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Experiences with Green Charcoal: A Gender Consideration of Rural and Urban Households in Gulu District

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Gender,
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The study focused on the use of green charcoal, a sustainable cooking fuel made from agricultural residues, in Gulu District, to highlight the experiences households have encountered, from a gender perspective. The study followed a cross-sectional design using qualitative approach which included the use of one-on-one interviews, focus group discussions, key informant interviews, and ethnographic observations for data collection. The findings show that households in Gulu District use a combination of cooking fuels such as firewood, wood charcoal, green charcoal, or gas. Furthermore, the study established that there were cases where both men and women had shared experiences in cooking, for example, knowledge of the faster cooking rate, cleanliness, and much ash content involved while using green charcoal. However, to a larger extent, there were gendered differences in cooking activities: while women predominantly handle cooking, men often influence decisions about what and how to cook, revealing underlying gender and power dynamics within households. Key findings indicate that green charcoal is favored for its affordability relative to traditional black charcoal, prolonged burn time, and higher heat output, though it is also harder to light and produces more ash. It is particularly popular in rural Owoo Sub-County, where residents are more involved in its production compared to their urban counterparts in Gulu City. The study concluded that positive experiences with green charcoal have facilitated its adoption and recommends further actions to promote its use. These include increasing awareness of its environmental, health, and financial benefits, improving product quality, and involving women and girls as advocates to expand its utilization.

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INTRODUCTION

The global demand for cooking fuels is rising, with black charcoal being a significant fuel source (Mwampamba et al., 2013). In Africa, approximately 80% of the population relies on traditional fuels such as firewood, charcoal, or coal (Meng et al., 2021). In Uganda, particularly in urban and peri-urban areas, about 90% of the population depends on wood-based fuels, leading to severe deforestation and environmental degradation (NEMA, 2016; MEMD, 2020). Specifically, the Acholi sub-region of Northern Uganda has seen a marked increase in the use of solid fuels for cooking and charcoal trade, resulting in the loss of about 4020 hectares of primary forests by 2020, with Gulu District accounting for 32% of this loss (Asiimwe, 2021). The reliance on wood fuels not only contributes to environmental issues but also poses health risks and gender-related conflicts over fuel resource control and choice (WHO, 2014), increasing the workload for women, causing soil erosion, and adversely affecting the ecology and food security (Admassie, A & Abebaw, D. (2021). In response to these challenges and aligning with Sustainable Development Goal Seven, which promotes access to affordable, reliable, sustainable, and modern energy (Wu & Wu 2015), there is a shift towards more sustainable cooking fuel options, including the transition from traditional fuels to indigenously hand-molded briquettes and the innovative, machine-made, and laboratory-tested green charcoal. This represents a significant move towards alternative, sustainable cooking fuel solutions at the household level.

Conceptualizing green charcoal and experiences**Green charcoal**

Keeve, C. B. (2020) argues that in theory, green charcoal is a product similar to black charcoal in its appearance and use, but outstandingly prevents the cutting of trees since it is produced from agricultural and organic residues. This is unlike firewood and black charcoal, which require the cutting down of trees. The environmental advantage of green charcoal is that, it can be locally produced, with simple materials such as organic wastes, agricultural residues such as rice husks, peanut shells, millet stalks, cottonseed shells and stalks, banana peelings, corncobs, and coconut shells, thereby minimizing deforestation rates that could potentially worsen global warming (Théau & Kinaga, 2021). By production means, green charcoal can be molded using hands, shaped using boxes, and made using fabricated machines (Wang et al., 2023).

Experiences

This paper views 'experiences' as household feelings, attitudes, mindset, access, choice, practice, convenience, and involvement with green charcoal. Martín-Ferrer, et al., (2023) in their theory of 'experience', conceptualize it to include the intellectual, affective, and practical characteristics of people and their transactional relations, material, and social environment as cited by Roth and Jornet (2014). Romano (2011) and Waldenfels, B. (2017) support that individuals are not only subjects of experience but are also subject to experience.

Whereas it is important to introduce green charcoal as a strategy to save the environment and human health in cooking, it is imperative to consider the consumers' satisfaction driven by their different experiences with green charcoal. Using Maslow's consumer satisfaction theory, for a consumer's decision to either accept or reject a product, there is always a reason or complexities of reasons (Constantin et al., 2010). This study examines these reasons as arising from their shared and non-shared experiences with green charcoal.

METHODOLOGY

This study was conducted in Gulu District, Northern Uganda, in June 2023 using a qualitative research approach. Data collection methods included one-on-one interviews, focus group discussions, key informant interviews, and ethnographic observations. The selection of rural and urban households in Gulu District was purposeful, focusing on areas where green charcoal production was active, giving residents firsthand experience with the product. This selection aimed to facilitate a detailed comparison of the usage patterns of traditional fuels and green charcoal between these two types of households.

During the study, a total of six Focus Group Discussions (FGDs) were conducted, split evenly between urban and rural households. Each location hosted three distinct types of FGDs: one exclusively for men, one for women, and one mixed-gender group, each consisting of 10 participants and lasting one hour. The study involved 60 participants in total, with an equal number of 30 participants from urban and rural settings. The gender-specific FGDs were designed to highlight gender-related dynamics, such as decision-making about cooking fuel, cooking responsibilities, and household provisioning. This approach allowed participants to discuss gender issues more freely within their groups.

The study also included individual one-on-one oral interviews and key informant interviews, conducted

with informed consent in either Acholi or English based on the respondent's preference. Each interview, designed to be semi-structured and lasting 30 minutes, allowed respondents to speak freely using a guided set of questions. Interviews were audio-recorded with consent, though notes and a memory log were used if a respondent was uncomfortable with recording. These interviews, involving a total of 20 participants, collected data on the type of cooking fuels used, gender roles and power dynamics in cooking, cooking experiences with various fuels including green charcoal, and cultural norms related to cooking.

Similarly, data was collected using key informant oral interviews, with the respondents' consent. The data collected included aspects such as community perception and usage of green charcoal, their experiences with other commonly used cooking fuels, benefits of using green charcoal, and possible suggestions to increase its wider adoption and usage by households in Gulu District. In total, four key informant participants were interviewed, and these included two individual experts within the UPCHAIN Project and two producers of green charcoal.

Ethnographic participant observation complemented the interview data by examining various aspects of the households, including their composition (number of male and female members), the design of cooking areas (kitchens), the types of fuels and stoves used, what was cooked, and how cooking tasks were divided among household members. This information was precisely recorded in field diaries and observation protocols, which later supported the analytical process. Additionally, photographs and video recordings were made, but only with the consent of the participants.

RESULTS AND DISCUSSION

Experiences with green charcoal

In this study, the respondents described their experiences as their household and personal

feelings, attitudes, mindset, access, choice, practice, convenience, and involvement with green charcoal. The study therefore discovered the common gendered experiences that households and individuals in Gulu District have had with green charcoal. These experiences are discussed below:

Feelings

Green charcoal has uplifted their status. A key informant who is a producer and user of green charcoal in the rural setting stated that;

“For the past year, I have been using green charcoal, my personal and family social status has improved in the community. My fellow women regard me as a class apart and a woman who uses modern cooking energy. This gives me psychological satisfaction.”

Readily available (accessibility)

The study found that green charcoal is becoming increasingly available and utilized in both rural and urban households, with 77% of respondents having used or heard of it, showing potential for future growth in its use. In rural settings, participants, predominantly women, reported a scarcity of firewood due to deforestation and rising costs of both firewood and black charcoal. As alternatives, they turned to locally made hand-molded briquettes known as *bilo maka*, crafted from black charcoal powder, clay, and organic waste (locally known as yugi). These briquettes, reflecting local knowledge and resourcefulness, are often used. However, the UPCHAIN project's machine-made and laboratory-tested briquettes are heavier and burn slower, making them more economical and effective. This aligns with similar findings by Romeo (2018), that green charcoal, similar in appearance and function to black charcoal but environmentally friendlier, is made primarily from agricultural waste, thus avoiding tree cutting.

Relatively cheaper than other cooking fuels

The study participants, both rural and urban, noted that green charcoal is cheaper compared to other

cooking fuels such as black charcoal, firewood, and gas, whose prices and quality they found less favorable. In the rural area of Owoo Sub-County, 1 kg of green charcoal is priced at Ug shs. 1000, significantly cheaper than 1 kg of black charcoal, which costs Ug shs. 3000. Similarly, in the urban setting of Gulu District, green charcoal sells for Ug shs. 2000 per kg, compared to Ug shs. 3000 for black charcoal. This price advantage has made the participants more receptive to using green charcoal as an alternative cooking fuel.

Produces and retains much heat for a longer time

During ethnographic participatory observations where participants cooked using green charcoal, it was noted that a kilogram of green charcoal could cook a kilogram of beans in about 1 hour and 25 minutes, boil fresh cassava in around 30 minutes, and heat four liters of water. In contrast, the same amount of black charcoal was insufficient for cooking a kilogram of beans. This efficiency made green charcoal a favored option among study participants, especially for foods that take longer to cook. They appreciated that green charcoal required less monitoring and refueling compared to firewood and black charcoal, making it easier to estimate the amount needed for cooking. Both male and female participants highlighted these benefits, with men specifically valuing the ease of lighting, convenience, and cleanliness of green charcoal over other fuels.

Difficulty in lighting

Ethnographic observations and cooking experiments revealed that lighting green charcoal is more challenging than black charcoal or firewood, requiring already burning black charcoal and good aeration. Some participants attempted to use polythene and paper, which proved inefficient. This difficulty particularly concerned urban men, who noted that lighting green charcoal could take as long as preparing a breakfast of tea and eggs using gas. Consequently, men preferred using green charcoal only when they had sufficient time and were at

home. In contrast, women, accustomed to lighting firewood and black charcoal, faced fewer difficulties. These findings suggest a need for innovation in green charcoal lighting methods and an improvement in its quality to enhance ease of use.

Difficulty in putting it off and much ash content

Participants in the study noted that while green charcoal provides adequate heat and cooks food quickly, it is difficult to extinguish once ignited. Unlike black charcoal, which can be easily put out with sand or water, green charcoal continues to burn until it disintegrates into ash, causing wastage as it cannot be reused. This issue did not significantly concern men in rural and urban focus groups, as they were less involved in cooking. However, women, who were more engaged in cooking activities, pointed out the advantages of firewood and black charcoal—particularly their ease of lighting and extinguishing, and their reusability after cooking is completed. One woman from the rural household FGD lamented that;

“For the first time that I used green charcoal, I was so disappointed because it was not as durable as advertised by the producers here, compared to the black charcoal. In most cases, I could not even put off part of it whenever I got done with cooking. This however is different with firewood and charcoal, which I can easily put off and reuse the next day. However, the UPCHAIN green charcoal which is heavier, burns slowly, emits a lot of heat with no smoke which is very good, although like other green charcoal, it cannot be put off easily.”

This calls for the need to improve the quality of green charcoal, to make it more competitive than traditional cooking fuels such as black charcoal and firewood.

CONCLUSION

The study revealed that women predominantly choose and use cooking fuels, especially in

households that primarily use green charcoal. This aligns with findings by Théau & Kinaga (2021), who noted that women and girls often collect cooking fuels like firewood which are key in cooking activities. However, this may not hold across all economic levels as financially abled women tend to opt for non-wood-based fuels like gas or electricity and may not cook themselves, and instead resort to hiring maids or purchasing prepared food.

Culturally, there is a strong preference for traditional solid fuels like firewood in Gulu District's rural areas, attributed to their suitability for cooking specific traditional foods such as ocwi cwí (hippopotamus meat) and their use in large cultural events like burials, marriages, and sacrifices, etc. This underscores the complex interplay between economic status, cultural practices, and fuel choice in these communities.

Specifically in Owoo Sub-County, the study found that despite ongoing rural electrification efforts, households are reluctant to adopt electricity as a cooking fuel due to high costs, power failure, and perceived health risks such as electric shocks. This has led to a continued preference for traditional solid fuels such as firewood and charcoal. Additionally, the study identified a significant barrier to the adoption of green charcoal: a lack of awareness about its benefits. To overcome this, the study recommends launching targeted public awareness campaigns in key social spaces like markets and trading centers, as well as educational institutions. These campaigns should educate the community on the environmental, health, and cost benefits of green charcoal over traditional fuels, and address the health and environmental impacts of using fuels like firewood and charcoal. Highlighting green charcoal's role in climate change mitigation is also suggested to boost its acceptance and usage.

The study emphasizes the need to improve the quality and affordability of green charcoal, citing concerns about its durability and ease of lighting. To address these issues, it recommends enhancing the

technology to make green charcoal more user-friendly and conducting training for community members, particularly those near green charcoal production units. This training would help to improve the quality of green charcoal produced by the community members themselves to increase and continue production and possibly lower the unit cost leading to higher consumption by the rest of the community members. Additionally, lowering prices, offering subsidies, or considering alternative pricing strategies could make green charcoal more accessible to broader urban and rural populations.

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Abbreviations used:

DANIDA – Danish International Development Agency

FGDs – Focus Group Discussions

MEMD – Ministry of Energy and Mineral Development

NEMA – National Environment Management Authority

SDGs – Sustainable Development Goals

UBOS – Uganda Bureau of Statistics

UPCHAIN – Unlocking the Potential of Green Charcoal Innovation in Northern Uganda

WHO – World Health Organisation

Conflict of interest: The authors declare that they have no conflict of interest.

Availability of data: The datasets/transcripts used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Author's contributions:

Okello, S. and Alidri, A. participated in designing the study and drafting the initial manuscript; Mbazalire, E. and Aoyo, C. participated in collecting, analyzing, and presenting field data; Atube, F. and Okello, C. participated in reviewing the manuscript; Okumu, C. made the final editing. All the authors participated in writing and approved the final version of the manuscript.

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