CHARCOAL PRICE TRACKING REPORT FOR 2023

Planning, Policy and Research Unit

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1.0 Introduction

As of 2022, woodfuel consumed accounted for about 33.5%[1] of the country's final energy consumption. The share of charcoal in woodfuel consumption over the last two decades has increased from about 18.5% to 41.7% and that of firewood has decreased from about 81.5% to 58.3%.[2]

However, for every unit of charcoal produced, four-to-six units of wood are used.[3] This low efficiency, coupled with the growing demand, could have more serious supply implications on the country's wood fuel resource base, which is already threatened by the country's high deforestation rate.

In spite of its importance, data on woodfuel (source of supply, woodfuel stock and quantity of woodfuel supplied per annum) is not readily available. This is partly because the woodfuel sub-sector is predominantly informal with resultant limitations such as record keeping, improper market structures, non-standardised packaging, and pricing. Consequently, unlike other more commercial fuels, data acquisition on woodfuel mostly involves ubndertaking face-to-face data collection.

Since 2021, the Planning, Policy and Research unit has been compiling a national database to track the price of charcoal and factors influencing demand and supply for charcoal at major market centres across the country in line with the Commission's mandate. This will contribute to the establishment of a comprehensive and up-to-date database on woodfuel to adequately forecast woodfuel demand and supply in the country for planning and policy formulation.

This report presents an analysis of data collected during the implementation of the study nationwide in 2023.

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[1] 2023 National Energy Statistics
[2] Energy Database Portal
[3] Strategic National Energy Plan (2000 – 2020), Woodfuels and Renewables

1.1 Objective

The objective of the survey is to establish the factors that influence woodfuel demand and supply in the country.

The survey aims to achieve the following specific objectives:

1. Regularly assess woodfuel prices on a quarterly basis.
2. Identify and analyze patterns and changes in woodfuel prices over time.
3. Determine a unit price for charcoal in the market.
4. Investigate factors influencing the demand and supply of charcoal.
5. Identify sources of woodfuel supply.
6. Examine challenges encountered by woodfuel retailers in their operations.

2.0 Methodology

Sample survey method to collect primary data from some selected district capitals was used for the study. The directorate carries out the data collection exercises in three phases, i.e. Southern zone, Middle zone and Northern zone. So far, all zones have been enumerated.

The survey was conducted in markets with the objective of determining the average price per kilogram of charcoal. The survey also helped to estimate the average weight of bags of charcoal, factors that determine changes in the price of woodfuel and factors that determine the demand and supply of woodfuel.

2.1 Study and Sampling Design

A cross-sectional research design was used using the Energy Profile in all District report, Strategic National Energy Plan (SNEP) II and Energy Statistics as the baseline documents. A cross-sectional survey collects data to make inferences about a population of interest at one point in time. Cross-sectional surveys have been described as snapshots of the populations about which they gather data[4]. Cross-sectional surveys may be repeated periodically; however, in a repeated cross-sectional survey, respondents to the survey at one point in time are not intentionally sampled again, although a respondent to one administration of the survey could be randomly selected for a subsequent one. The sample was selected from all 16 regions in order to achieve a national representative scenario. The design also ensured that some major charcoal marketing areas were represented in the sample.

2.2 Target population and sampling method

The target population was all major charcoal marketing areas in Ghana. Purposive sampling technique was employed for the data collection. Purposive sampling is a sampling technique in which the researcher relies on his or her own judgment when choosing members of population to participate in the study. Consequently, the country was divided into three zones; northern, middle and southern zones.

[4] Bethlehem, J. (1999). Cross-sectional research. Research methodology in the social, behavioural and life sciences, 110, 142.

2.3 Sample size and sampling frame

The sampling frame consisted of 23 major charcoal marketing areas in all the 16 regions as identified in the Energy Profile in all District report. Due to the small size of the sampling frame, a complete enumeration was required for the exercise. Meaning all 23 charcoal marketing centres will be visited for data collection. Further, in each market centre, three (3) charcoal dealers were randomly selected and interviewed. Key informant interviews were conducted with knowledgeable persons and key players in the charcoal value chain, specifically charcoal retailers. The key informants were selected using purposive sampling technique.

2.4 Data Collection Tools

A survey instrument in the form of a questionnaire was designed for the charcoal price tracking study. The survey instrument was used to collect information on the charcoal supply and charcoal sales (pricing) throughout the country.

2.5 Quality assurance and quality control

The survey was conducted with professionalism, and quality assurance was ensured throughout all the stages through the following mechanisms and measures;

- Prior to any data collection activities, the study methodology and survey tools were subjected to intense scrutiny. The recommendations and suggestions made were incorporated into the methodology and survey tools appropriately.
- The study tools were pre-tested in a 2-day pilot test exercise conducted before their use in the field. The pre-testing exercise facilitated the fine-tuning of the tools and was also used to ensure uniform understanding and interpretation of the data collection protocol and tools before the actual field data collection activity.
- Data quality was maintained throughout the entire study process. The field data collection team, which was made up of Energy Commission staff, always met to plan and review the execution of activities on a daily basis. The data collection team always compiled and cross-checked for accuracy and completeness of the responses on a daily basis.

2.6 Expected Output

- Quarterly reports
- Update of Energy database
- Included in the National Energy Statistics and Annual Energy Outlook

3.0 Data Collection, Results and Analysis

3.1 Data Collection

The enumeration areas nationwide were Kintampo and Techiman both in the Bono East region, Sunyani in the Bono region, Goaso and Mim in the Ahafo region, Takoradi in the Western region, Sefwi-Wiawso in the Western North region, Kumasi in the Ashanti region, Koforidua in the Eastern region, Cape Coast and Kasoa in the Central region, Dambai in the Oti region, Ho and Hohoe in the Volta region, Accra and Tema in the Greater Accra region, Wa in the Upper West Region, Bolgatanga in the Upper East region, Tamale in the Northern region, Nalerigu and Walewale in the North East region and Damongo in the Savannah region.

3.2 Demographic Information of Respondents

3.2.1 Age of respondents

The age distribution of the respondents is illustrated in Figure 1.

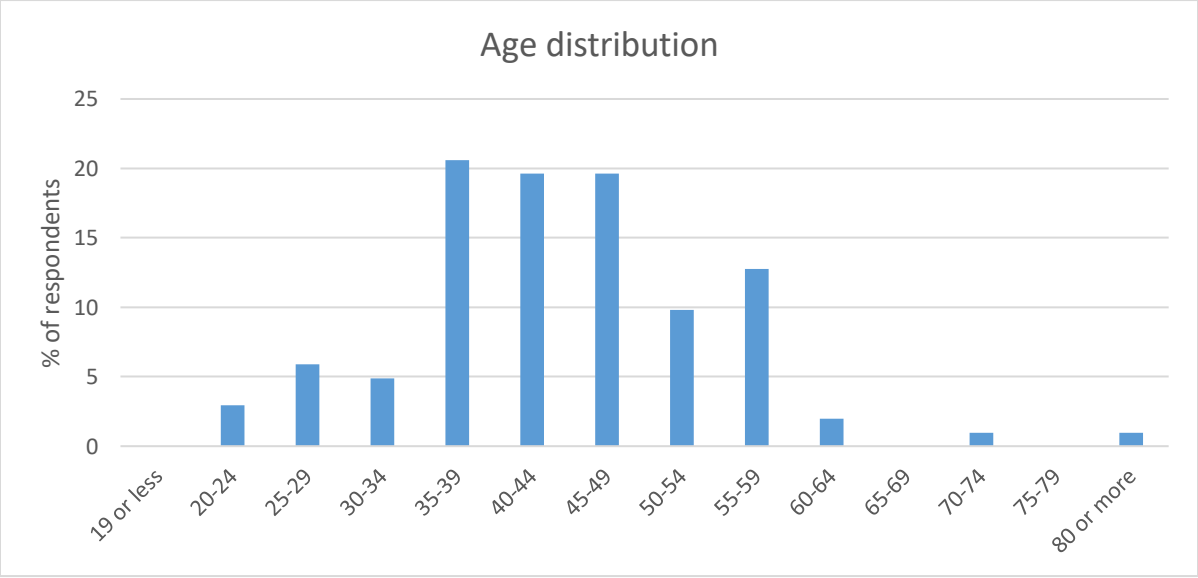

Figure 1: Age distribution of respondents

The age range of the respondents was between 20 and 81 years, with a mean age of 43.5 years. As seen in Figure 1, majority of the respondents (59.8%) were between the ages of 35 and 49 inclusive followed by 55 to 59 years representing 12.7% of respondents. The least number of respondents (1%) were from the ages of 70 to 74 years and 80 years or more. The foregoing results indicate that age distribution of charcoal traders in Ghana is concentrated in the middle-age range, particularly between 35 and 49 years, while the representation decreases towards both younger and older age groups.

3.2.2 Gender of respondents

The gender of respondents in located in figure 2

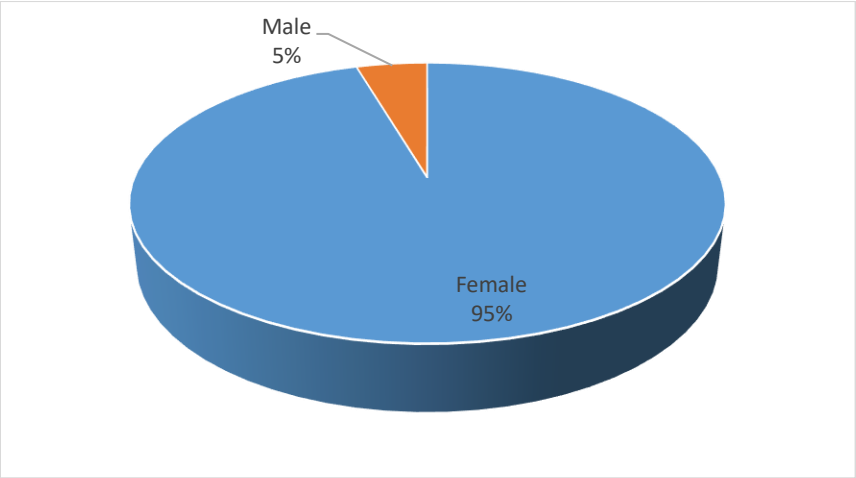

Figure 2: Gender of respondents

Figure 2 indicates a significant gender disparity among charcoal traders, with approximately 95% being female and only about 5% being male. This suggests a pronounced female dominance in the charcoal selling sector.

3.3 Seasons in Charcoal Supply and Charcoal Sales

Charcoal supply and sales exhibit a seasonal pattern, categorized into major season and minor season. Figure 3 gives a distribution of the major sales and supply seasons nationwide. Figures 4 and 5 provides the regional distribution of both major sales and supply seasons.

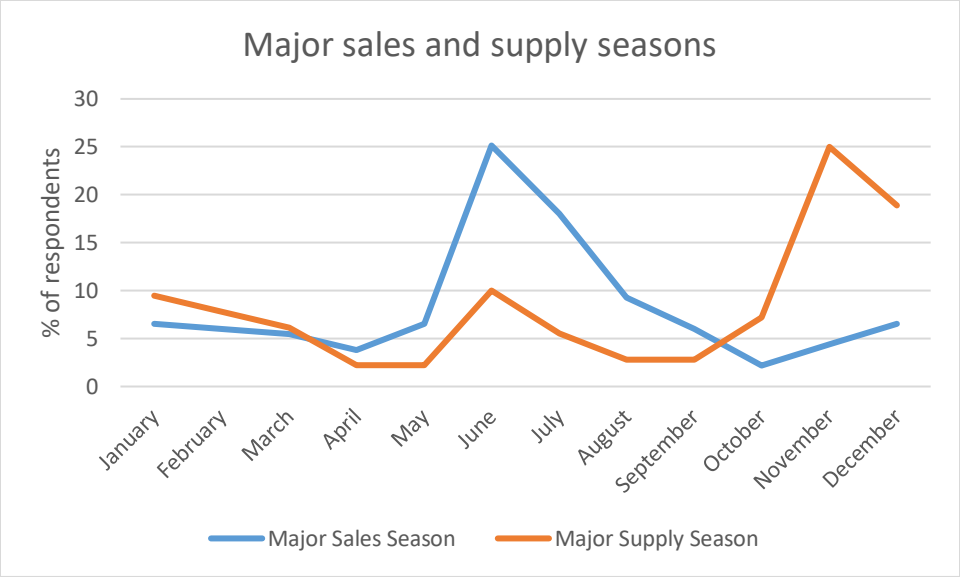

Figure 3: Major sales and supply seasons nationwide

As illustrated in Figures 2, 3 and 4, 59% of respondents indicated that the major sales season is from May to August, whilst 51% of respondents indicated that the major supply season spans from October to December. Thus, the major sales season occurs within the wet season, which predominantly spans May to September. Likewise, the major supply season occurs within the dry season which is from November to February. These seasonal variations in charcoal supply and sales reflect the influence of weather conditions on charcoal production and sales activities in Ghana, highlighting the importance of considering climatic factors in understanding and planning within the charcoal industry.

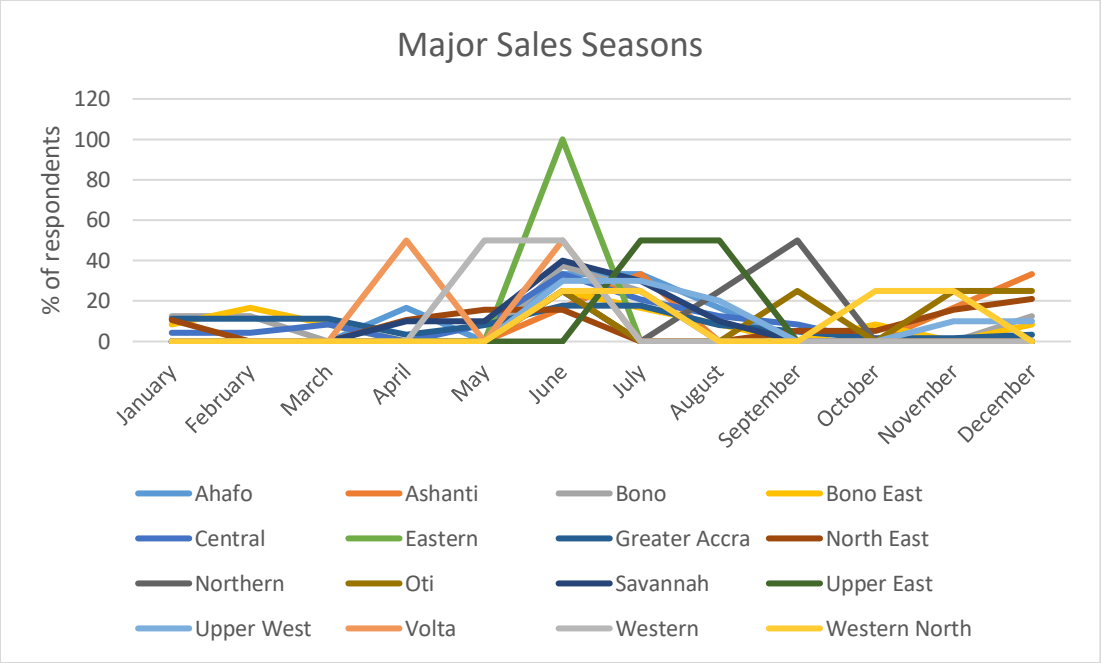

Figure 4: Major sales seasons by region

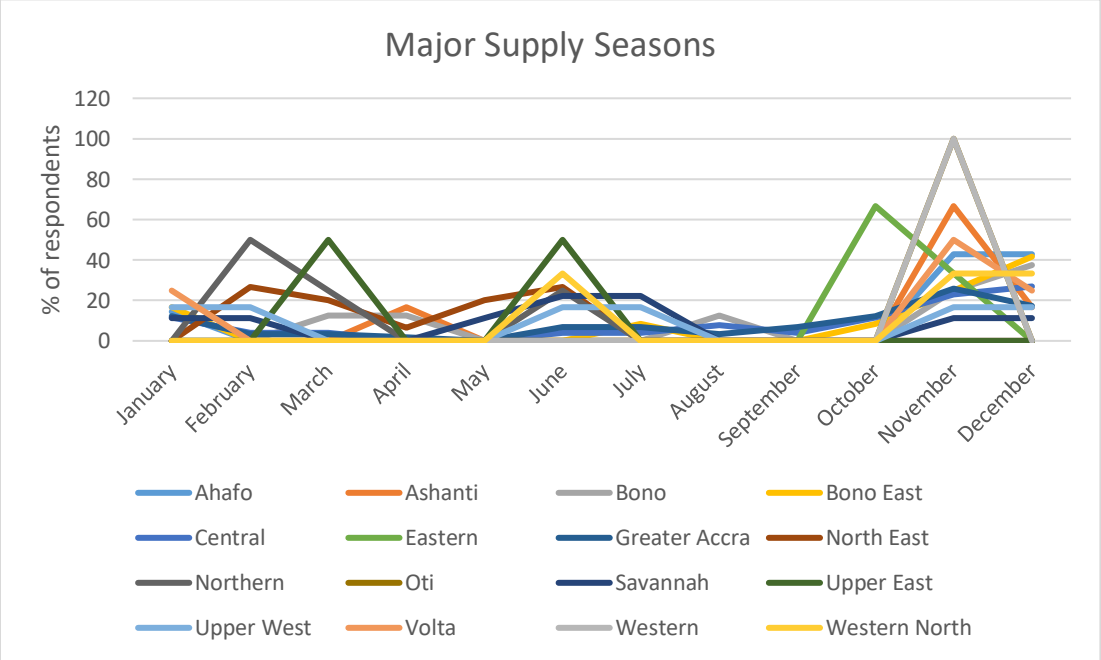

Figure 5: Major supply seasons by region

Respondents also opined that the variation in charcoal supply is mainly due to heavy rains followed by bad road networks, which are rife during the wet season. The least causes of variation in charcoal supply are the demand for charcoal and ban on charcoal production. These challenges underscore the importance of considering both climatic conditions and infrastructure development in developing strategies for sustainable and resilient charcoal supply chains in the country.

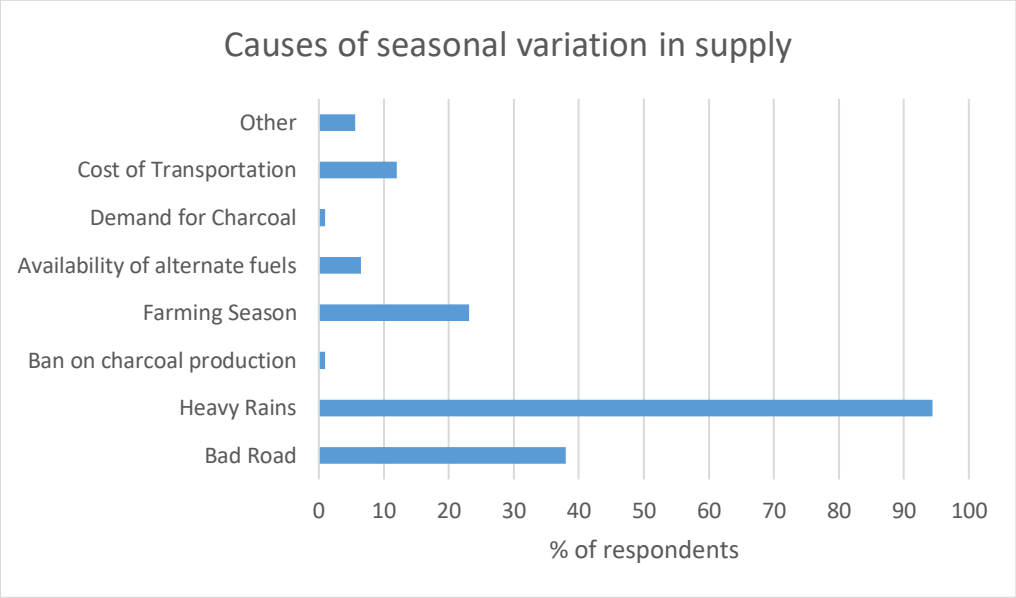

Figure 6: Factors that influence charcoal supply

3.4 Sources of Charcoal Supply

The sources of charcoal supply in Ghana exhibit regional variations, with a significant proportion of respondents relying on local suppliers. The result suggests that 88.9% of respondents obtain 50% or more of their charcoal supply from within the regions they conduct their trade. For instance, respondents from Cape Coast, Koforidua, Ho, Hohoe, Damongo, Nalerigu, Walewale, Tamale and Wa had all their charcoal supply sources from immediate localities within their region, followed closely by Kintampo (90%), Takoradi (80%) and Sunyani (75%). This indicates a strong reliance on local sources, suggesting that these regions have sufficient charcoal production to meet the demand of local traders. However, the remaining respondents source their charcoal primarily from outside the regions they ply their trade. Respondents in Kasoa source all their charcoal from outside

their regions of location followed by Accra (97.9%). Figure 7 summarises the percentage of respondents with supply sources from the region they ply their trade. Table 1 captures the sources of charcoal supply for each town visited.

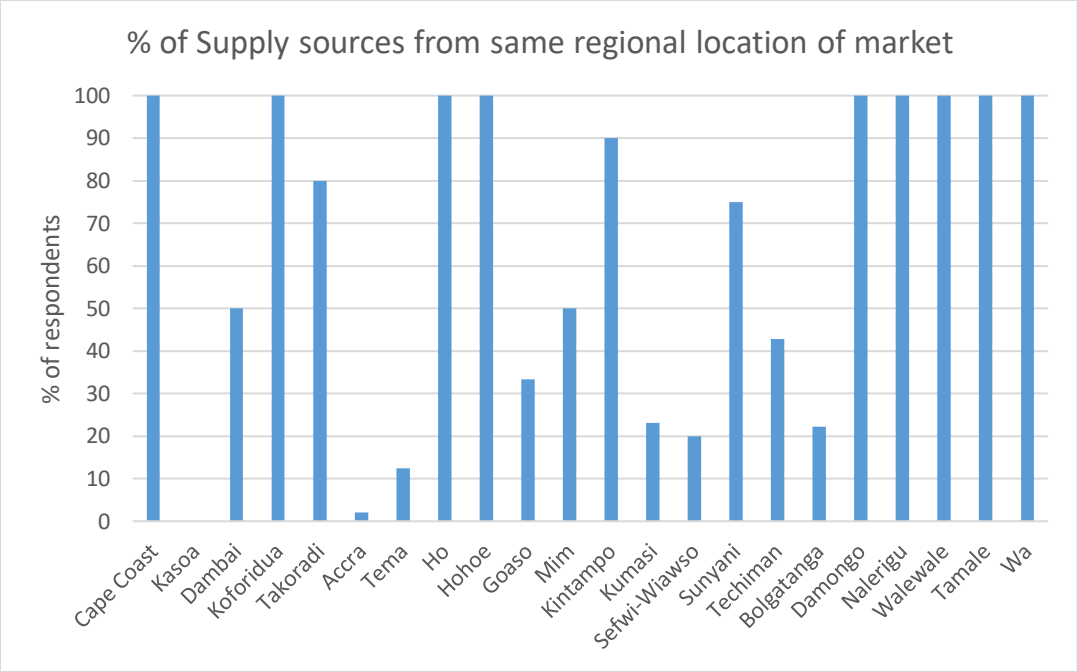

Figure 7: Percentage of respondents with supply sources from the same market region

Table 1: Sources of charcoal supply

Town	**Source of Charcoal Supply**
Cape Coast	Yamoransa, Apewosika
Kasoa	Damongo, Afram Plains, Atebubu, Bole, Tinga, Prang, Kintampo
Dambai	Kadjebi, Chamba, Ofosu
Koforidua	Asesewa, Maame Krobo, Asifaw
Takoradi	Tarkwa, Nzema, Kintampo
Accra	Damongo, Dambai, Afram Plains, Daboya, Buipe, Bole, Kintampo, Tinga, Dambai, Dawadawa
Tema	Damongo, Atebubu, Jasikan, Ashaiman, Buipe, Kintampo

Ho	Adaklu, Nyive, Tokor, Mafi Kumase
Hohoe	Dambai
Goaso	Ampenkro, Bediako (Asunafo North), Ayensua
Mim	Kintampo, Bediako
Kintampo	Miawani, Apesika, Papato, Zanwara
Kumasi	Sokoban, Bole, Tinga, Kintampo, Damongo, Bole
Sefwi-Wiawso	Koforikrom, Tanoso, Zanwara, Techiman
Sunyani	Sampa, Wa, Nsawkaw, Damongo, Seikwa
Techiman	Techiman, Bamboi, Sawla, Damongo, Nkoranza
Bolgatanga	Walewale, Mankarigu, Lukula, Damongo
Damongo	Yiripala, Buipe, Larabanga, Broto
Nalerigu	Gbangu, Kpalevaka, Yawale, Jawani, Tuni
Walewale	Wisiaw, Wagrudo, Kukua,Guagado
Tamale	Kpalivi, Salaga, Damongo, Savelugu
Wa	Wa, Olu, Sagia, Chaina, Dorimon

3.5 Weight of Charcoal

The average weight of charcoal per bag across the markets visited is illustrated in Figure 8.

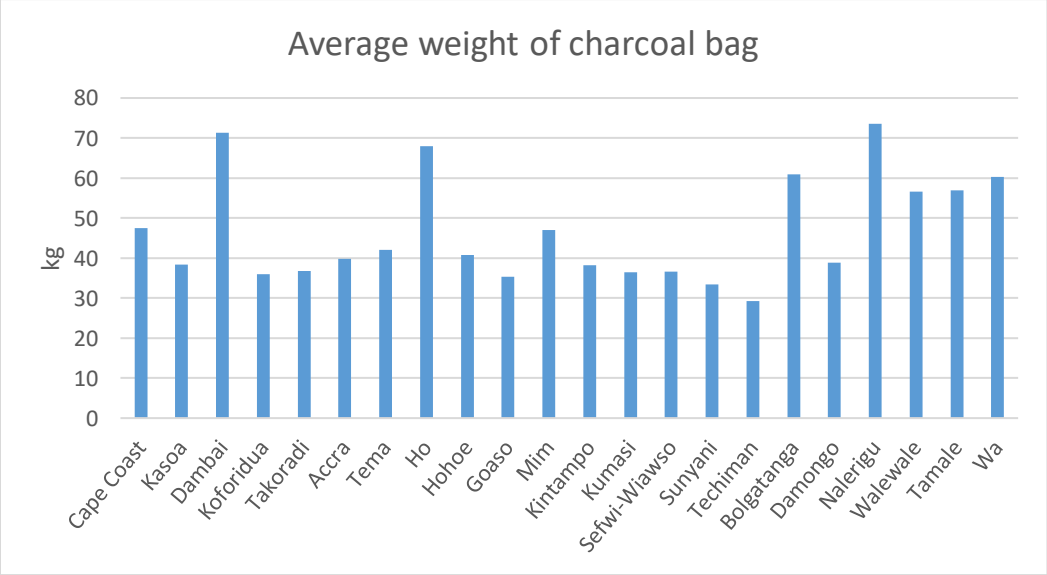

Figure 8: Average weight of charcoal

Nationwide, charcoal bag weights spanned from 29.3kg to 73.5kg, with the national average at 46kg. Nalerigu had the highest average weight of charcoal bag of 73.5kg followed by Dambai (71.35kg) and Ho (68kg). The least average weight of charcoal bags was obtained in Techiman (29.3kg) followed by Sunyani (33.5kg) and Goaso (35.4kg). The difference in the weight of charcoal across the country is as a result of non-standardized charcoal bags.

3.6 Charcoal Prices

3.6.1 Charcoal Price per Package

The price of charcoal bags nationwide ranged from GH₵57 to GH₵253, with a national average price of GH₵124. The price of charcoal bags was highest in Ho, followed by Cape Coast and Hohoe respectively.

The price of charcoal bags was least in Damongo, followed by Mim and then Sefwi-Wiawso. These variations likely reflect diverse economic conditions and market dynamics such as demand and supply chain dynamics across regions. A summary of the charcoal prices is illustrated in Figure 9.

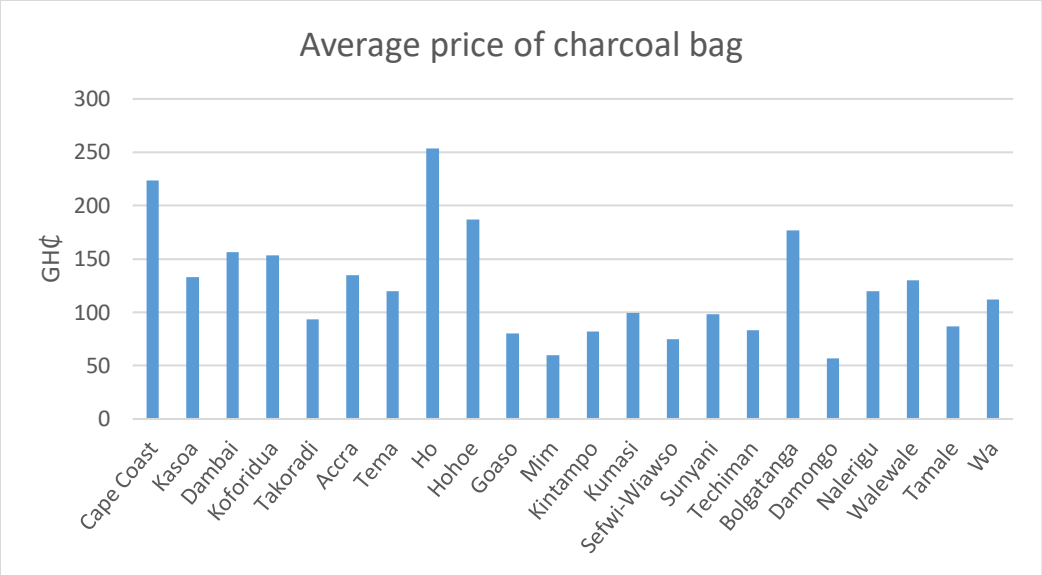

Figure 9: Charcoal price from the various markets

3.6.2 Unit Price of Charcoal

In Ghana, charcoal is sold by volume, not by weight. Therefore, we sought to estimate the price of charcoal per kilogram in all the markets visited. The average unit price of charcoal (cedi/kg) estimated from the survey is represented in Figure 10.

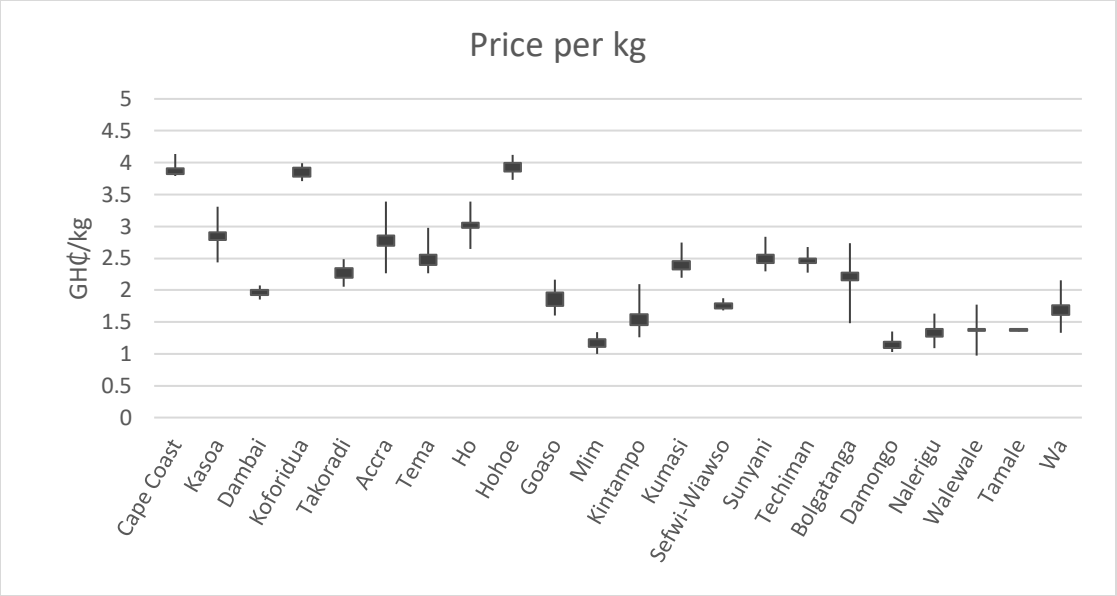

Figure 10: Unit price of charcoal (GH₵ per kg)

The national average price per kilogram of charcoal is GH₵ 2.70. The highest price per kg of charcoal was recorded in Cape Coast (GH₵4.7) followed by Hohoe and Koforidua respectively. Mim had the least price per kg of charcoal of GH₵1.28 followed by Damongo (GH₵1.46) and then Tamale (GH₵1.52).

3.7 Unit price of Charcoal vs LPG

The government launched a National LPG Promotion Programme in 1989 to achieve the policy objective of promoting the use of LPG as a clean cooking fuel alternative to charcoal and firewood. The policy strategy was to utilise the LPG from the refinery and in so reduce the rapid rate of charcoal and firewood use, which was contributing to deforestation. Although the programme was interrupted in 1995, the number of households using LPG as the main source of cooking fuel increased from 2.2% of the 3.3 million households in 1991 to 6.1% of the 3.71 million households in 2000 to 18.2% of the 5.6 million households in 2010 and then to 36.9% of 30.8 million

households in 2021[5],[6],[7]. Similarly, the unit price of LPG has been increasing over the last two decades at an annual average rate of 20.5%[8]. Figure 11 displays the price of energy measured in mmbtu of LPG and charcoal for easy comparison

In 2009, the government re-launched the promotion of LPG as cooking fuel, this time setting a target of LPG use penetration of 50% of households by 2030. With the LPG penetration rate increasing to 36.9% in 2021, government is more likely to achieve the 2030 target if the usage of LPG increases annually by 3.43%.[9]

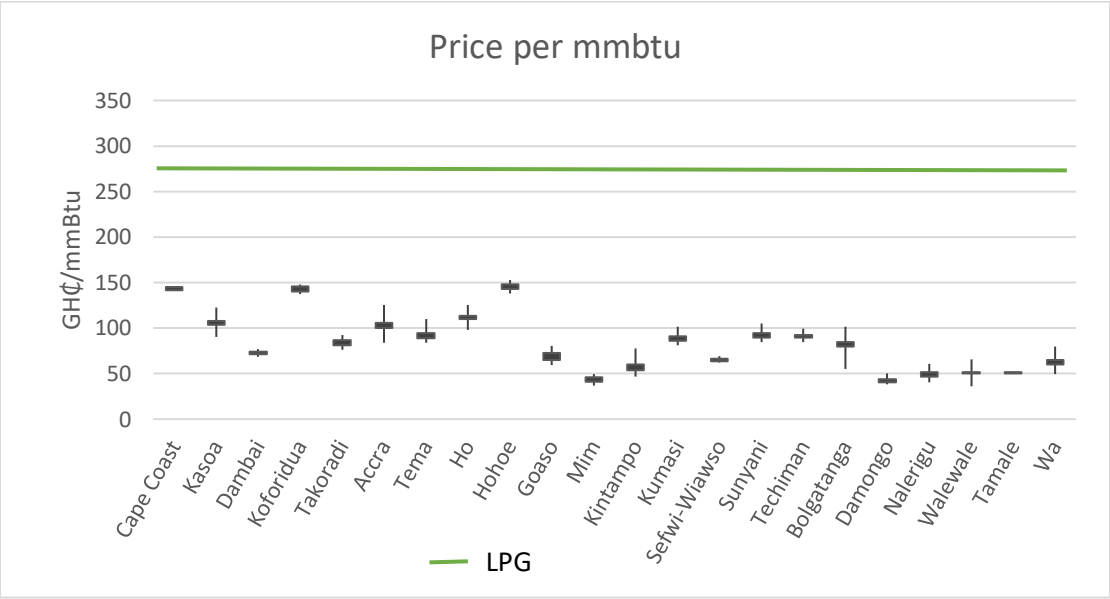

Figure 11: Price per mmBtu of LPG and Charcoal

There is no geographical price variation for LPG because of the Uniform pricing regime policy for all petroleum products. As evident in Figure 11, the price of charcoal per mmBtu is lower than that of LPG in all locations.

[5] Ghana Statistical Service: "Ghana - Ghana Living Standards Survey 3 -1991, Third round"
[6] Ghana Statistical Service: "Ghana – Population Data Analysis Report" Volume 1, August 2005
[7] Ghana Statistical Service: "Ghana – 2010 Population and Housing Census", National Analytical Report, May 2013
[8] 2023 National Energy Statistics
[9] Ghana Statistical Service: "Ghana 2021 Population and Housing Census", General report, Housing Characteristics

Different technologies are used in burning these fuels. Whilst LPG uses the LPG stove, charcoal is used mainly in traditional-stove or improved cookstove. One of the popular improved cookstoves is the Gyapa[10]. These appliances have different thermal efficiencies. Therefore, the useful energy from LPG and charcoal when used in these end-use appliances is varied. Using a thermal efficiency of 60.7%[11], 33.3% and 23.4%[12] for LPG stove, improved cookstove (Gyapa) and traditional charcoal stove respectively, the effective cost of mmBtu of useful energy is shown in Figure 12.

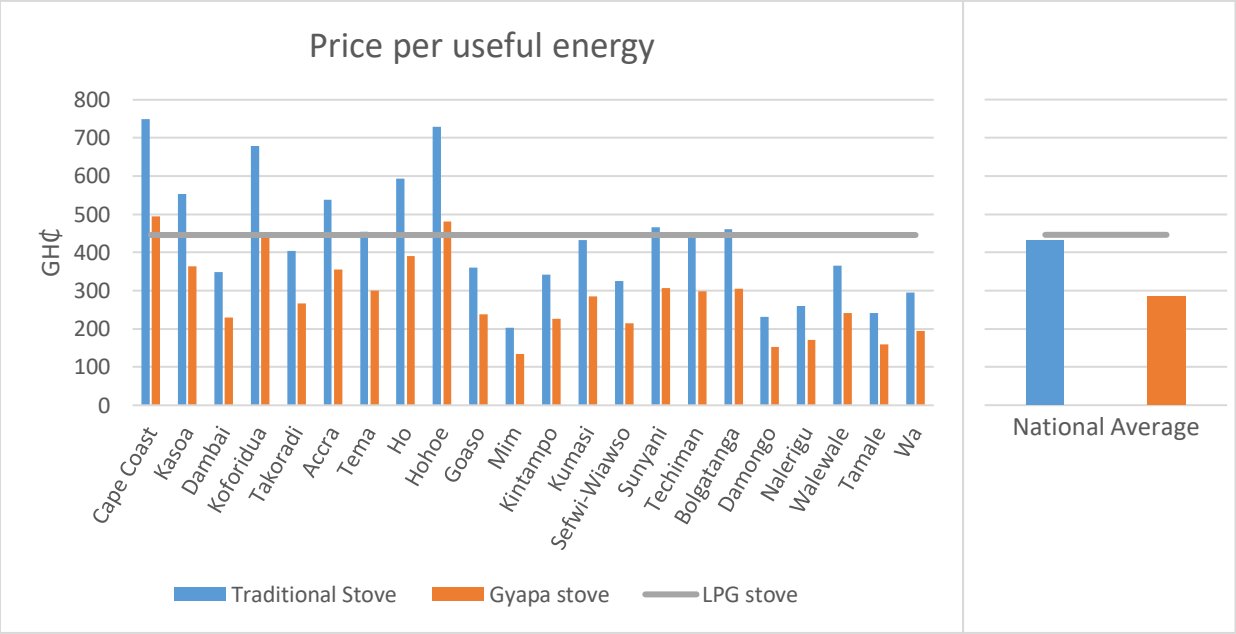

Figure 12: Price per mmBtu of useful energy

Generally, it costs households within all regional capitals visited less to use Gyapa stove than LPG stove, and likewise approximately 73% of these capitals reported even lower costs when using traditional charcoal stoves compared to LPG stoves as shown in Figure 12.

[10] GLSS 7
[11] Lather, R. S. (2019, November). Performance Analysis of an LPG Cooking Stove for Improvements and Future Usability Perspective. In *National Conference on IC Engines and Combustion* (pp. 633-643). Springer, Singapore.
[12] Boafo-Mensah, G., Amponsah-Benefo, K., Animpong, M. A. B., Oduro, W. O., Kotey, E. N., Akufo-Kumi, K., & Laryea, G. N. (2013). Thermal efficiency of charcoal fired cookstoves in Ghana.

The national average cost of useful energy from LPG stove is GH₵445.9 per mmBtu. However, on average it will cost a household GH₵ 431.1 per mmBtu of useful energy if the household uses the traditional cookstove. This cost would further reduce by 34% to GH₵ 284.6 if an improved cookstove is used.

3.8 Factors affecting price of charcoal

About eight factors including transportation cost, availability of charcoal and weather conditions were assessed to identify their influence in the variation of price of charcoal. About half of the respondents (48.1%) indicated that weather conditions is the predominant cause of variation in price of charcoal followed by transportation cost (40.7%). The availability of LPG had the least impact on charcoal price variation, while the price of LPG and regulations showed no influence on charcoal prices.

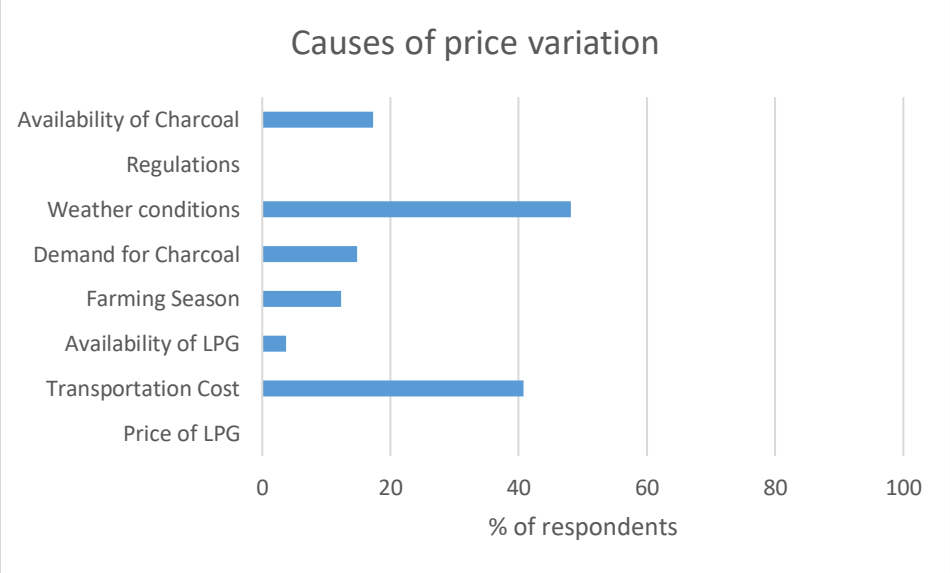

Figure 13: Causes of charcoal price variation

3.9 Charcoal Sales

The survey sought to measure the number of charcoal bags sold by the respondents. Figure 14, shows the average charcoal sales (number of bags sold) by retailers and wholesalers nationwide.

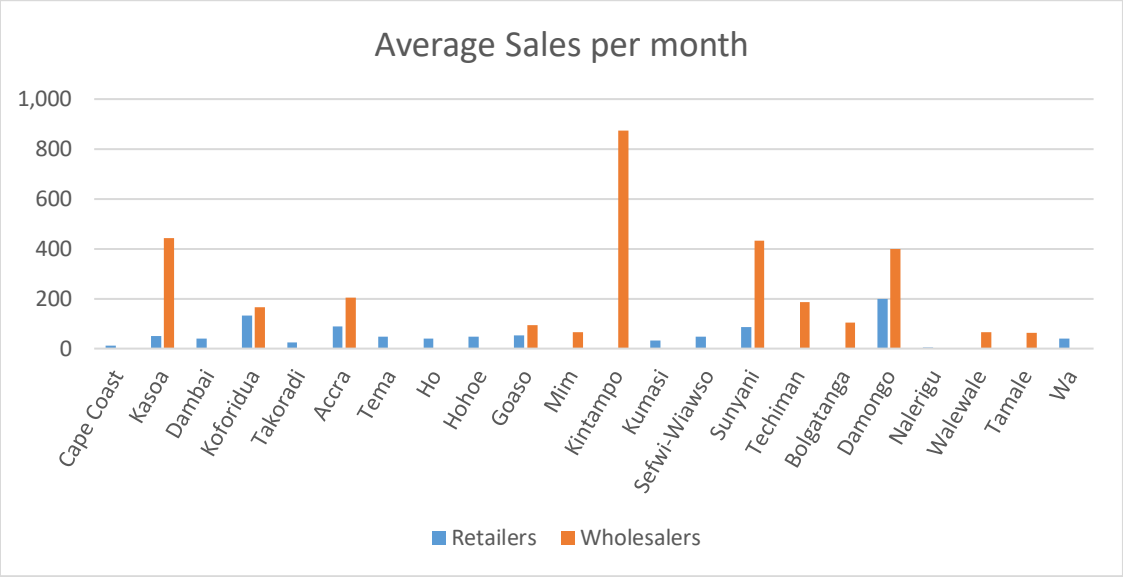

Figure 14: Average charcoal sales per month

Averagely, about 63.6% of respondents were retailers while the remaining 36.4% of respondents were wholesalers. The average monthly charcoal sales by retailers nationwide was 64 and that of wholesalers was 306. Kintampo had the highest average monthly charcoal sales by wholesalers (873) followed Kasoa and Sunyani respectively. On the other hand, Damongo had the highest average monthly charcoal sales by retailers (200) followed by Koforidua and Accra respectively.

3.10 Challenges in the charcoal retail business

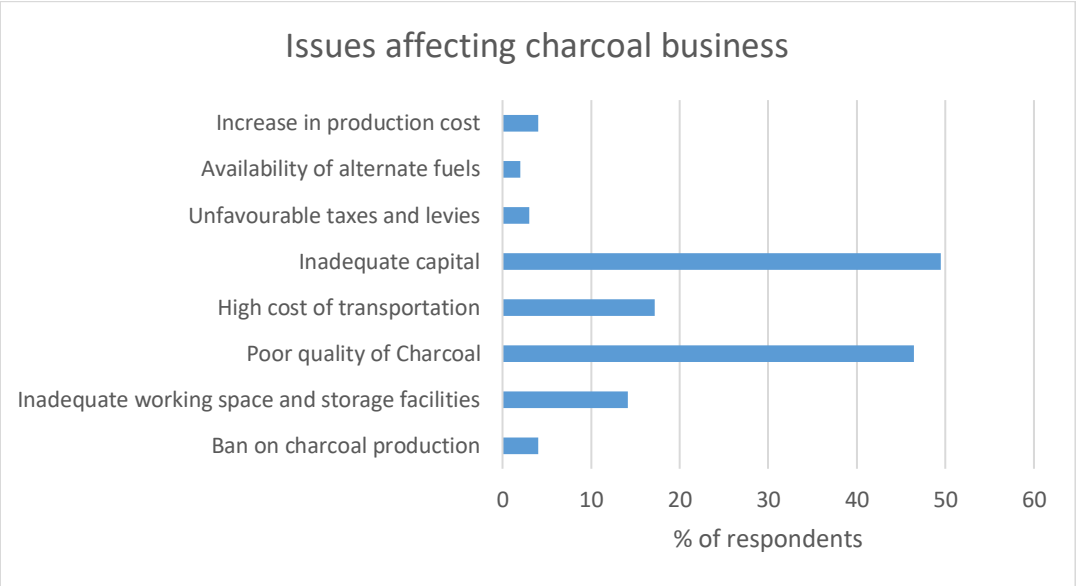

Figure 15: Issues affecting charcoal business

Currently, the predominant challenge confronting the charcoal business is insufficient capital, followed by concerns regarding the quality of charcoal. Conversely, the least prominent issue in the charcoal business pertain to the availability of alternative fuels followed by unfavorable taxes and levies.

3.11 Charcoal production trees

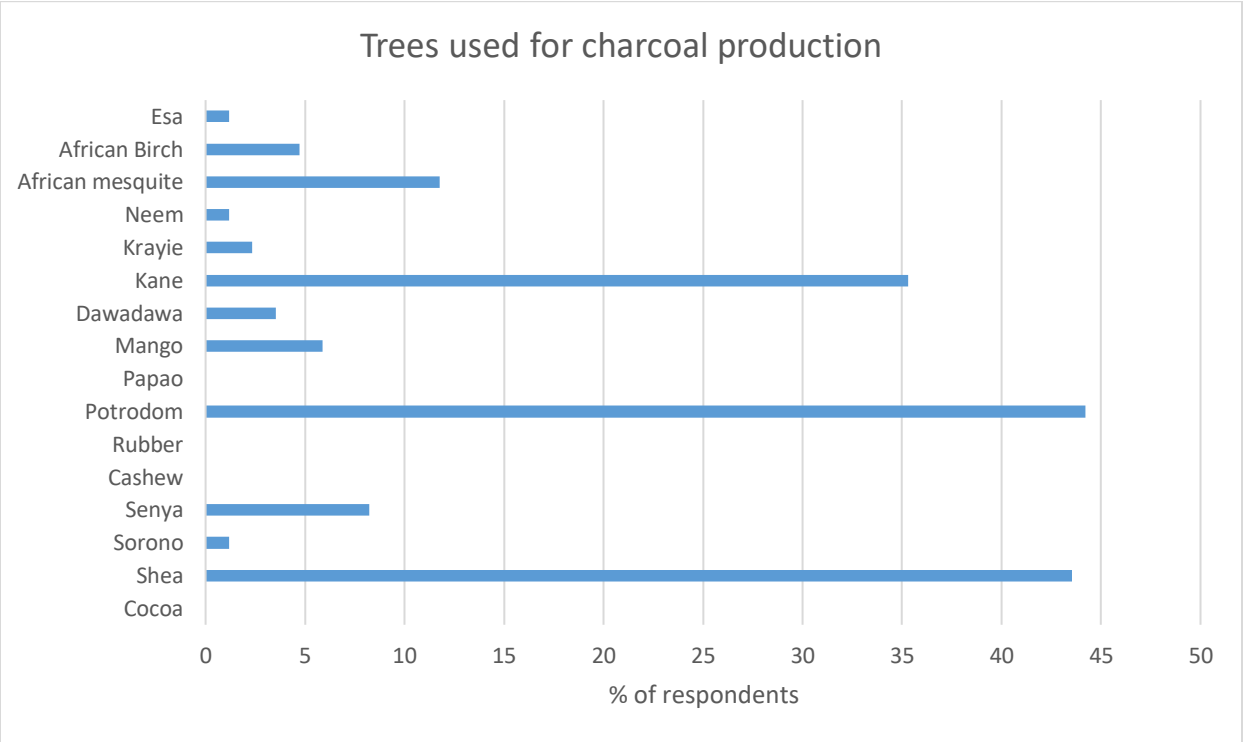

Figure 16: Charcoal production trees

Various tree species are employed for charcoal production, reflecting the country's biodiversity and local preferences. The tree predominantly used for charcoal production is Potrodom followed closely by shea tree and Kane respectively. Conversely, the trees least utilized for charcoal production are Esa, Neem and Sorono.

3.12 Factors that influence customer decision in charcoal purchase

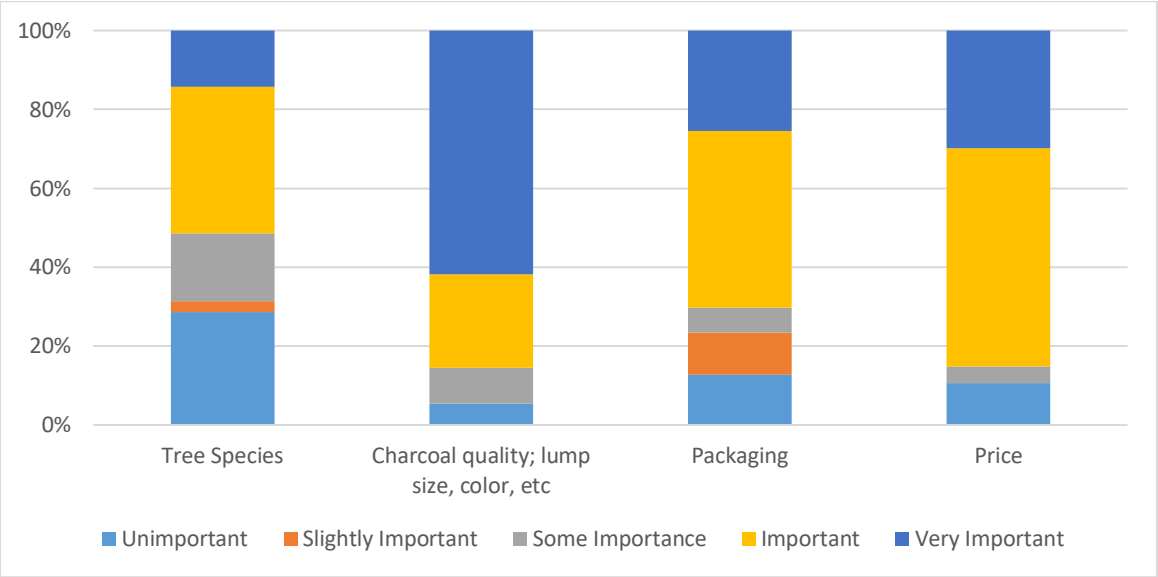

Figure 17: Customer considerations when purchasing charcoal

Customer decisions when purchasing charcoal are influenced by various factors including the quality of the charcoal, its price, packaging considerations and tree species. About 85.5% of customers consider quality of charcoal as an important or very important factor when purchasing charcoal closely followed by price (85.1%) with tree species being the least important factor.

3.13 Customer types

Charcoal customers encompass a diverse range, including households, schools, and restaurants. The predominant customer of charcoal are households followed by restaurants. Hotels represent the customer type with the least prevalence in charcoal purchases followed schools.

Figure 18: Share of customer type

4.0 Conclusions

A summary of the key findings during the nationwide survey is presented below:

- Charcoal trading is primarily dominated by females within the middle-age range, particularly between 35 and 49 years.
- The supply and sales of charcoal follow a seasonal pattern, with the major sales season occurring between May and August, while the major supply season extends from October to December. The seasonal variations in charcoal supply and sales is predominantly influenced by weather conditions, particularly rainfall and semi-dry weather conditions.
- The sources of charcoal supply in Ghana exhibit regional variations. About 88.9% of respondents obtain 50% or more of their charcoal supply from within the regions they conduct their trade, which includes Eastern, Savannah, North East, Northern and Upper West. However, the remaining respondents source their charcoal primarily from outside the regions they ply their trade, including Greater Accra and Western North.
- Respondents in regions predominantly reliant on local charcoal sources tend to sell charcoal at lower price than those primarily dependent on external sources. This pricing variation is mainly attributed to the consequential impact of transportation costs. Essentially, proximity to the supply source is associated with lower transportation expenses, resulting in a subsequent reduction in charcoal prices, whereas greater distance leads to higher prices.
- In general, the weight of charcoal supplied in the northern savannah areas are higher than that of coastal and forest areas.
- The national average price per kilogram of charcoal is GH₵ 2.70. The highest price per kg of charcoal was recorded in Cape Coast (GH₵4.7) followed by Hohoe (GH₵4.6) and Koforidua (GH₵4.2) respectively. Mim had the least price per kg of charcoal of GH₵1.28 followed by Damongo (GH₵1.46) and then Tamale (GH₵1.52).
- Incorporating stove efficiency in the comparison between charcoal and LPG indicates that, on average, a household will incur a cost of GH₵445.9 to obtain 1 mmBtu of useful energy from LPG. Conversely, if the household utilizes charcoal, the cost per 1 mmBtu of useful energy ranges between GH₵284.6 for an improved cook stove and GH₵431.1 for traditional cookstove.

- Generally, it costs households within all regional capitals visited less to use traditional charcoal stove or Gyapa stove than to use LPG stove.
- Currently, the predominant challenge confronting the charcoal business is insufficient capital, followed by the quality of charcoal. Conversely, the least prominent issue in the charcoal business pertain to the availability of alternative fuels and unfavorable taxes and levies.
- The tree predominantly used for charcoal production is Potrodom followed closely by shea tree and Kane respectively. Conversely, the trees least utilized for charcoal production are Esa, Neem and Sorono.
- Customer decisions when purchasing charcoal are influenced by various factors including the quality of the charcoal, its price, packaging considerations and tree species. About 85.5% of customers consider quality of charcoal as an important or very important factor when purchasing charcoal closely followed by price (85.1%) with tree species being the least important factor.
- Charcoal customers encompass a diverse range, including households, schools, and restaurants. The predominant customer of charcoal are households followed by restaurants. Hotels represent the customer type with the least prevalence in charcoal purchases followed schools.

5.0 Recommendations

- The dominance of women in charcoal trading has the potential to positively influence economic empowerment, gender equality within the charcoal supply chain, and community development. However, challenges such as exploitation, increased workloads, potential health impacts, environmental degradation, and limited resource access need to be addressed. An effective resolution demands a comprehensive approach, entailing supportive policies, regulations, and awareness programs.
- Transportation costs in the charcoal business impact selling prices, with proximity to the supply source reducing prices. Despite fixed costs per destination, traders with sufficient capital can negotiate lower prices by increasing charcoal quantity. Government support in providing financial resources is crucial for business improvement and livelihood enhancement in the charcoal industry.
- A comparison of charcoal and LPG price per mmBtu revealed that it cost more to get a unit of useful energy from LPG than from charcoal regardless of stove efficiency. To encourage and increase LPG use (which is more efficient and environmentally friendly), the Ministry of Energy through relevant stakeholders such as NPA take necessary steps to reduce the price of LPG. The price intervention will help achieve the government's policy of achieving 50% of households using LPG by 2030.
- Recognizing the seasonal patterns in charcoal supply and sales, stakeholders in the industry should develop strategies to address challenges during low seasons. This could involve implementing storage solutions, diversifying product offerings, or exploring alternative income streams during off-peak periods.
- Encourage collaboration between regions to ensure a sustainable and diverse supply of charcoal. This may involve sharing best practices, promoting responsible sourcing, and implementing measures to prevent deforestation.
- Encourage the widespread adoption of efficient charcoal stoves to optimize energy output and decrease household costs through initiatives such as government subsidies, incentive programs, etc.