ADDRESS

Ghana Airways Avenue
Airport Residential Area
(behind Alliance Francaise)

Private Mail Bag
Ministries Post Office
Accra – Ghana

POST CODE

GA-037-3212

CONTACT

PHONE:
0302-813-756/7

FAX:
0302813764

WEBSITE:
www.energycom.gov.gh

EMAIL:
info@energycom.gov.gh

FOLLOW US:

EnergyCommissionGhana
EnergyCommissionGhana
EnergyCommissionGhana

CHARCOAL PRICE TRACKING

2021 REPORT

MARCH 2022

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1.0 Introduction

As of 2017[1], more than one third (34.1%) of households in Ghana depends on charcoal as their main source of cooking fuel. The country consumed 2977 ktoe of woodfuel in 2020[2] for energy purposes which accounts for about 34% of the country's final energy consumption with charcoal accounting for 51% of total woodfuel consumed. Charcoal consumption in Ghana is expected to increase from 773 ktoe in 2020 to 905 ktoe in 2030[3] (representing an annual average growth rate of 1.6%), due to the expected continuous reliance on woodfuel for cooking and increase in the number of urban households.

However, for every unit of charcoal produced, four-to-five units of wood are used. This low efficiency, coupled with the growing demand, could have more serious demand 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 economical fuels, data acquisition mostly involves undertaking face-to-face data collection.

In line with the Commission's mandate and in line with the approved 2021 work program, the Planning, Policy and Research unit commenced a nationwide quarterly data collection process to track the price of charcoal and factors influencing demand and supply for charcoal at major consumption centres across the country. 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 2021.

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[1] Ghana Statistical Service (2019). Ghana Living Standard Survey 7
[2] 2021 National Energy Statistics
[3] Strategic National Energy Plan II

1.1 Objective

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

The specific objectives of the survey are to establish:

- Woodfuel prices on a quarterly basis
- Patterns and changes in woodfuel prices
- A unit price for charcoal
- Factors that influence the demand and supply of charcoal
- Sources of woodfuel supply
- Challenges facing woodfuel retailers

2.0 Methodology

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

The survey was conducted in markets with the objective of determining the average price per unit 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, 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 Design of Data Entry Template

The Data Entry Template was designed using Census and Survey Processing System (CSPro). CSPro is a public domain statistical software package developed by the United States of America Census Bureau, Macro. CSPro is used for entering, editing, tabulating, and disseminating census and survey data.

2.6 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.

2.7 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 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 in the Central region, Dambai in the Oti region, Ho in the Volta region, Accra in the Greater Accra region, Wa in the Upper West Region, Bolgatanga in the Upper East region, Tamale in the Northern region, Nalerigu in the North East region and Damongo in the Savannah region.

3.2 Demographic Information of Respondents

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

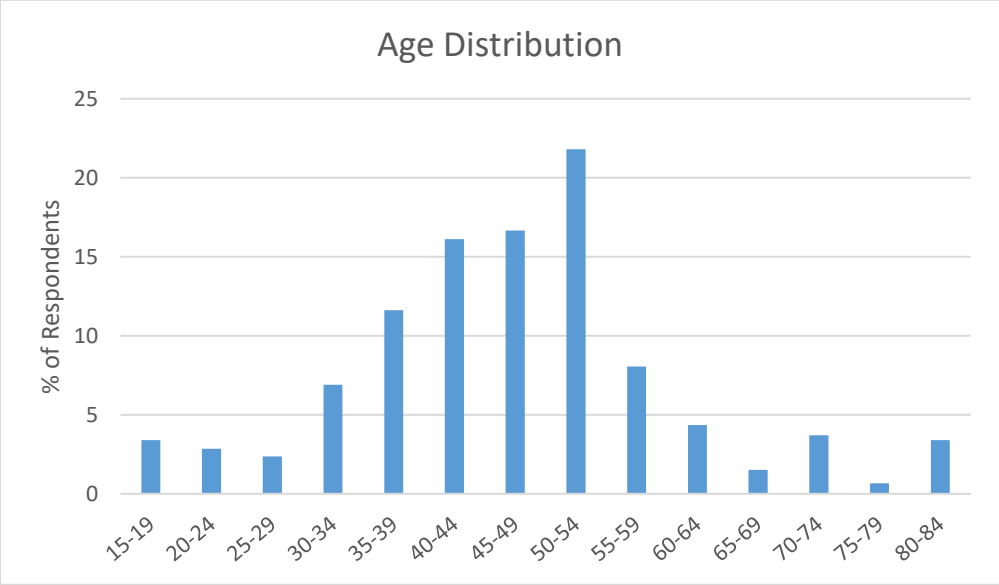

Figure 1: Age distribution of respondents

The age range of the respondents was between 15 and 84 years, with a mean age of 47 years. As seen in Figure 1, majority of the respondents (21.81%) were between the ages of 50 and 54

inclusive (modal class) followed almost equally by 45 to 49 and 40 to 44 years. The least number of respondents (0.67%) were from the ages of 75 and 79 followed by 65 to 69.

3.3 Seasons in Charcoal Supply and Charcoal Sales

Charcoal supply and sales have two seasons, namely; major season and minor season. Figure 2 gives a distribution of the major sales and supply seasons nationwide. Figures 3 and 4 provides the regional distribution of both major sales and supply seasons.

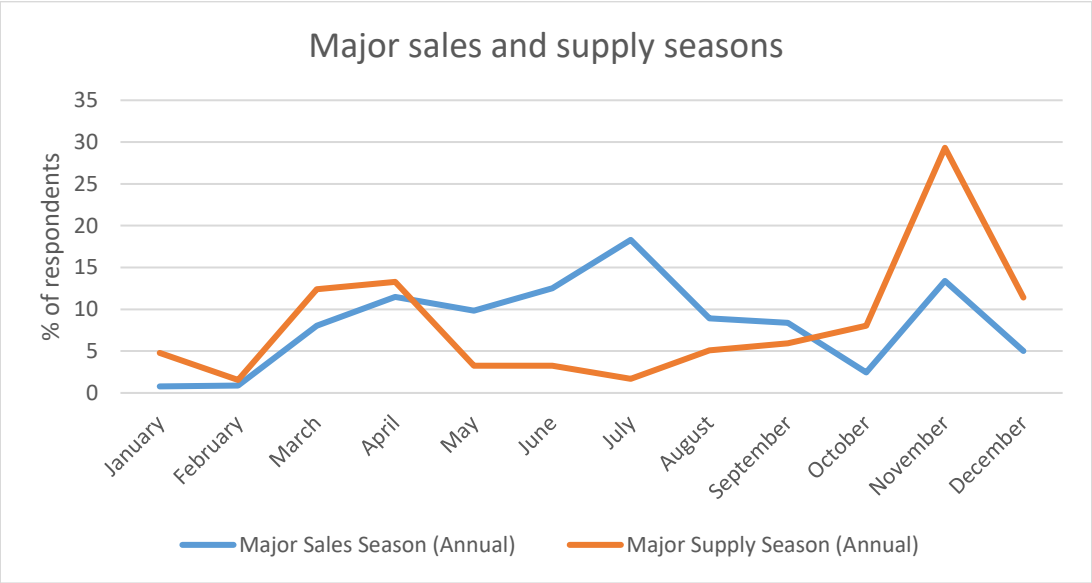

Figure 2: Major sales and supply seasons nationwide

As illustrated in Figures 2, 3 and 4, 44% of respondents representing seven (7) regions (Ashanti, Central, Eastern, Oti, Savannah, Volta and Western North) indicated that the major sales season is from May to August, whilst 50% of respondents representing eight (8) regions (Ahafo, Ashanti, Bono, Central, Eastern, Greater Accra, Oti and Upper West) indicated that the major supply season is between October and December inclusive. 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.

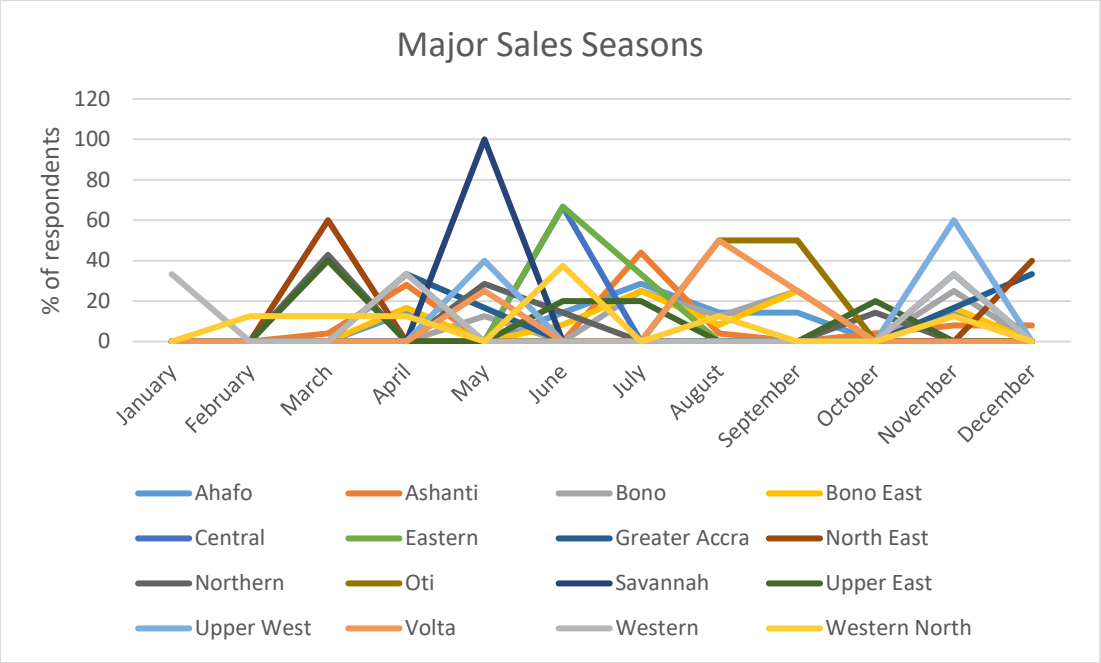

Figure 3: Major sales seasons by region

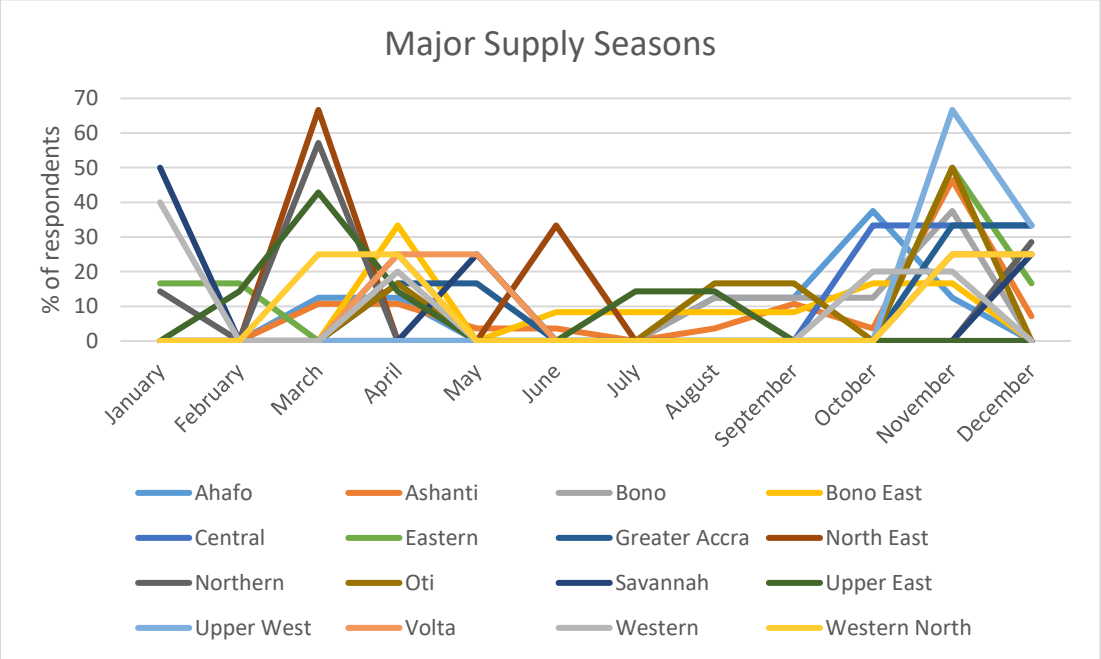

Figure 4: Major supply seasons by region

Accordingly, respondents asserted that heavy rains and bad road networks, which are commonplace during the wet season, are the top two major causes of variation in charcoal supply. They are followed by the onset of the farming season and the fuel price, respectively.

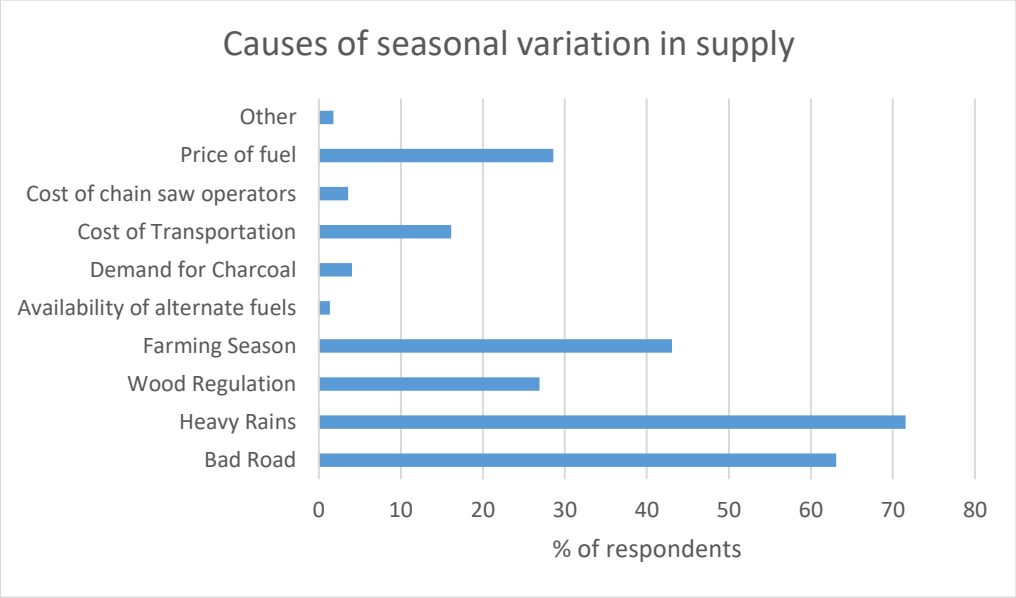

Figure 5: Factors that influence charcoal supply

3.4 Sources of Charcoal Supply

Averagely, 87% of respondents had 50% or more of their supply sources from within the regions they ply their trade. For instance, respondents from Goaso, Kintampo, Bolgatanga, Nalerigu, Tamale and Wa had all their charcoal supply sources from immediate localities within their region, followed closely by Cape Coast (80%). However, the remaining respondents claim to source their charcoal primarily from outside the regions they ply their trade. Respondents in Dambai, Takoradi and Accra source all their charcoal from outside their regions of location. Figure 6 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.

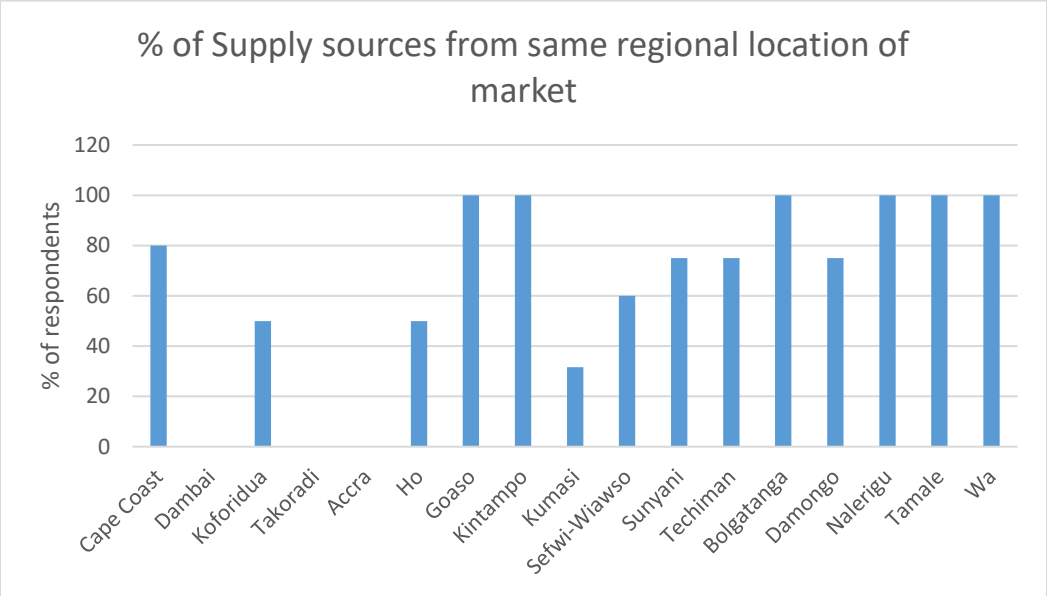

Figure 6: Percentage of respondents with supply sources from the same market region

Table 1: Sources of charcoal supply

Town	**Source of Charcoal Supply**
Cape Coast	Abura Abiam, Yamora, Pataase, Esiama, Afetu, Mampong
Dambai	Chamba, Ofosu
Koforidua	Asesewa, Akateng
Takoradi	Buipe, Damongo, Berman Nkwanta, Tumu, Techiman, Cape Coast, Kintampo
Accra	Kintampo, Techiman, Buipe
Ho	Mafi Adidome, Bakpa Adzani, Adaklu, Mafi Kumase, Dzemeni
Goaso	Nyamebekyere, Ebujam Payi, Akrodei, Kenyasi
Kintampo	Anyima, Kyereho, Kunsu, Miawani
Kumasi	Buipe, Adwira, Amante, Kintampo, Atebubu, Sefwi, Kwame Danso, Krakye, Ankaase, Nkoransah, Techiman, Cape Coast, Nsuta
Sefwi-Wiawso	Tanoso, Nyamebekyere, Anhwiam, Asawinso
Sunyani	Wenchi, Sampa, Damongo
Techiman	Buipe, Kintampo
Bolgatanga	Dulugu, Kunbangre, Zuarungu
Damongo	Damongo, Yepala

Nalerigu	Gbandaa, Tunni
Tamale	Dungu, Kudula, Lamashegu
Wa	Dorimon

3.5 Weight of Charcoal

The average weight of charcoal in maxi and mini bags packaging across the markets visited is illustrated in Figure 7.

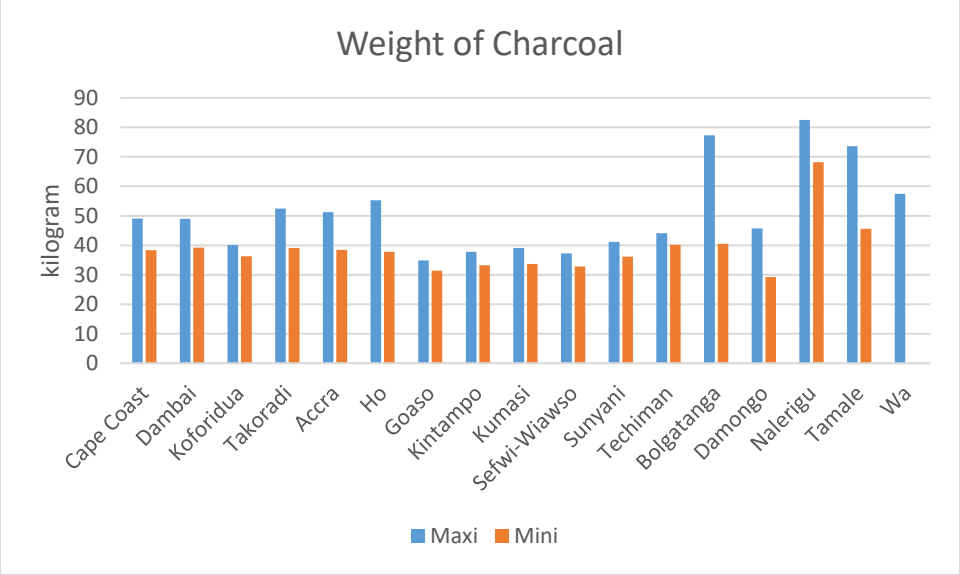

Figure 7: Average weight of charcoal

All the towns traded in both maxi and mini charcoal bags with the exception of Wa which traded only in maxi bags. The average weight of a maxi charcoal bag nationwide was 51.1 kg and, that of the mini charcoal bag was 38.8 kg.

Nalerigu had the highest average weight of both maxi and mini charcoal bags of 82.5kg and 68.2kg, respectively. The next highest weight of maxi charcoal bags was obtained in Bolgatanga (77.4kg) followed by Tamale (73.6kg), which also recorded one of the highest weights of mini charcoal bags.

Goaso and Sefwi-Wiawso had the least weight of both maxi and mini charcoal bags. The weights of maxi and mini charcoal bags in Goaso were 34.9 and 31.4kg respectively, and that of Sefwi-Wiawso were 37.2kg and 32.8kg respectively.

3.6 Charcoal Prices

3.6.1 Charcoal Price per Package

A maxi bag had a national average price of GH₵62, and that of a mini bag was GH₵44. The price of a maxi bag was highest in Accra, followed by Cape Coast and Koforidua respectively. Mini bag had its highest price in Kumasi followed closely by Accra and Techiman respectively.

Damongo had the least price of both maxi and mini bags. The price of maxi and mini bags at Damongo were GH₵25 and GH₵21.78 respectively. A summary of the charcoal prices is illustrated in Figure 8.

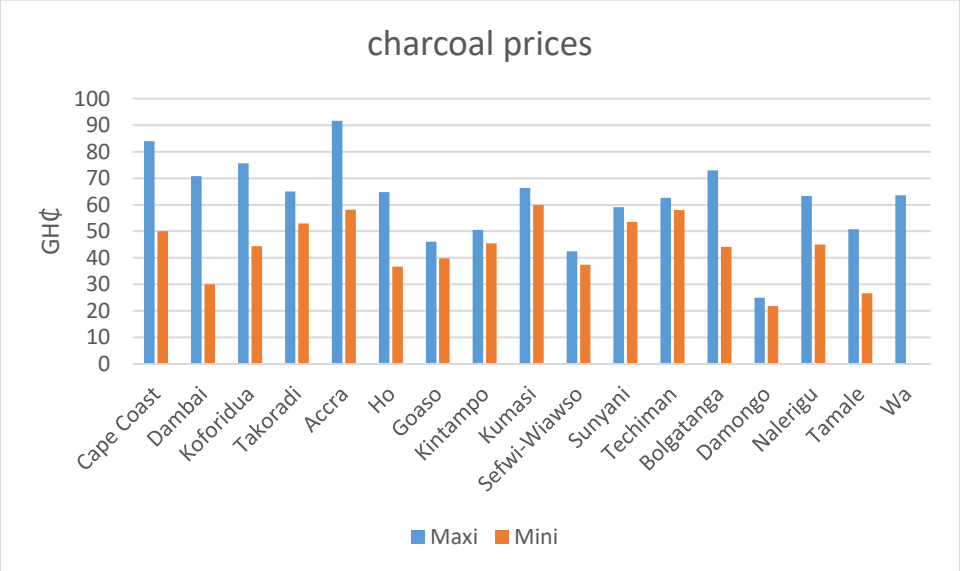

Figure 8: Charcoal price from the various markets

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 9.

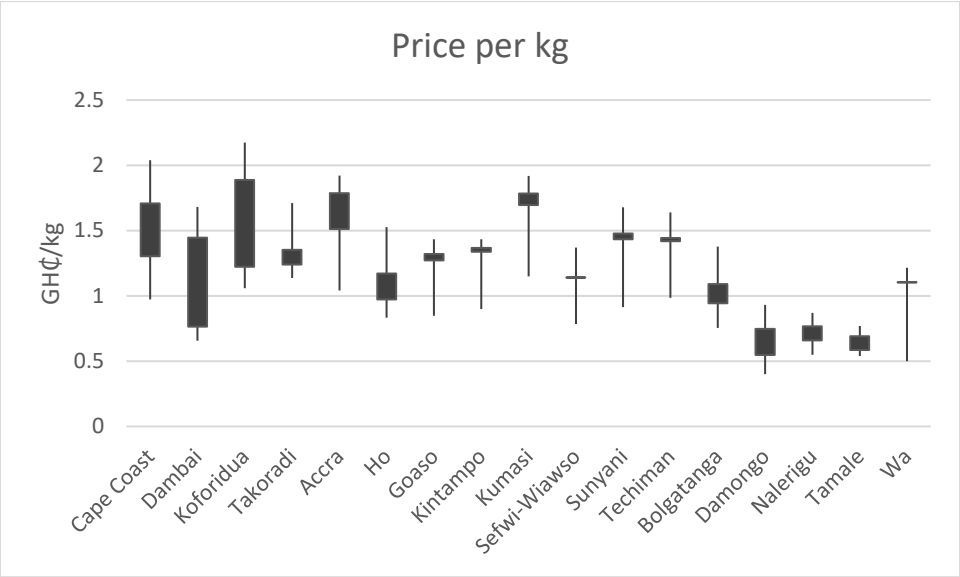

Figure 9: Unit price of charcoal (GH₵ per kg)

The national average price per kilogram of charcoal is GH₵ 1.22. The highest price per kg of charcoal was recorded in Kumasi (GH₵1.74) followed by Koforidua and Accra respectively. Tamale had the least price per kg of charcoal of GH₵ 0.64 followed closely by Damongo (GH₵ 0.65).

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 and then to 18.2% of the 5.6 million households in 2010[5],[6],[7].

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. However, the LPG penetration rate as at 2020 was 25.3%[8].

One of the causes of the slow growth in the use of LPG by households as the main cooking fuel is the price as compared to other fuels such as charcoal. Figure 10 displays the price of energy measured in mmbtu of LPG and charcoal for easy comparison.

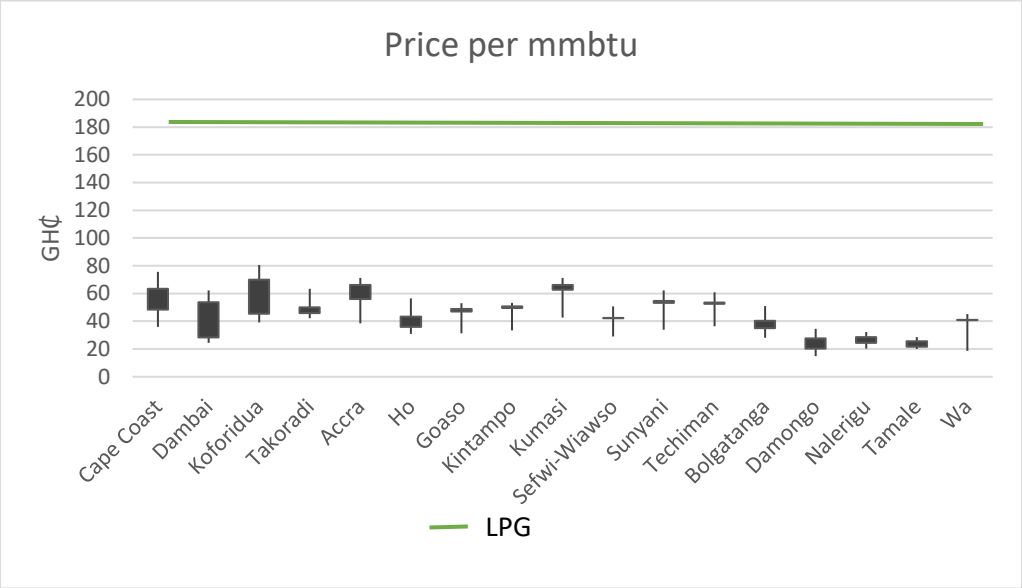

Figure 10: Price per mmBtu of LPG and Charcoal

[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] 2021 National Energy Statistics

There is no geographical price variation for LPG because of the Uniform pricing regime policy for all petroleum products. As evident in Figure 10, the price of charcoal per mmBtu is lower than that of LPG in all locations.

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[9]. 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%[10], 33.3% and 23.4%[11] for LPG stove, improved cookstove (Gyapa) and traditional charcoal stove respectively, the effective cost of mmBtu of useful energy is shown in Figure 11.

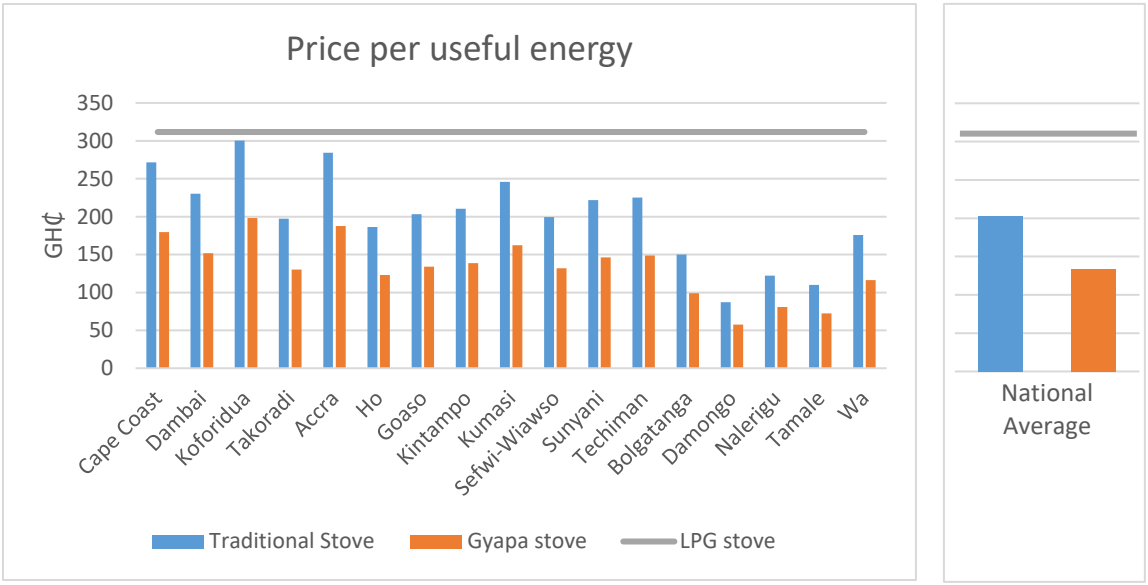

Figure 11: Price per mmBtu of useful energy

[9] GLSS 7
[10] 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.
[11] 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.

Generally, it costs households within all regional capitals visited less to use traditional charcoal stove or Gyapa stove than to use LPG stove as shown in Figure 11.

The national average cost of useful energy from LPG stove is GH₵312 per mmBtu. However, on average it will cost a household GH₵ 201 per mmBtu of useful energy if the household uses the traditional cookstove. This cost would further reduce by 34% to GH₵ 133 if an improved cookstove is used.

3.8 Factors affecting price of charcoal

Six factors including price of LPG, transportation cost, availability of LPG, availability of charcoal and demand for charcoal were assessed to identify whether they are causes of variation in charcoal price. About 61.8% of the respondents indicated that at least one the proposed factors is a cause of charcoal price variation. The main cause of price variation is transportation cost followed by wood regulation then availability of charcoal. The least cause of charcoal price variation is Demand for charcoal.

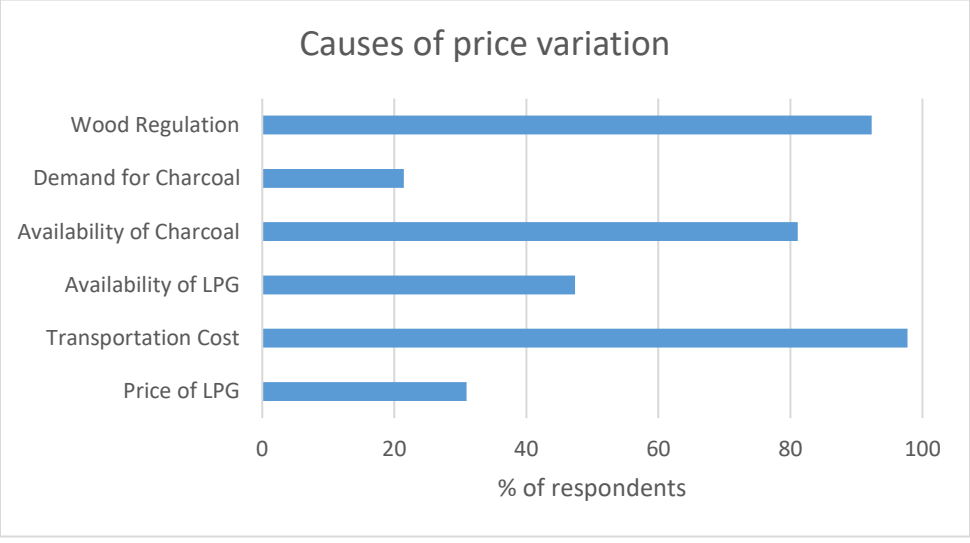

Figure 12: Causes of charcoal price variation

3.9 Charcoal Sales

The survey sought to measure the number of charcoal bags sold by the respondents. Figure 13, Table 2 show the average charcoal sales (number of bags sold) recorded nationwide. This was done to accurately estimate the quantity of charcoal used in the economy.

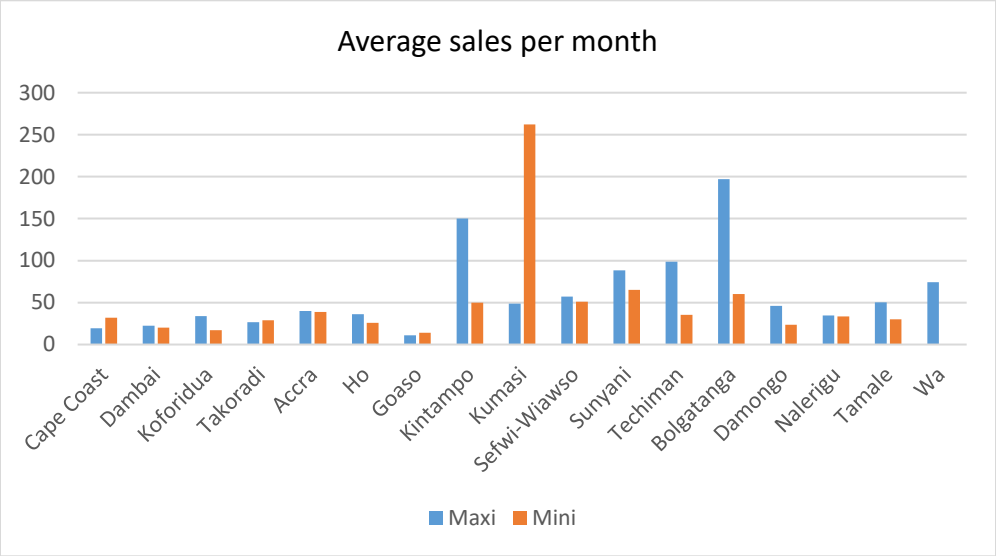

Figure 13: Average charcoal sales per month

Averagely, about 55% of the quantity of charcoal sold monthly are maxi bags. Maxi charcoal bags are predominantly traded in Bolgatanga and Kintampo whereas mini bags are mainly sold in Kumasi. Goaso had the lowest monthly sales for both mini and maxi charcoal bags.

Table 2: Average monthly quantity of charcoal sold

Area	Maxi	Mini
Cape Coast	20	32
Dambai	23	20
Koforidua	34	17
Takoradi	27	29
Accra	40	39
Ho	36	26
Goaso	11	14
Kintampo	150	50
Kumasi	49	262
Sefwi-Wiawso	57	51

Sunyani	89	65
Techiman	99	35
Bolgatanga	197	60
Damongo	46	24
Nalerigu	34	33
Tamale	50	30
Wa	74	

3.10 Challenges in the charcoal retail business

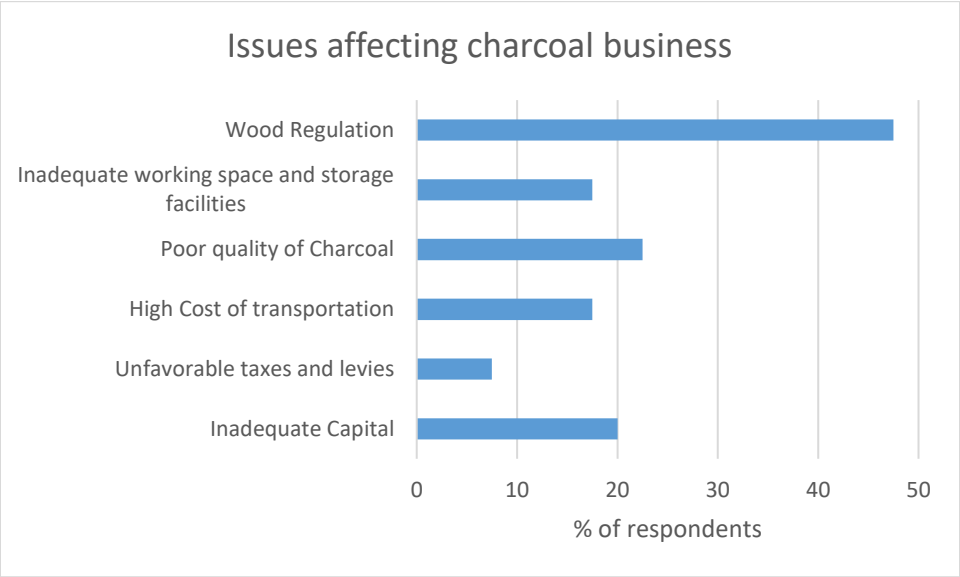

Figure 14: Issues affecting charcoal business

The most common issue facing charcoal business is regulation such as restriction or ban on charcoal production. This is followed by the poor quality of charcoal from suppliers, then inadequate capital.

Some of the challenges enumerated by respondents in their business include:

- Inadequate Capital

  Traders from all areas with the exception of Sunyani complained about having inadequate capital to expand their business. They asserted that due to the informal nature and lack of unionised body to champion their cause, accessing funds from government or financial institutions is difficult. Some also argued that they are repelled from collecting loans from financial institutions due to the unfavorable and rigid loan repayment plans.

- Unfavorable taxes and levies

  Respondents from Accra, Kintampo, Kumasi and Sunyani opined that high and numerous taxes and levies from local authorities and government is unfavorable to their business. They made it known that, when there is increment in taxes and levies, they often absorb the increment resulting in profit reduction, breaking even or sometimes a loss in order to

keep their customer base. However, they sometimes pass the increment to customers, which results in low patronage of their charcoal.

- High cost of transportation

  Traders expressed their worry over the high cost of transportation for charcoal. This they attributed to bad road networks from the charcoal production sites to the market places and also increase in fuel price. Due to the high cost of transportation incurred by charcoal suppliers and its resultant increase in price of charcoal, consumers of charcoal are affected thus creating an unconducive environment for charcoal business.

- Poor quality of charcoal

  Charcoal sellers from Goaso, Kumasi, Bolgatanga and Sunyani have experienced situations whereby the quality of charcoal supplied to them was poor. They were of the opinion that this could be due to the poor quality of wood used in charcoal production or an unethical decision by some charcoal producers to avoid a loss by bagging sand with charcoal.

- Inadequate working space and storage facilities

  Traders complained about lack of sheds for charcoal storage and therefore making charcoal business unattractive when there is heavy rainfall. They also complained of the small working area within which they ply their trade and advocated for bigger ones.

- Ban on Charcoal production

  The Savannah Regional Minister, Saeed Muhazu Jibril, on 10th April 2021, announced the decision by the Regional Coordinating Council to ban tree logging and the production of charcoal in the Savannah region. Consequently, the Buipewura, Abdulai Jinapor Il, has ordered for the permanent closure of the biggest charcoal market in the Savanah Region at Buipe. This ban according to charcoal retailers in the Savanah region will have adverse impact on the supply of charcoal in the region and the nation at large. Currently however, most charcoal producers have started clearing their land for farming since the rainy season has started in the region. Therefore, the impact of the charcoal ban would not be felt in this quarter but subsequent quarters within the year.

4.0 Conclusions

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

- The markets visited had charcoal packaged in maxi and mini bags (mostly in woven polypropylene, popularly called fertiliser bags).
- All the towns traded in both maxi and mini charcoal bags with the exception of Wa which traded only in maxi bags.
- Averagely, 87% of respondents had 50% or more of their supply sources from within the regions they ply their trade. For instance, respondents from Goaso, Kintampo, Bolgatanga, Nalerigu, Tamale and Wa had all their charcoal supply sources from immediate localities within their region, followed closely by Cape Coast (80%).
- Generally, charcoal is sourced from the forest and transition zones in the country. The major supply source of charcoal is Kintampo followed by Buipe and Damongo.
- About 44% of respondents representing seven (7) regions (Ashanti, Central, Eastern, Oti, Savannah, Volta and Western North) indicated that the major sales season is from May to August whilst 50% of respondents representing eight (8) regions (Ahafo, Ashanti, Bono, Central, Eastern, Greater Accra, Oti and Upper West) indicated that the major supply season is between October and December inclusive.
- The average weight of a maxi charcoal bag nationwide was 51.1 kg and, that of the mini charcoal bag was 38.8 kg. Nalerigu had the highest average weight of both maxi and mini charcoal bags of 82.5kg and 68.2kg respectively. On the other hand, Goaso and Sefwi-Wiawso had the least weight of both maxi and mini charcoal bags.
- The national average price per kilogram of charcoal is GH₵ 1.22. The highest price per kg of charcoal was recorded in Kumasi (GH₵1.74) followed by Koforidua and Accra respectively. Tamale had the least price per kg of charcoal of GH₵ 0.64 followed closely by Damongo (GH₵ 0.65).
- Charcoal vs LPG comparison when stove efficiency is included showed that, on average it will cost a household GH₵312 to get 1 mmBtu of useful energy from LPG whilst it will cost between GH₵ 133 and GH₵ 201 if the household uses charcoal.
- Generally, it costs households within all regional capitals visited less to use traditional charcoal stove or Gyapa stove than to use LPG stove.

- About 61.8% of the respondents indicated that at least one the following factors namely price of LPG, transportation cost, availability of LPG, availability of charcoal, demand for charcoal and regulation primarily ban on charcoal is a cause of charcoal price variation. The main cause of price variation is transportation cost followed by wood regulation then availability of charcoal. The least cause of charcoal price variation is demand for charcoal.
- The most common issue facing charcoal business is regulation such as restriction or ban on charcoal production which coincidentally is one of the major causes of variation in charcoal price. This is followed by the poor quality of charcoal from suppliers, then inadequate capital.

5.0 Recommendations

- 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.
- The charcoal business is affected by wood regulations particularly the ban or restriction on the production of charcoal. This has greatly influenced the variation of price of charcoal and has sometimes caused a reduction in the quality of charcoal being supplied to traders. Though charcoal production poses harm to the environment, it provides a source of livelihood for its producers, suppliers and traders. There is therefore the need to undertake further surveys to identify, study and monitor factors that potentially affect the charcoal business to ensure that the means of income generation of the value chain is not harmed. This can be a guide in the development of regulations for woodfuel to ensure quality charcoal is produced and marketed nationwide as well as ensure environmental sustainability.
- Unlike petroleum products and natural gas, charcoal trading is mostly done in the informal sector. Therefore its price tracking is more challenging and need primary data collection. Nonetheless the importance of charcoal price tracking cannot be underestimated since it's a competing fuel with LPG. It is therefore important to continue the survey, at least twice a year to have a holistic and upto date data on price of charcoal to aid planning and policy formulation.