoal production causes body wounds, skin irritation and burns (96.23%), back and muscle pains (94.34 %), respiratory impairment (92.45%), frequent eyes problem (81.13), falling and slipping (60.38 %), poisonous bites from animals (54.72 %) and traffic accidents (22.64 %). The result of investigation revealed that many charcoal producers are aware of the environmental and health hazards associated with charcoal production.

Keywords: Charcoal, Environment, Health, Impact, Respiratory impairment.

1.0 INTRODUCTION

Wood fuel (charcoal and firewood) is the most commonly form of energy used for cooking and heating in rural area and it is also used in small-scale businesses such as restaurants, bakeries, street food kiosks, brick making, drying produce (WHO, 2006). The wood fuel value chain has significant value as it provides income, employment, livelihoods and energy security (Obiri *et al.*, 2014). On the other hand, unsustainable wood fuel processes results into 1-2.4Gt of carbon dioxide equivalent (CO₂) per year, which is 2.7% of total anthropogenic GHG emissions (FAO, 2017). The emissions are generated in various stages of the value chain and wood production, carbonization of wood into charcoal and utilizations are the greatest contributors (World Bank, 2011).

Charcoal production constitutes an integral energy source and a major livelihood component in most developing countries especially those with wood resources suitable for its production (Zulu & Richardson, 2013). Charcoal production has risen in recent decades as demand has grown among urban households and enterprises (FAO, 2017). In very inefficient operations, charcoal production can result into 9kg of CO₂e per kilogram of charcoal produced and 29-62%, 28-61% and 9-18% of emissions are from wood sourcing, carbonization of wood into charcoal and end use (FAO, 2017; World Bank, 2011). Inefficient production and utilization of charcoal has linked to several environmental and health problem. Globally, over 4 million deaths occur annually from illnesses related to the smoke generated by indoor combustion, which mainly affects women and small children (Bailis, *et al.*, 2005). Coughing, sneezing and headaches are common among women who work in smoky kitchens, while bronchitis, lung cancer, asthma and tuberculosis have also been linked to smoke from indoor combustion (WHO, 2006). The negative effects of charcoal production on the environment and health have raised a growing concern among policy makers concern with the management of forest resources. Hence, the need to understand the environmental and health implications of charcoal production in Ibarapa central local government area, Oyo State, Nigeria.

2.0 MATERIALS AND METHODS

2.1 Study Area

The study was conducted in Ibarapa central local government area, Oyo State. The Local government has two major towns which are Igboora as the headquarter and Idere. In 2018, the study area has a population estimated be around 322,189 (NPC, 2018) with a land mass of 440km². The study area is located on longitude 7° 26' 1.79"N, latitude 3°17' 16.37' E. with approximately 66 km North-northwest of Ibadan, the Oyo State capital and about 32 km

Table 1 Distribution of the Respondents According to Socio-economic Characteristics

Characteristics	Frequency	Percentage (%)
Sex		
Male	50	94.34
Female	3	5.66
Age		
Less than 25	3	5.66
26-30	10	18.87
36-40	26	49.06
46-50	9	16.98
Above 50	5	9.43
Marital Status		
Single	5	9.43
Married	40	75.47
Divorced	5	9.43
Widow/widower	3	5.66
Level of Education		
No Formal education	7	13.21
Primary education	14	26.42
Secondary education	28	52.83
Tertiary education	4	7.55
Household Size (Persons)		
< 5	17	32.08
5-10	34	64.15
>10	2	3.77
Years of charcoal production		
1-5 years	0	0
6-10 years	33	62.26
11-15 years	17	32.08
16 and above	3	5.66
Sources of labour		
Family labour	29	54.72
Hired labour	8	15.09
Both	16	30.19
Membership of charcoal producer		
Registered member	20	37.74
Non-registered member	33	62.26
Annual income derived from forest charcoal production (₦)		
Less than ₦ 100,000	8	15.09
₦201,000-₦300,000	27	50.94
₦301,000-400,000	11	20.75
₦401,000-500,000	5	9.43
Above ₦500,000	2	3.77

3.2 Factors that Influence Charcoal Production

The factors that influence charcoal production in the study area are presented in table 2. Availability of suitable tree species for charcoal production (100 %) and low cost energy demand (94.33 %) are the major factors that influence the production of charcoal in the study area. The respondents claimed to find the wood in the forests cheap and available means of energy. Fuel wood, either burned and transformed into charcoal, or dried, are the major source of energy observed in the study area. Other factors that influence charcoal production according to the respondents include Source of employment (90.57 %), market availability (81.13 %), monetary value (71.70), an alternative source to crop production (69.81 %) and required no special skills (39.62 %). These factors has impact on the exploitation of the forest resources especially timber forest products (TFP) by reducing the relative availability, accessibility and rate of exploitation.

Table 2. Factors that Influence Charcoal Production in the Study Area

Factors	Frequency	Percentage	Ranking
Availability of suitable tree species for charcoal production	53	100	1 st
Low cost energy demand	50	94.33	2 nd
Source of employment	48	90.57	3 rd
Market availability	43	81.13	4 th
Monetary value	38	71.70	5 th
An alternative source to crop production	37	69.81	6 th
Required no special skills	21	39.62	7 th

3.3 Environmental Impact of Charcoal Production

The respondents highlighted environmental impact due to charcoal production as presented in table 3. Majority (98.11 %) of the respondents indicated that timber shortage has been the major effect arising from uncontrolled charcoal production. The respondents reported unavailability of most essential timber product in the study area and cases of conflict between charcoal producers and other timber products users as a result of the limited available timber products. 88.68 % of the respondents reported climatic change as part of the observed environmental impact of charcoal production. Most the respondents do not understand the scientific dynamics of how charcoal production influences climatic change, they could clearly share their experiences on the manifestations of global warming as result of the observed rapid rate of deforestation in the area.

Most of the local people affirmed the drying and dying state of crops on their farms, reduced soil moisture and general over heating of the air as evidence of environmental impact of charcoal production and this they perceived is due to the increased and continual loss of trees cover. These experiences are built on their understanding of the local climate and which in turn are related with respondent's age, livelihood and probably length of stay and engagement is charcoal production in the community. 77.36 % of the respondents reported environmental pollution has one of the major effect of charcoal production in the study area due to the release of smoke and dust from indiscriminate burning of wood for charcoal production at any available space. Loss of beneficial medicinal plants (71.69 %), soil erosion (62.26 %), Forestland depletion and degradation (50.94 %), and reduction and extinction of wildlife species (51.50 %) were reported as part of the environmental impact of charcoal production observed in the study area.

Table 3 Perceived Environmental Impact of Charcoal Production in the Study Area

Environmental Effects	Frequency	Percentage (%)	Ranking
Timber shortage	52	98.11	1 st
Climatic change	47	88.68	2 nd
Environmental pollution	41	77.36	3 rd
Loss of beneficial medicinal plants	38	71.69	4 th
Soil erosion	33	62.26	5 th
Forest land depletion and degradation	27	50.94	6 th
Reduction and extinction of wildlife species	22	41.50	7 th

3.4 Health Impact of Charcoal Production

The perceived health impact of charcoal production in the study area are presented in table 4. Majority of the respondents perceived body wounds, skin irritation and burns (96.23 %), back and muscle pains (94.34 %), respiratory impairment (92.45 %), frequent eyes problem (81.13 %) and falling and slipping (60.38 %) as the major health related problems associated with charcoal production. The hazardous working conditions associated with the production of charcoal often constitutes a significant individual investment of time. Charcoal producers found in the community work in close proximity to earth mound, which generate high temperature, release toxic compounds with high risk of poisoning. In addition, lack of modern tools most often results in the use of human labor throughout the entire production process and may potentially lead to moderate or severe injuries (Eniola and Odebode, 2018), which can prove fatal in rural areas that lack access to adequate medical care. Extreme temperatures combined with volatile chemical compounds, including carbon monoxide and sulfur dioxide; create an extremely dangerous environment for any human, especially those without adequate safety protection (Bailis, *et al.*, 2005).

Table 4 Perceived Health Impact of Charcoal Production in the Study Area

Health Effects	Frequency	Percentage (%)	Ranking
Body wounds, skin irritation and burns	51	96.23	1 st
Back and muscle pains	50	94.34	2 nd
Respiratory impairment	49	92.45	3 rd
Frequent eyes problem	43	81.13	4 th
Falling and slipping	32	60.38	5 th
Poisonous bites from animals	29	54.72	6 th
Traffic accidents	12	22.64	7 th

4. CONCLUSION AND RECOMMENDATION

This study investigated the perceived environmental and health impact of charcoal production in Ibarapa central local government area, Oyo State, Nigeria. The study revealed that, majority of those engaging in charcoal production are male within the age range of 36-40 years. Different factors influence the engagement in charcoal production with availability of suitable tree species for charcoal production in the study area ranked as the top factors that influence the production of charcoal. The perceived environmental impact of charcoal production are, timber shortage, climatic change, environmental pollution, loss of beneficial medicinal plants, soil erosion, forestland depletion and degradation and reduction and extinction of wildlife species. While, the health impact of charcoal production causes body wounds, skin irritation and burns, back and muscle pains, respiratory impairment, frequent eyes problem, falling and slipping, poisonous bites from animals and traffic accidents. Therefore, in order to alleviate the challenges associated with charcoal production, the following measures should be taken:

- i. Stakeholders should promote and manage forests resource, in order to ensure environmental sustainability.
- ii. Encouragement of environmental education and awareness.
- iii. Local community should have a practice of replanting various trees species used for charcoal production in a sustainable way.
- iv. Encourage the adoption of alternative energy sources, in order to reduce dependency on fuelwood and charcoal.
- v. Awareness campaign on health consequences of charcoal production should be promoted.
- vi. The use of personal protective equipment, provision of on-site first aid kit and periodic medical examination among charcoal producers should be encourage.
- vii. Shift duty should be employed to reduce hours of exposure during charcoal production.

References

- Adejumo, M.A. and Adeyemi, A.O., (2021). *Impact of Bush Burning on Chemical Properties of Some Soil in Igboora, Oyo State, Nigeria. Lautech journal of Civil and Engineering Studies. Volume 7, Issue 2; September, 2021.*
- Bailis, R., M. Ezzati & D. M. Kammen (2005) Mortality and greenhouse gas impacts of biomass and petroleum energy futures in Africa. *Science, 308, 98-103.*
- Beatrice Darko Obiri, Isaac Nunoo, Elizabeth Obeng, Francis Wilson Owusu and Emmanuel Marfo. (2014). The Charcoal industry in Ghana: An Alternative livelihood Option for Displaced Illegal Chainsaw Lumber Producers. *Tropenbos International Wageningen the Netherlannds. 132pp*
- Eniola, P. O and Odebo, S.O. (2018). Perceived Health Effects of Charcoal Production among Rural Dwellers of Derived Savannah Zone of Nigeria. *Journal of Agriculture and Environmental Sciences June 2018, Vol. 7, No. 1, pp. 127-133 ISSN: 2334-2404 (Print), 2334-2412.*
- FAO, (2013). Sustainable Forest Management in a Changing Climate. FAO-Finland Forestry Programme -Tanzania. A Fire Baseline for Tanzania. Retrieved from www.fao.org/forestry/39605-016494740dc4dd315b0b298b573b083b.pdf on 1st January, 2017.
- FAO. (2017). The charcoal transition: greening the charcoal value chain to mitigate climate change and improve local livelihoods, by J. van Dam. Rome, Food and Agriculture Organization of the United Nations.
- NPC (2018). National Population Commission, Nigeria.
- Ogara J. I. (2011) Preliminary studies on charcoal production and producers' knowledge of environmental hazards in Nasarawa State, Nigeria. *Production Agriculture and Technology 7(2): 68-75.*
- WHO. (2006). Fuel for life: household energy and health. Paris, World Health Organization.
- World Bank, (2011). Wood-Based Biomass Energy Development for Sub-Saharan Africa; Issues and Approaches. World Bank, Washington.
- Zulu, L. C., & Richardson, R. B. (2013). Charcoal, livelihoods, and poverty reduction: Evidence from sub-Saharan Africa. *Energy for Sustainable Development, 17(2), 127-137.*