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LIVELIHOOD SUSTAINABILITY AND LAND DEGRADATION: SOCIO-ECONOMIC ASSESSMENT OF CHARCOAL TRADE IN YEWA DIVISION, OGUN STATE

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ABSTRACT

Charcoal merchandise is a thriving business in Yewa Division of Ogun State. Despite the livelihood support from charcoal trading, significant negative impacts on land and environment have been widely reported. There is the need to balance economic gains and land degradation. A survey of purposively sampled five hundred charcoal stakeholders was conducted through the use of well-structured questionnaire and interviews. Data were collected on socio-economic characteristics, perceptions on livelihoods and land degradation. Data were analysed using descriptive statistics, logistic and ordinal regression analyses. The study found that 56 % of the respondents were male and 55 % were married. Most of the respondents (63 %) had secondary level education, involved as producers (60 %), and earning income of between ₦50,000 and ₦120,000 monthly (48 %) from charcoal activities. The research revealed that marital status ($\chi^2_{2,498}$ = 7.43; p=0.02) and occupation ($\chi^2_{1,499}$ = 0.001; p=0.01) significantly influenced the perception of respondents with respect to charcoal merchandise for livelihood support. Percieved impact of charcoal production on land degradation was significantly influenced by marital status ($\chi^2_{2,498}$ = 7.43; p=0.02), education level ($\chi^2_{2,498}$ = 4.68; p=0.01) and income level ($\chi^2_{2,498}$ = 11.53; p=0.01). Charcoal trading appears to be a lucrative business that supports livelihoods. Married couple, well educated people and high income earners appeared to be involved in this business, and they seemed fully aware of the consequenes of charcoal activities on land degradation. However, the study recommends that charcoal merchandise should be strictly regulated to forestall adverse consequences to the land and environment.

Keywords: Charcoal merchandise, Livelihood support, Land degradation, Yewa Division

INTRODUCTION

Charcoal is a fuel that is produced by carbonization of biomass. Charcoal production is a relevant money-making venture mostly in rural sectors and an important source of energy, especially in developing countries (Brobbey *et al*., 2019). Therefore, the use of wood to generate heat energy, particularly for cooking and heating, is still very much relevant in most countries of the Sub-Saharan Africa (Zulu & Richardson, 2013). Wood fuels contribute between 90 and 98 % of all energy consumed in developing countries and at the same time represent about 60 to 80 % of all wood consumed worldwide (Idiata *et al*., 2013). Mensah *et al*. (2022) estimated that 65 % of charcoal production emanates from the Sub-Saharan Africa, mostly dominated by small holder producers.

In most of the rural and peri-urban communities of developing countries, charcoal production is a veritable source of livelihood for millions of people (Njenga *et al*., 2013). Charcoal production is a key source of income and energy, especially where alternative fuels are unaffordable and inaccessible (Babalola & Opii, 2010). Charcoal merchandise offers income generation opportunities to small holder farmers, landless labourers and informal workers (Zulu & Richardson, 2013). Charcoal production process requires relatively simple tools and limited capital, making it accessible to marginalized groups, including women and youth (Luoga *et al*., 2000). Market demand for charcoal is in high demand especially in urban areas, where it is used for cooking due to its availability and affordability (Rose *et al*., 2022).

Reseach studies have established strong links between charcoal production and land degradation (Chidumayo & Gumbo, 2013; Kiruki *et al*., 2017). Woods are harvested unsustainably leaving large tracts of land exposed to deforestation with consequent biodiversity reduction, ecosystem disruption and habitat loss (Babu *et al*., 2025; Butler, 2019). Removal of protective canopy exposes soilto erosion from rainfall (Wei *et al*., 2024), resulting in reduced soil productivity (Pierce & Lal, 2017) and subsequent reduction in water quality from siltation of rivers and streams (Osuagwu *et al*., 2014). Nutrient-rich soils are depleted following land clearance for charcoal production, resulting in loss of soil fertility (Lisboa *et al*., 2020). Repeated removal ofvegetation for charcoal producton without sufficient regeneration contributes immensely to desertification (D'Odorico *et al*., 2019).

Charcoal production in West African countries such as Nigeria, Togo and Ghanais mostly sourced from dense and slow-growing indigenous tree species (Adeniji *et*

al., 2015). Adebayo *et al*., 2019 reported the following indigenous tree species as the preferred choicefor charcoal production in parts of Southwestern States in Nigeria: *Vitellariaparadoxa* (Shea tree/Emi), *Anogeissusleiocarpus* (Axle wood/Ayin), *Brideliaferruginea* (Guinea/Ara), *Pericopsislaxiflora* (Pericopsis/Ayanre), *Terminalia spp* (Tropical almond tree/Idi) and *Harunganamadagascariensis* (Dragon's blood tree/Adin). In the absence of aforementioned traditional tree species, charcoal producers often switch to other high-density non-traditional tree species such as *Tectona grandis* (Teak) and *Gmelina arborea* (Melina).

Charcoal merchandise is a striving business in Yewa Division of Ogun State as eveident in truckload of charcoal bags transported across the axis from time to time (Banjo, 2024). There is the need to add to existing knowledge on the socio-economic characteristics of stakeholders in charcoal production business and understand their perspectives on fuel wood exploitation and forest land degradation. Due to the extremely high prevalence of poverty in the nation, Olugbire and Aremu (2014) reported that over 60 % of Nigerians rely on fuelwood and charcoal as their primary energy sources for cooking. Given the level of poverty brought on by high unemployment and low per capita income, selling charcoal has turned into a source of revenue (Babalola & Opii, 2010). Charcoal is readily available at comparatively lower costs as a substitute for LPG, kerosene; there has been a significant shift in the usage of charcoal, which has increased demand for the material. However, this surge in demand for charcoal production and usage degrades forest land (Sedano *et al*., 2022) and significantly impact public health (Idowu *et al*., 2023). This study investigates the socio-economic characteristics of stakeholders involved in the charcoal merchandise in Yewa Division of Ogun State Nigeria with the view to elucidating the impacts of their activities on livelihood sustainanceand forest land degradation.

MATERIALS AND METHODS

The Study Area

The study was carried out in the Yewa Division of Ogun State Nigeria. Yewa Division, located in Ogun West Senatorial District, lies between latitudes 6°30′N and 7°15′N and longitudes 2°45′E and 3°30′E. It comprises of five local government areas, namely: Yewa North, Yewa South, Ipokia, Imeko-Afon, and Ado-Odo/Ota (Figure 1). Annual rainfall ranges from 1,200 mm to 2,000 mm, while temperatures typically fluctuate between 24 and 35 °C indicating pronounced seasonal shifts in thermal characteristics (Adedeji *et al*., 2021). Yewa Division has numerous charcoal kilns scattered across the landscapes, especially near the forest reserves (Figure 2). The study area shares western boundary with the Republic of Benin, enhancing its relevance for transboundary trade activities (Olorunshola *et al*., 2023; Talabi *et al*., 2011). The topography is a combination of plains, hills, and isolated highlands, supporting diverse vegetation covercharacterized as derived savannah ecosystem, dominated by savannah trees (Salami *et al*., 2021) such as *Vitellariaparadoxa*, *Anogeissusleiocarpus*, *Brideliaferruginea* that are suitable for charcoal production (Adebayo *et al*., 2019).

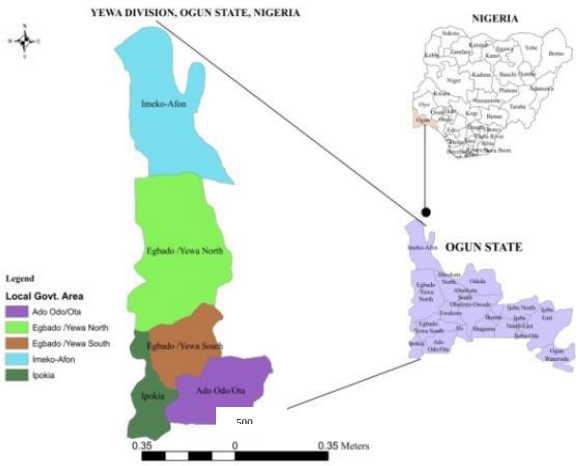

Figure 1: Map of the study area

Figure 2: Earth-mound charcoal kiln

Sampling Design and Data Analysis

Purposive sampling was used to select 100 respondents from each of the local government in Yewa Division according to their major dealings with charcoal production site within the respective Local Government Area (Adeniji *et al*., 2015). Structured questionnaires and interviews were conducted to obtain information on socio-economic characteristics and their perceptions of charcoal business on livelihood sustenance and forest degradation.

The data collected from the field were analyzed using descriptive statistics of mean and frequencies. Logistic and ordinal regression analyses were also used to test the hypotheses of relationships between the socio-economic characteristics of respondents and their perceptions of charcoal merchandise on livelihood

sustenance and impact on forest land degradation. All data were analysed at 5% level of significance.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Respondents

Socio-economic characteristics of respondents are presented in Table 1. Marital status of the respondents was observed as follows: the percentage of married respondents involved in charcoal production was 55 %; single involved were 38 % and the widowed were 7 %. It was observed that 3 % had primary school education while 63 and 34 % had secondary and tertiary education, respectively. With regards to religion, 59 % were Christian and 41 % were Muslim. For the household sizes, 61 % of respondents had less than 5-person household while 39 % was observed to have more than 5-person household. Respondents involved in direct charcoal producton activity were observed to be 60 % while those involved in transportation/marketing were 40 %. The income level of the respondents was also considered, where 8 % earned less than ₦50,000, 48 % earned between ₦50,000 and ₦120,000, while 44 % earned more than ₦120,000 monthly.

Of all respondents involved in charcoal merchandise in this study, 56 % were male while the remaining 44% represented the female gender. The dominance of men in both the production of charcoal and marketing is in agreement with Belay *et al*. (2024), and as well a signal that males are known for jobs that are energy-demanding, unlike females (Mensah *et al*., 2024). This finding appear to agree with Zulu and Richardson (2013) who asserted that charcoal business is male-dominated because participation in charcoal value-chain merchandise requires physical labour, mobility requirement and access to land and capital. Also, Schure *et al*. (2015) opined that charcoal production activities are energy-intensive, and are primarily dominated by males in some sub-Saharan African countries such as Ghana, Ethiopia and Republic of Congo. The results of the study showed that age brackets are involved in the production of charcoal, 65 % of respondents were less than 40 years and 35 % of respondents were more than 40 years. This finding is consistent with Agyeman *et al*. (2012) who observed that the lack of employment opportunities drives rural youth to engage in charcoal production as a means of sustaining their livelihood.

Table 1: Socio-economic characteristics of respondents

Variable	Category	Frequency (n=500)	%
Gender	Female	220	44
	Male	280	56
Age	Less than 40 years	325	65
	More than 40 years	175	35
Education level	Primary	15	3
	Secondary	315	63
	Tertiary	170	34
Marital status	Married	275	55
	Single	190	38
	Widowed	35	7
Religion	Christianity	295	59
	Islam	205	41
Household size	Less than or equal to 5	305	61
	More than 5	195	39
Occupation	Producer	300	60
	Transporter	200	40
Income level	Less than #50,000	40	8
	Between #50,000 – #120,000	240	48
	More than #120,000	220	44

Source: Field Survey (2024)

Percieved Effect of Charcoal Production on Livelihood Sustenance in Yewa Division

The perceived impacts of charcoal business on livelihood sustenance in Yewa Division are presented in Table 2. Marital status (p-value = 0.02) and occupation (p-value = 0.01) were found to significantly influence respondent's perception of the likely effect of charcoal merchandise on livelihood sustenance.

Single and married respondents indicated increased likelihood of charcoal business supporting their means of livelihood at log odds 0.42 (Odd Ratio = 1.52) and 0.16 (Odd Ratio = 1.17) respectively when compared with widowed respondents. In other words, single (1.52 times) and married (1.17 times) respondents were more likely than widowed people to perceive high/medium level impact of charcoal business on livelihood sustenance. As reported by Jadhav, 2022, the finding of this study could possibly imply that widowed individuals may have less access to resources such as capital, network and labour to scale up or sustain charcoal business to a level thayt supports livelihood as opposed to single or married respondents with more household labour and better access to markets and finances.

Respondents who were categorized as 'producer' showed less likelihood (log odd -0.20; odd ratio = 0.82) acceptance that charcoal business had significant impact on their livelihood sustenance when compared to those categorized as 'transporter'. In other words, transporters are 18% more likely to affirm that charcoal activities contribute to their livelihood than producers. By implication, producers who engage in the labor-intensive process of tree felling, carbonization, and initial packaging, often face insecure tenure, fluctuating market prices, and high production costs, which limit net livelihood gains (Zulu & Richardson, 2013; Naughton-Treves *et al*., 2007). However, transporters tend to capture higher margins because they operate closer to market centers and control the logistics of moving charcoal to urban demand hubs, where prices are more favorable (Schure *et al*., 2014). These differences in positioning along the value chain may explain why transporters are more likely to perceive charcoal as contributing positively to livelihood sustenance.

Table 2: Percieved impact of charcoal production on livelihood sustenance in Yewa Division

Predictor Variable	Category	Log (Est.)	Chi-Square	p-value
Gender	Female	-0.34	0.32	0.54 ns
	Male	REF		
Age	Less than 40 years	-0.15	1.22	0.05ns
	More than 40 years	REF		
Religion	Christianity	0.02	1.18	0.79 ns
	Islam	REF		
Marital Status	Married	0.16	7.43	0.02 s
	Single	0.42		
	Widowed	REF		
Household Size	Less than or equal to 5	0.05	0.81	0.45 ns
	More than 5	REF		
Education Level	Primary	-0.28	4.68	0.24n s
	Secondary	-0.07		
	Tertiary	REF		
Income Level	Less than ₦50000	0.15	11.53	0.42 ns
	Between ₦50000-₦120000	0.00		
	More than ₦120000	REF		
Occupation	Producer	-0.20	0.001	0.01 s
	Transporter	REF		

Dependent Variable: Percieved impact of charcoal business on livelihood sustenance (High, Medium, Low - ordinal regression analysis); REF = Reference Value; Est. = Estimate; ns – not significant; s – significant; $\alpha = 0.05$

Table 3: Percievedimpact of charcoal production on forest land degradation in Yewa Division

Predictor Variable	Category	Log (Est.)	Chi-Square	p-value
Gender	Female	0.43	0.32	0.57 ns
	Male	REF		
Age	Less than 40 years	-1.44	1.22	0.29 ns
	More than 40 years	REF		
Religion	Christianity	-0.89	1.18	0.28 ns
	Islam	REF		
Marital Status	Married	22.20	7.43	0.02 s
	Single	24.43		
	Widowed	REF		
Household Size	Less than or equal to 5	-0.99	0.81	0.37 ns
	More than 5	REF		
Education Level	Primary	-22.09	4.68	0.05 s
	Secondary	-2.14		
	Tertiary	REF		
Income Level	Less than ₦50000	4.87	11.53	0.01 s
	Between ₦50000-₦120000	1.71		
	More than ₦120000	REF		
Occupation	Producer	-0.02	0.001	0.98 ns
	Transporter	REF		

Dependent Variable: Perceived impact on forest land degradation (Yes, No - logistic regression analysis; REF = Reference Value; Est. = Estimate; ns – not significant; s – significant; $\alpha = 0.05$

Perception of Impacts Charcoal Production on Forest Land Degradation

Perceived impacts of charcoal production on forest land degradation are presented in Table 3. Levels of charcoal production impact on forest land degradation were significantly influenced by marital status ($\chi^2_{2,498}$ = 7.43; p=0.02), education level ($\chi^2_{1,499}$ = 4.68; p=0.05), and income level ($\chi^2_{1,499}$ = 11.53; p=0.01).

Married and single respondents in the study perceived increased likelihood of the impact of charcoal production on forest land degradation by log odds (22.20) and (24.43), respectively when compared to widowed respondents.Married respondents may have greater household stability and broader resource management responsibilities, which can heighten awareness of how charcoal production affects forest

sustainability (Schure *et al*., 2014). Similarly, single individuals—particularly younger or more mobile participants—may be more exposed to educational campaigns, policy discussions, or peer networks that highlight environmental degradation, thereby strengthening their perception of charcoal's ecological impacts (Mwampamba *et al*., 2013).

In contrast, widowed respondents may face social and economic marginalization, limiting access to environmental information and decision-making spaces (Jadhav, 2022). Studies of gender and widowhood in rural Africa have shown that widows often prioritize immediate survival needs over environmental concerns due to reduced labour, assets, and social support (UN Women, 2021). This can translate into weaker recognition of long-term environmental consequences.

Similar patterns are documented in charcoal and woodfuel studies, where socio-demographic factors such as education, household headship, and marital status influence perceptions of forest degradation (Zulu & Richardson, 2013; Angelsen *et al*., 2014).

As shown in Table 3, respondents with primary and secondary school education less likely perceived the impact of charcoal production on forest land degradationat log odds (-22.09) and log (-2.14) when compared to those with tertiary education.These findings are consistent with previous studies that have highlighted the role of education in shaping environmental awareness and perceptions. Higher educational attainment has been shown to enhance knowledge of ecological processes, critical thinking, and awareness of the long-term impacts of unsustainable resource use (Munyati & Makhado, 2019; Tadesse *et al*., 2022). Educated individuals are also more likely to access environmental information through formal channels, including extension services and media, which broaden their understanding of the consequences of charcoal production on forest ecosystems (Etongo *et al*., 2015).

By contrast, respondents with only primary or secondary schooling may perceive charcoal primarily through its immediate livelihood benefits rather than its ecological costs. Limited literacy and environmental knowledge can reduce recognition of indirect or long-term consequences such as biodiversity loss, soil degradation, and reduced ecosystem services (Ajayi & Ikurekong, 2013). Moreover, studies in sub-Saharan Africa show that low levels of education are often associated with lower participation in sustainable land-use practices and reduced capacity to adopt alternative energy sources (Zulu & Richardson, 2013; Schure *et al*., 2014).

Comparing the 'above ₦120000' monthly income earner with categories of respondents who earned 'less than ₦50000' (log odd 4.87) and 'between ₦50000 and ₦120000' (log odd 1.71), the result shows that charcoal production activities showed higher perception of impact on forest land degradation. These findings highlight income-related differences in environmental perception within the charcoal sector whereby low income earners of 'less than ₦50000' and 'between ₦50,000 and ₦120000' were 130 times (odd ratio) and 5.52 times (odd ratio) more likely to perceive charcoal activities as degrading forest land relative to high-income earners (above ₦120000). Lower-income participants may experience land degradation more acutely because they depend directly on nearby forest resources for production and have limited capacity to offset scarcity by securing alternative wood sources (Zulu & Richardson, 2013).

This direct dependency heightens their awareness of forest depletion. Studies on rural livelihoods emphasize that households with fewer assets are typically more vulnerable to resource degradation, making them more sensitive to environmental change (Ellis, 2000; Angelsen *et al*., 2014). Conversely, higher-income earners in the charcoal trade often operate at larger scales or occupy downstream roles (e.g., wholesale or transport), which buffer them from the immediate impacts of forest degradation (Schure *et al*., 2014). They may also have access to broader sourcing networks, allowing them to maintain supply despite local scarcity. Mwampamba *et al*. (2013) note that such structural advantages can reduce the perceived linkage between charcoal production and land degradation among wealthier actors.

CONCLUSION

This study underscores how socioeconomic status influences perceptions of stakeholders in charcoal merchandise activities on livelihood sustainance and forest land degradation. Marital status and occupation significantly influenced respondents' perception of the impact of charcoal business on livelihood sustainance. In the same vein, marital status, education status and income level had sgificant influence on respondents' perception of charcoal activities on forest land degradation. Forest management policy interventions designed to alleviate poverty and mitigate forest degradation should explicitly integrate the socioeconomic characteristics of stakeholders. Recognizing variations in livelihood strategies, resource dependence, and environmental perceptions is essential for promoting equitable outcomes. Tailoring interventions to these socioeconomic realities can foster a more sustainable balance between charcoal-based livelihood opportunities and the protection of forest ecosystems.

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