CHARCOAL PRICE TRACKING REPORT FOR 2024

Planning, Policy and Research Unit

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1.0 Introduction

As of 2023, woodfuel consumption accounted for about 31.2%[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 45%, and that of firewood has decreased from about 79.9% to 54%.[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 for the country's wood fuel resource base, which is already threatened by the country's high deforestation rate.

Despite 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 undertaking 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 2024.

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[1] 2024 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 monthly.
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 data collection exercise was carried out 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 charcoal and factors that determine the demand and supply of charcoal.

2.1 Study and Sampling Design

The study adopted a cross-sectional survey design guided by baseline documents, including the Strategic National Energy Plan (SNEP II) and the Energy Profile in All Districts report. 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 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 judgment when choosing population members to

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

participate in the study. Consequently, the country was divided into northern, middle and southern zones.

2.3 Sample size and sampling frame

The sampling frame consisted of 23 major charcoal marketing areas in all 16 regions as identified in the Energy Profile Report. Due to the small size of the sampling frame, complete enumeration was required for the exercise. This means that 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 daily. The data collection team always compiled and cross-checked for accuracy and completeness of the responses daily.

2.6 Expected Output

- Annual 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 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 regio

3.2 Demographic Information of Respondents

3.2.1 Age of respondents

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

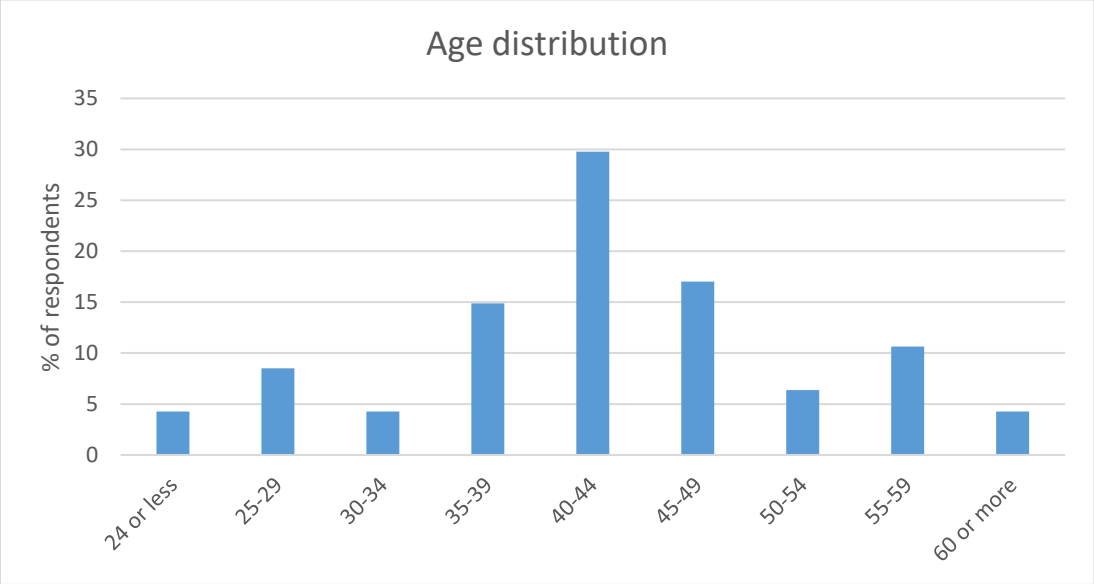

Figure 1: Age distribution of respondents

The age range of the respondents was between 20 and 63 years, with a mean age of 42.2 years. As seen in Figure 1, the majority of the respondents (61.7%) were between the ages of 35 and 49 years. The least number of respondents (4.26%) were from the ages of 24 years or below and 60 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

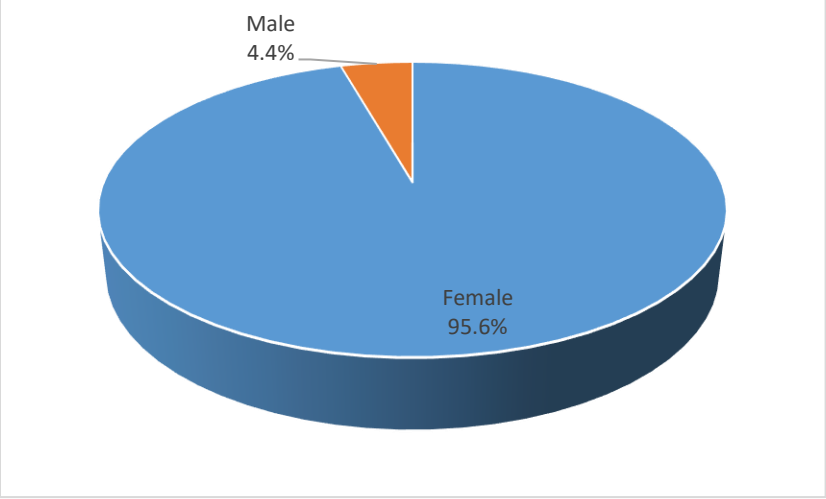

Figure 2: Gender of respondents

Figure 2 indicates a significant gender disparity among charcoal traders, with approximately 95.6% being female and only about 4.4% 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, categorised into major season and minor season. Figure 3 gives a distribution of the major sales and supply seasons nationwide. Figures 4 and 5 provide the regional distribution of both major sales and supply seasons.

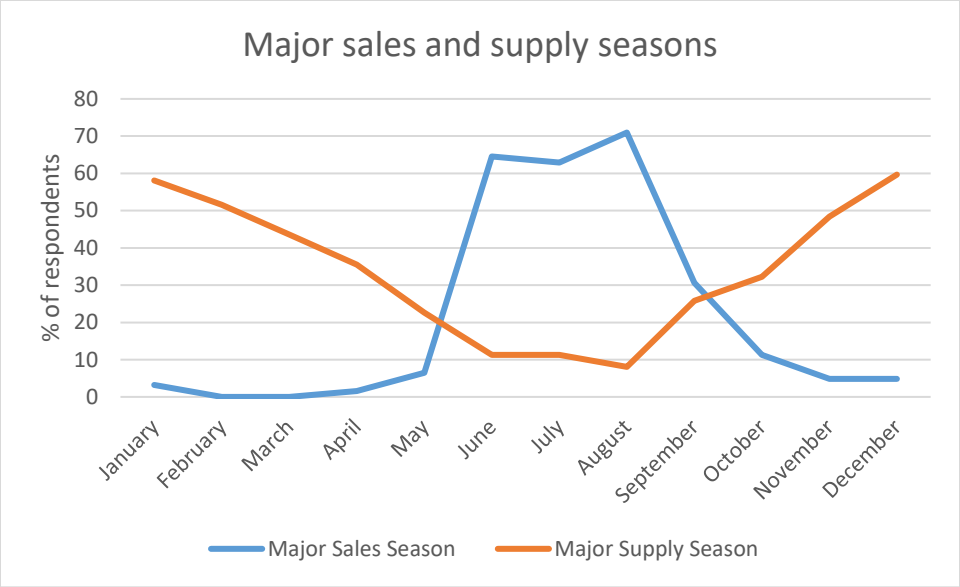

Figure 3: Major sales and supply seasons nationwide

As illustrated in Figures 2, 3 and 4, 78% of respondents indicated that the major sales season is from June to August, whilst 72% of respondents indicated that the major supply season spans from November to March. 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 March.

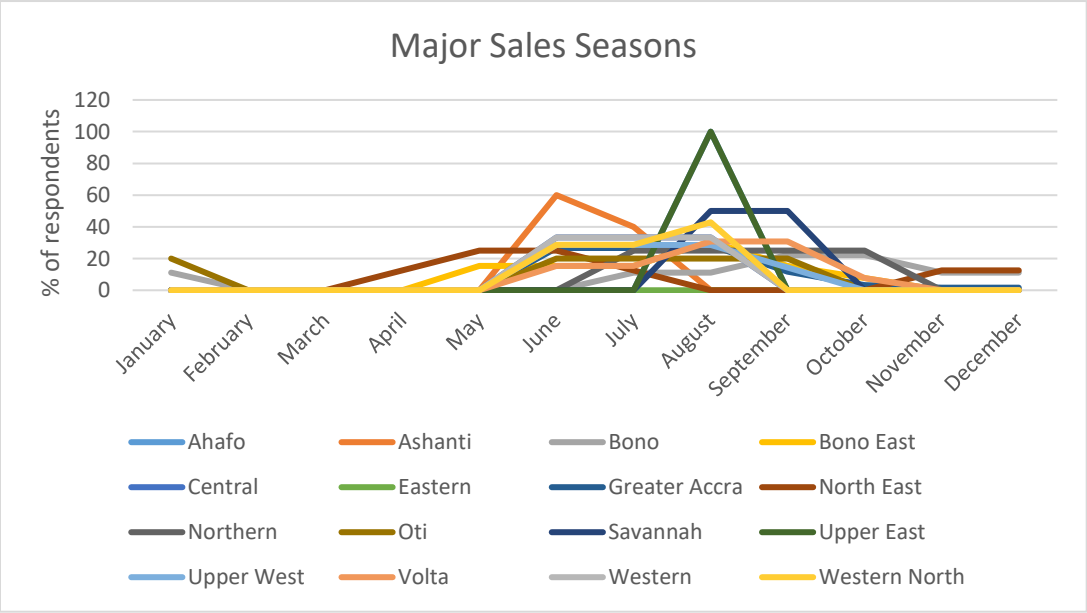

Figure 4: Major sales seasons by region

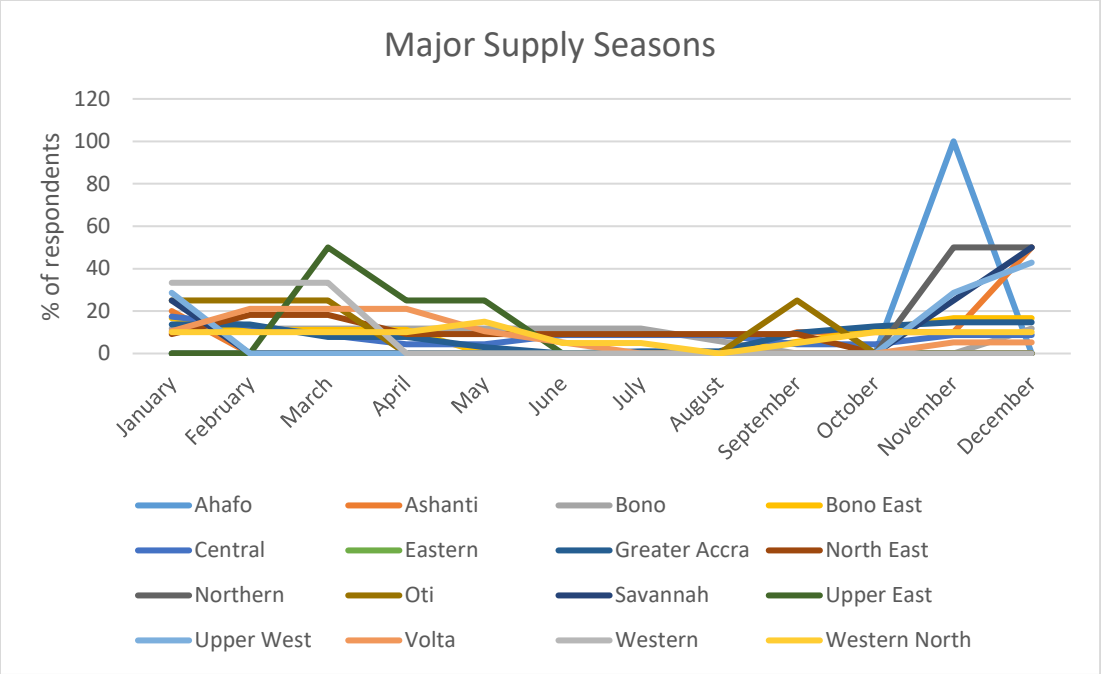

Figure 5: Major supply seasons by region

3.4 Factors that influence charcoal supply

The predominant factor contributing to the increase in charcoal supply is moderately dry weather[5]. While extreme dry weather results in complete combustion, moderately dry weather conditions enhance the efficiency of wood carbonisation, resulting in higher-quality charcoal. This improved quality motivates producers to scale up production. In addition, dry weather enhances road accessibility, enabling more efficient and reliable transportation of charcoal.

Conversely, the primary factors that reduce charcoal supply are heavy rains and poor road conditions. Heavy rains result in incomplete carbonisation, reducing the amount of charcoal produced. Moreover, heavy rains often render roads inaccessible and impassable, significantly hindering the transportation of charcoal. As a result, the overall supply of charcoal is adversely affected.

[5] Moderately dry weather describes a period during which precipitation levels are below average, leading to reduced soil moisture and minor impacts on vegetation or water resources, but without the widespread or prolonged effects characteristic of drought conditions.

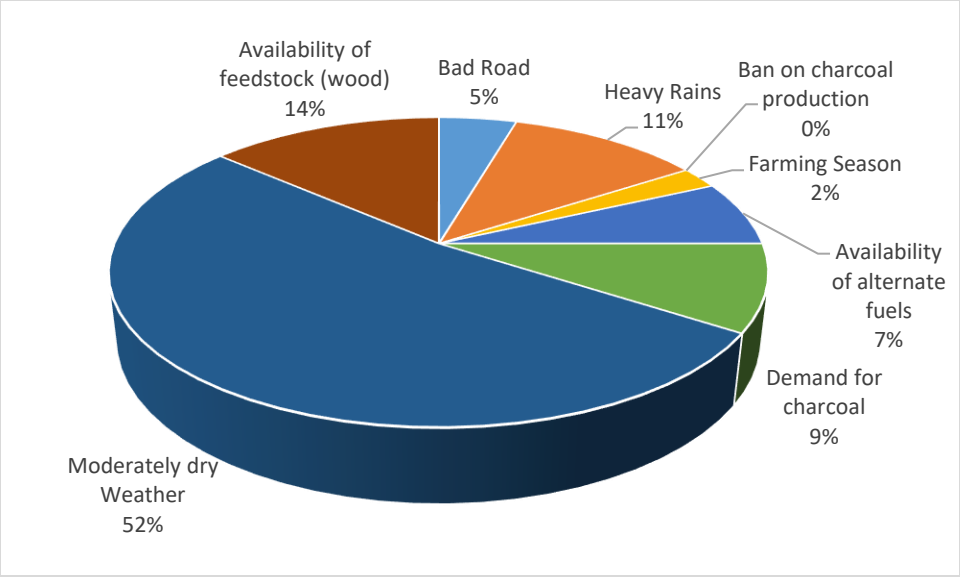

Figure 6: Factors that increase charcoal supply

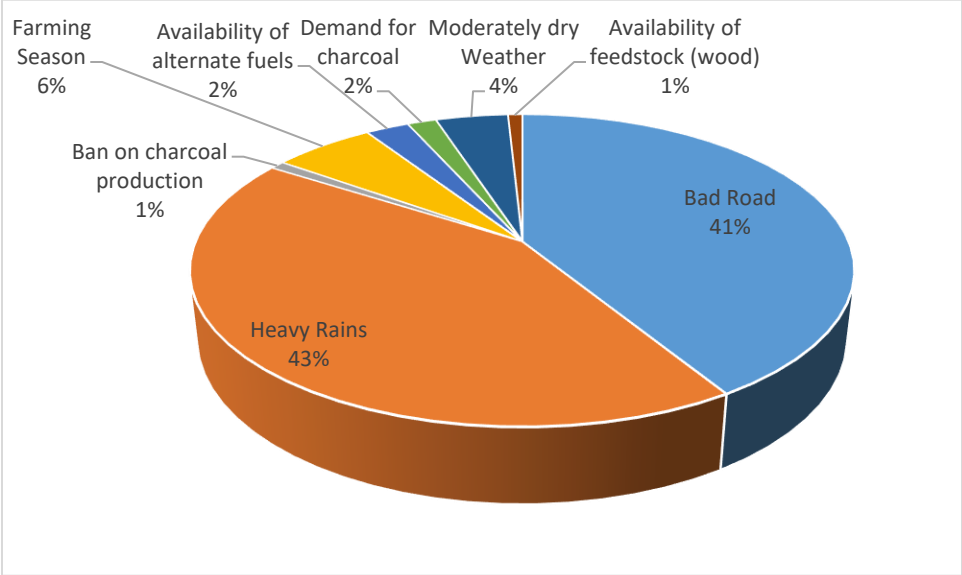

Figure 7: Factors that decrease charcoal supply

3.5 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 85.6% of respondents obtain 50% or more of their charcoal supply from immediate localities within the regions they conduct

their trade. However, the remaining respondents source their charcoal primarily from outside the regions they ply their trade. Respondents in Kasoa, Koforidua, Bolgatanga and Accra source almost all their charcoal from outside their regions of location. Figure 8 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.

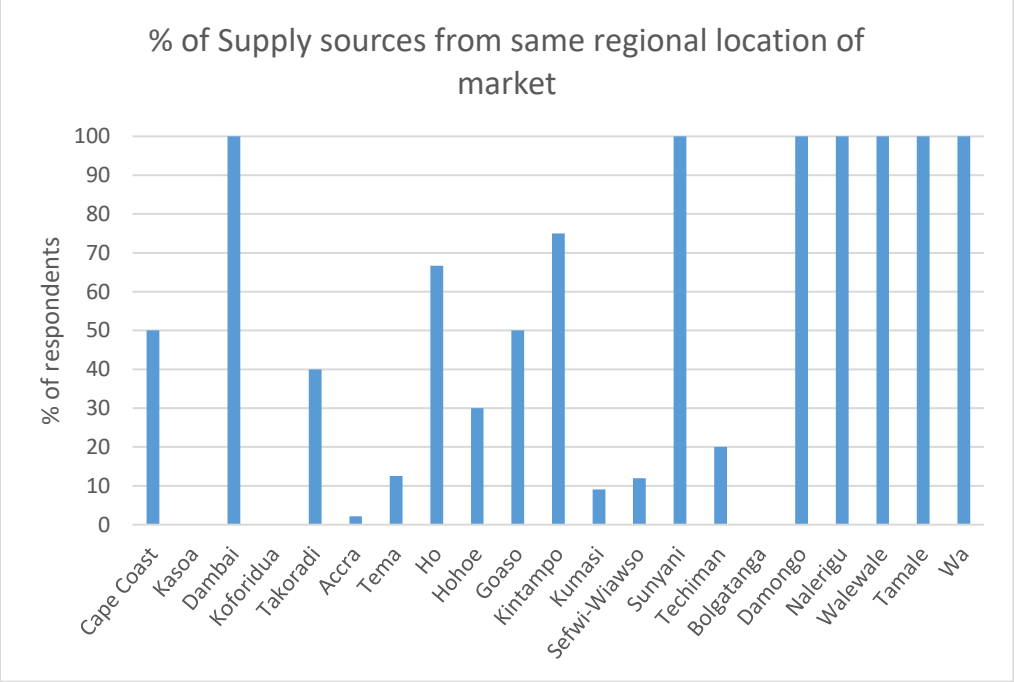

Figure 8: Percentage of respondents with supply sources from the same market region

Table 1: Sources of charcoal supply

Town	**Source of Charcoal Supply**
Cape Coast	Apesika, Abasa, Bibinso
Kasoa	Damongo, Afram Plains, Atebubu, Bole, Tinga, Prang, Kintampo
Dambai	Ntewoso, Tokokrom, Nkwanta
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, Kpelema, Tokuroano
Goaso	Ampenkro, Bediako (Asunafo North), Ayensua
Kintampo	Mose, Kunsu, Kyirimoko, Apesika, Papato, Zanwara
Kumasi	Atebubu, Damongo, Techiman, Kintampo
Sefwi-Wiawso	Koforikrom, Tanoso, Zanwara, Techiman
Sunyani	Sampa, Wa, Nsawkaw, Damongo, Seikwa
Techiman	Techiman, Bamboi, Sawla, Damongo, Nkoranza
Bolgatanga	Walewale, Mankarigu, Bole, 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

3.6 Weight of Charcoal

The average weight of charcoal per bag across the markets visited is illustrated in Figure 9.

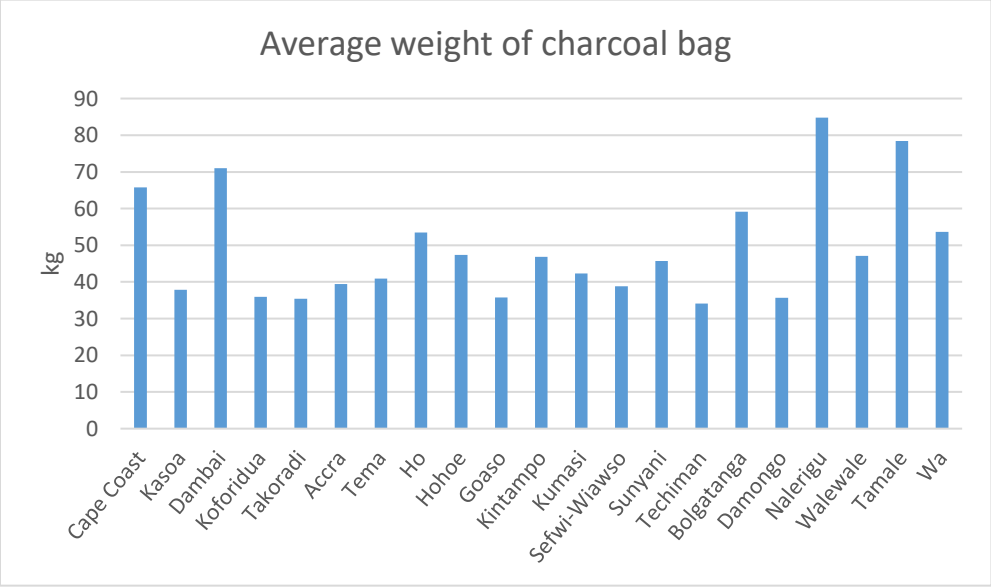

Figure 9: Average weight of charcoal

From the survey, the national average weight of charcoal bags was 49kg. Nalerigu had the highest average weight of charcoal bag of 84.8kg followed by Tamale (78.4kg) and Dambai (71.1kg). The least average weight of charcoal bags was obtained in Techiman (34.1kg) followed by Takoradi (35.4kg) and Damongo (35.7kg). The difference in the weight of charcoal across the country is because of non-standardized charcoal bags.

3.7 Charcoal Prices

3.7.1 Charcoal Price per Package

The price of charcoal bags nationwide ranged from GH₵64 to GH₵279, with a national average price of GH₵114. The price of charcoal bags was highest in Cape Coast, followed by Koforidua and Bolgatanga respectively.

The price of charcoal bags was least in Kintampo, followed by Damongo 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 10.

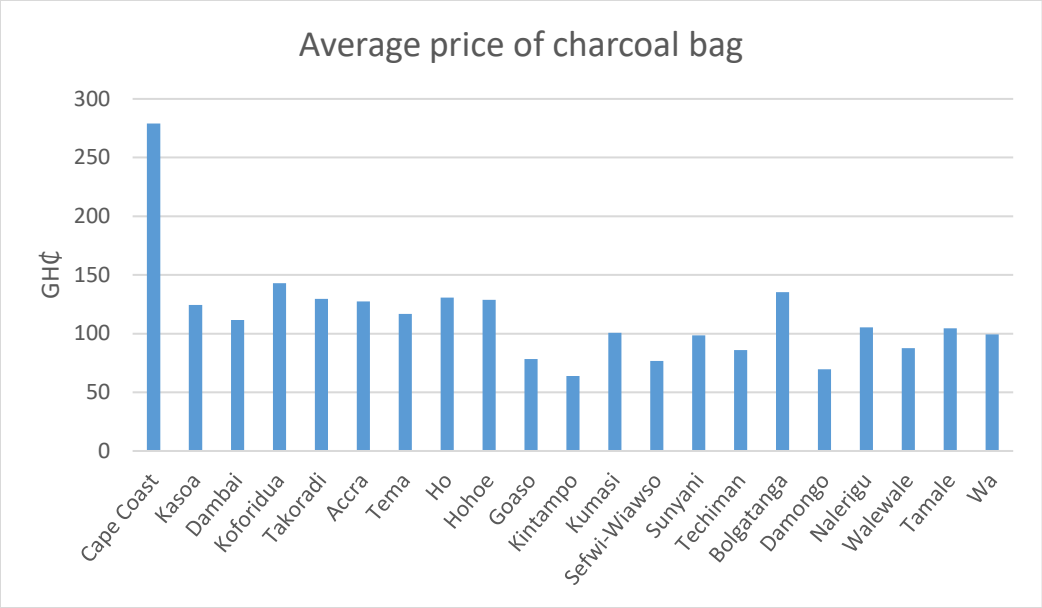

Figure 10: Charcoal price from the various markets

3.7.2 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 11.

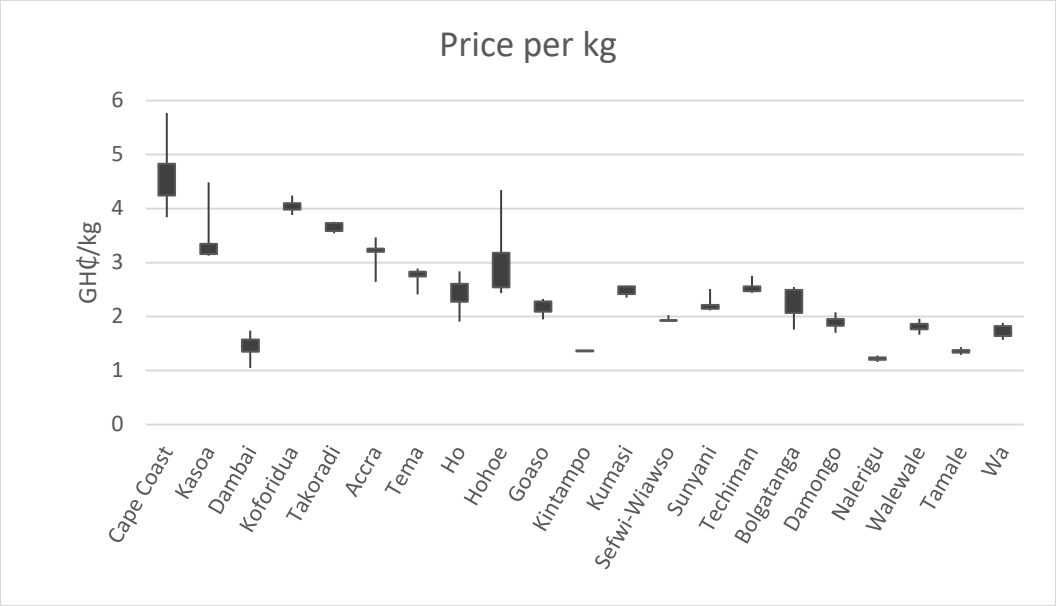

Figure 11: Unit price of charcoal (GH₵ per kg)

The national average price per kilogram of charcoal is GH₵ 2.47. The highest price per kg of charcoal was recorded in Cape Coast (GH₵4.24), followed by Koforidua and Takoradi, respectively. Nalerigu had the lowest price per kg of charcoal of GH₵1.24, followed by Tamale (GH₵1.33) and then Kintampo (GH₵1.36).

3.8 Unit price of Charcoal vs LPG

The government launched the National LPG Promotion Programme in 1989 to promote LPG as a cleaner cooking fuel alternative to charcoal and firewood, with the aim of reducing deforestation. The programme was suspended in 1995 due to challenges such as lack of safety education in LPG usage and LPG accessibility. In 2013, the Rural LPG Promotion Programme was introduced to improve LPG access in rural areas, but faced setbacks such as poor implementation[6]. Despite these challenges, LPG use as the main cooking fuel rose from 2.2% of 3.3 million households in 1991[7]

[6] Bekoe, Mcjerry & Enninful, Augustine. (2022). Ghana LPG Cylinder Recirculation Model: The Opportunities and Challenges. 10.5281/zenodo.7085887.
[7] Ghana Statistical Service: "Ghana - Ghana Living Standards Survey 3 -1991, Third round"

to 6.1% of the 3.71 million households in 2000[8] and then to 18.2% of the 5.6 million households in 2010[9] and then to 25% of 7.3 million households in 2016[10].

Furthermore, in 2017, the government introduced the Cylinder Recirculation Model (CRM) to centralize LPG refilling and distribution, with the goal of achieving 50% nationwide LPG access by 2030. This further increased LPG use to 36.9% of 8.56 million households in 2021[11]. Similarly, over the last two decades, the unit price of LPG has been increasing at an annual average rate of 20.2%[12]. Despite this price increase, the government is more likely to achieve the 2030 LPG access target if the usage of LPG increases at an annual rate of 3.43%.[13]. Figure 12 displays the price of energy measured in mmbtu of LPG and charcoal for easy comparison.

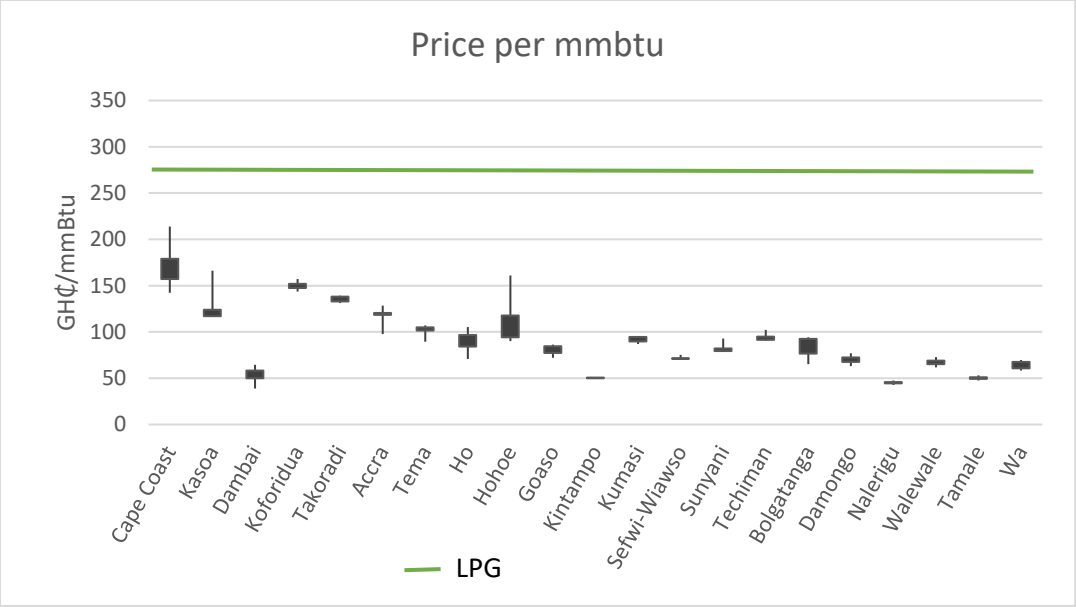

Figure 12: Price per mmBtu of LPG and Charcoal

[8] Ghana Statistical Service: "Ghana – Population Data Analysis Report" Volume 1, August 2005
[9] Ghana Statistical Service: "Ghana – 2010 Population and Housing Census", National Analytical Report, May 2013
[10] Ghana Statistical Service: "Ghana Living Standards Survey 7, Main report, June 2019"
[11] Ghana Statistical Service: "Ghana 2021 Population and Housing Census", General report, Housing Characteristics
[12] 2024 National Energy Statistics
[13] Ghana Statistical Service: "Ghana 2021 Population and Housing Census", General report, Housing Characteristics

There is no geographical price variation for LPG because of the Uniform pricing regime policy[14] for all petroleum products. As evident in Figure 12, the price of charcoal per mmBtu is lower than that of LPG in all locations.

Different technologies are used in burning these fuels. While there are no significant differences in the efficiency of LPG stoves, the efficiency of charcoal stoves varies. Improved charcoal cookstoves demonstrate higher thermal efficiency compared to traditional models. Therefore, the useful energy from LPG and charcoal when used in these end-use appliances varies. Using an average thermal efficiency of 60.7%[15], 46.7% and 35.3%[16] for LPG stove, improved cookstove and traditional charcoal stove respectively, the effective cost of mmBtu of useful energy is shown in Figure 13.

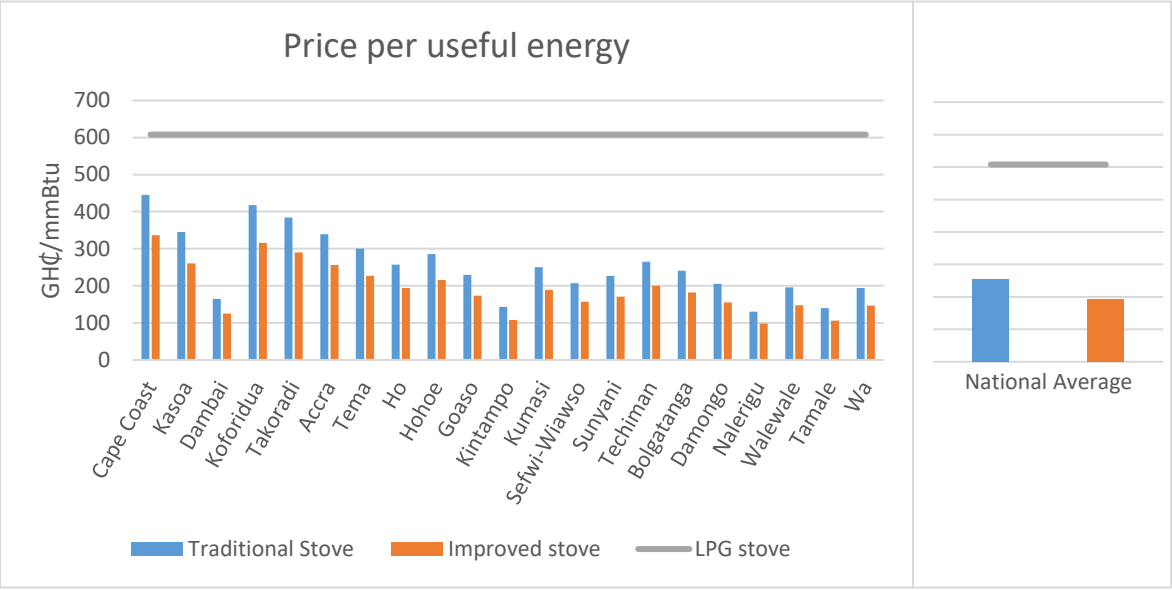

Figure 13: Price per mmBtu of useful energy

Therefore, considering thermal efficiency alone, it costs households within all regional capitals visited less to use either traditional or improved stoves than LPG stoves, as shown in Figure 13.

[14] National Energy Policy, 2021.
[15] 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.
[16] Energy Commission

The national average cost of useful energy from an LPG stove is GH₵607.8 per mmBtu. However, on average, it will cost a household about GH₵ 255.5 per MMBtu of useful energy if the household uses the traditional cookstove, giving a cost reduction of about 58%. This cost saving will further increase to about 68% if an improved cookstove is used.

3.9 Factors affecting price of charcoal

About nine factors, including transportation cost, labour cost, demand for charcoal and weather conditions, were assessed to identify their influence on the variation of the price of charcoal. More than half of the respondents indicated transportation cost (57.1%) and weather conditions (52.4%) are the predominant causes of variation in the price of charcoal, followed by labour cost (23.8%). On the other hand, the availability of LPG and the ex-production site price had the least impact on charcoal price variation.

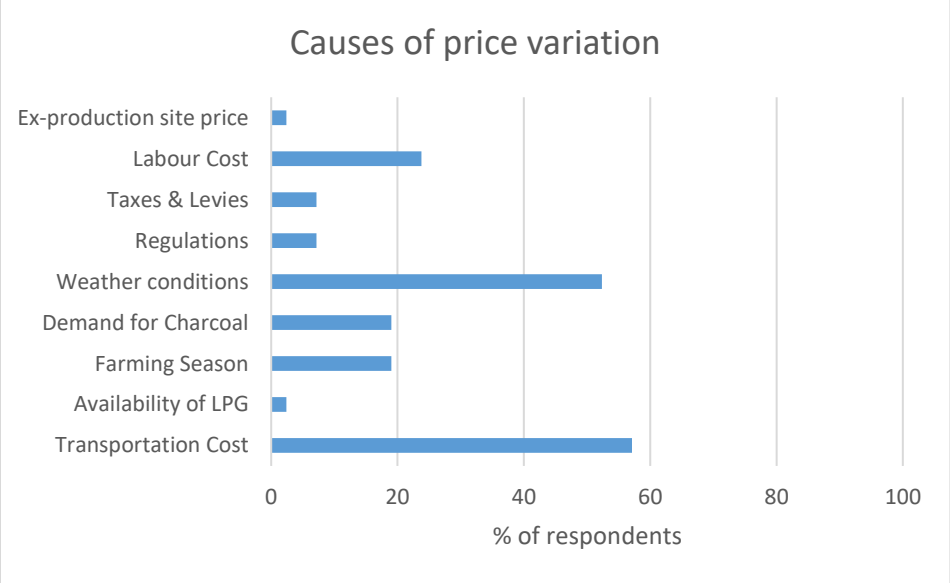

Figure 14: Causes of charcoal price variation

3.10 Charcoal Sales

The survey sought to measure the number of charcoal bags sold by the respondents. Figure 15 shows the average charcoal sales (number of bags sold) nationwide.

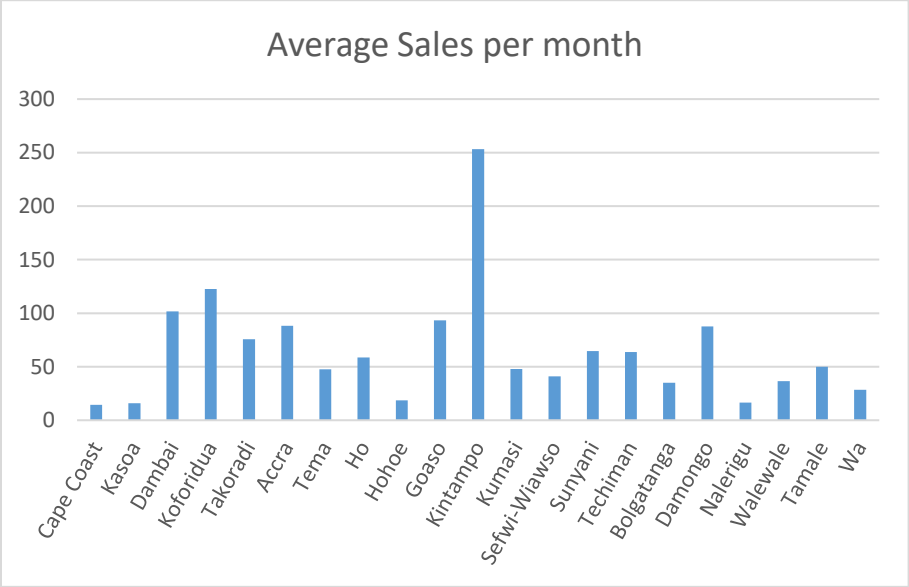

Figure 15: Average charcoal sales per month

The average monthly charcoal sales nationwide was 65 bags. Kintampo had the highest average monthly charcoal sales of 253, followed by Koforidua (123) and Dambai (102). On the other hand, Cape Coast had the least average monthly charcoal sales of 14 bags, followed by Kasoa (16) and Nalerigu (17).

3.11 Challenges in the charcoal retail business

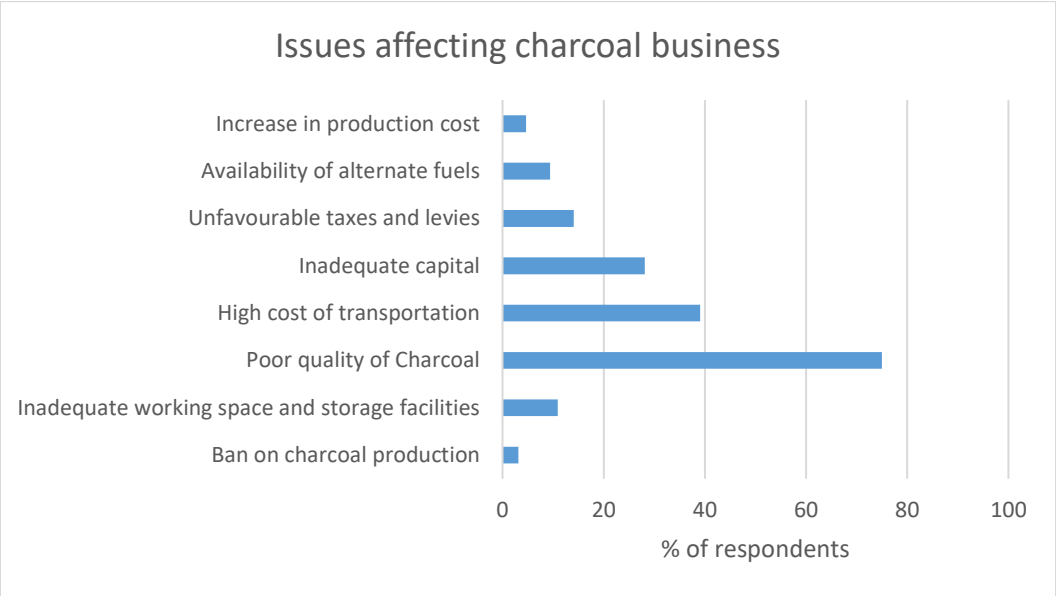

Figure 16: Issues affecting charcoal business

Currently, the predominant challenge confronting the charcoal business is poor quality of charcoal[17], followed by high cost of transportation. Conversely, the least prominent issue in the charcoal business pertains to the ban on charcoal production, followed by an increase in the production cost of charcoal and the availability of alternative fuels, respectively.

[17] Poor quality charcoal is charcoal that contains foreign materials such as soil, stones and partially carbonized wood.

3.12 Charcoal production trees

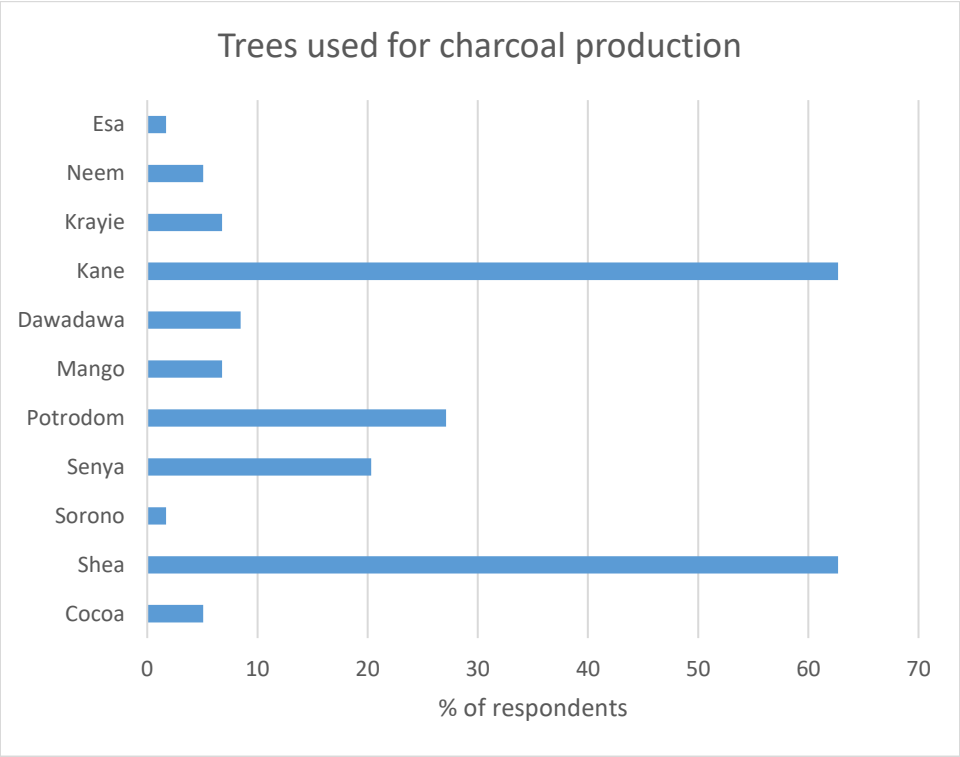

Figure 17: Charcoal production trees

Various tree species are employed for charcoal production, reflecting the country's biodiversity and local preferences. The trees predominantly used for charcoal production are Kane tree and Shea tree. Conversely, the trees least utilised for charcoal production are Sorono and Esa.

3.13 Factors that influence customer decision in charcoal purchase

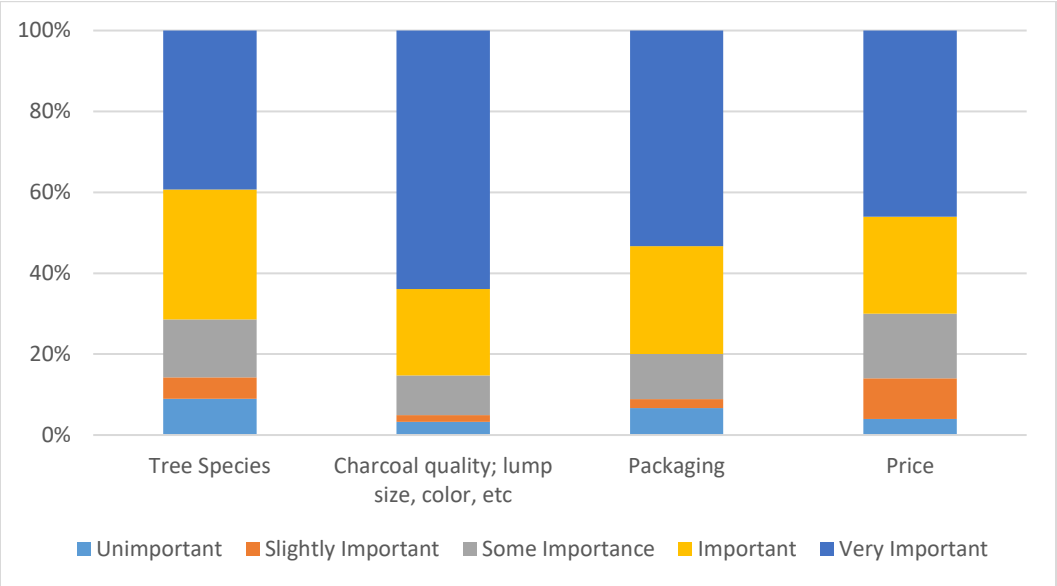

Figure 18: Customer considerations when purchasing charcoal

Customer decisions when purchasing charcoal are influenced by various factors, including the quality of the charcoal, its price, packaging considerations and tree species. Quality of charcoal is the most significant factor for customers, followed by packaging, tree species and price respectively.

3.14 Customer types

Charcoal customers encompass a diverse range, including households, schools, hotels, retailers and restaurants. The primary customers of charcoal are households, followed by restaurants. Hotels, however, are the least frequent customers followed by schools.

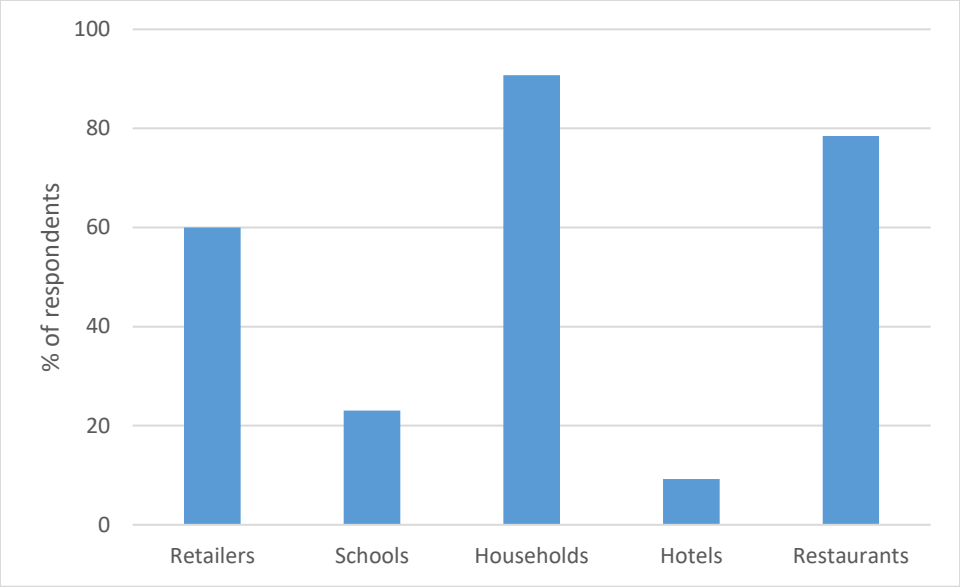

Figure 19: Share of customer type

4.0 Findings and 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 June and August, while the major supply season extends from November to March. The seasonal variations in charcoal supply and sales is predominantly influenced by weather conditions, particularly heavy rains and dry weather conditions.
- The sources of charcoal supply in Ghana exhibit regional variations. About 85.6% of respondents obtain 50% or more of their charcoal supply from within the regions they conduct their trade including Savannah, North East, Northern, Upper West, Ahafo and Bono East and Bono. However, the remaining respondents source their charcoal primarily from outside the regions where they ply their trade, including Greater Accra, Western North and Western.
- Respondents in regions predominantly reliant on local charcoal sources tend to sell charcoal at a 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 is higher than that of coastal and forest areas.
- The national average price per kilogram of charcoal is GH₵ 2.47. The highest price per kg of charcoal was recorded in Cape Coast (GH₵4.24), followed by Koforidua and Takoradi, respectively. Nalerigu had the lowest price per kg of charcoal of GH₵1.24, followed by Tamale (GH₵1.33) and then Kintampo (GH₵1.36).
- Incorporating stove efficiency in the comparison between charcoal and LPG indicates that, on average, a household will incur a cost of GH₵607.8 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₵193.1 and GH₵255.5.

- Generally, it costs households within all regional capitals less to use a traditional charcoal stove than to use an LPG stove.
- Currently, the predominant challenge confronting the charcoal business is the poor quality of charcoal, followed by the high cost of transportation. Conversely, the least prominent issue in the charcoal business pertains to the ban on charcoal production, followed by an increase in the production cost of charcoal and the availability of alternative fuels, respectively.
- The trees predominantly used for charcoal production are the Kane and the shea trees. Conversely, the trees least utilised for charcoal production are Sorono and Esa.
- Customer decisions when purchasing charcoal are influenced by various factors, including the quality of the charcoal, its price, packaging considerations and tree species. Quality of charcoal is the most significant factor for customers, followed by packaging, tree species and price respectively.
- Charcoal customers encompass a diverse range, including households, schools, hotels, retailers and restaurants. The primary customers of charcoal are households, followed by restaurants. Hotels, however, are the least frequent customers, followed by 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 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 costs 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, should 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.