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Where are the women? A review and conceptual framework for addressing gender equity in charcoal value chains in Sub-Saharan Africa

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ABSTRACT

The importance of the charcoal sector is growing rapidly in Sub-Saharan Africa. In addition to providing an affordable energy source for residents in the continent's growing urban centers, the charcoal value chain offers a critical income source for millions of people. Despite recent studies suggesting that women are taking on an increasing role in charcoal value chains, data and analysis on the role of women and the influence of gendered power relations in the often male-coded charcoal value chain have remained limited. This literature review interrogates the gender dynamics of participation and benefits across charcoal value chains in Sub-Saharan Africa. We find significant support for women's participation throughout value chains, thereby contrasting conventional views of charcoal as a male activity. However, while dynamics change between different contexts, women's participation tends to be significantly higher in retail, while women tend to constitute a minority in other parts of the value chain – often joining the sector in the absence of alternative livelihood opportunities. The review also finds that gender differences exist across various nodes in terms of the scope, nature and outcomes of participation. While significant regional differences exist, our study finds that participation and outcomes tend to generally be influenced by gender differences and inequalities in: 1) access to and control over productive resources and income; 2) social and political capital, and; 3) gender roles and responsibilities. Importantly, other axes of social differentiation, such as generation, marital status, wealth and social class, often intersect with gender relations in influencing outcomes. In addition to structuring the extent, nature and outcomes of women and men's participation, we argue that gender roles and relations may significantly influence the efficiency and sustainability of the charcoal value chain. Based on our findings, we call for placing gender at the core – rather than periphery – of charcoal value chain studies, and propose a conceptual framework for incorporating gender analysis in future value chain studies in the charcoal sector.

Introduction

The importance of the charcoal sector is growing rapidly in Sub-Saharan Africa. In addition to providing an affordable energy source for residents in the continent's growing urban centers, the charcoal value chain offers a critical income source for millions of people (IEA, 2014). While studies assessing employment and socioeconomic benefits in charcoal value chains have steadily increased in recent years (Sola et al., 2017), sex-disaggregated data on value chain participation is scarce. Indeed, charcoal business – and production in particular – is often portrayed as a male-activity (Zulu & Richardson, 2013; Smith, Hudson, & Schreckenberg, 2017). Despite recent studies suggesting that women are taking on an increasing role in the charcoal value chain (Gumbo et al., 2013; Jones, Ryan, & Fisher, 2016), the role of women and the influence of gendered power relations in the male-coded charcoal value chain has remained understudied (Ingram et al. 2016; Smith et al., 2017). Instead, women's involvement in the woodfuel sector has mainly been studied in terms of firewood collection for domestic use as well as the health impacts they are subjected to as the main users of woodfuel (Arnold, Köhlin, & Persson, 2006; Smith, 2006).

Operationalizing gender and value chain analysis

Over the past decade there has been increasing interest in value chain approaches among development actors, reflecting a broader shift within the international development community towards supporting private sector -led development (Mariotti & Shepherd, 2015). The aim of enhancing the efficiency, inclusivity, equity and sustainability, particularly of rural value chains, has also piqued the interest of national governments, often balancing developmental objectives with environmental sustainability (e.g. KFS, 2013). Increasingly, this shift has also prompted development actors and scholars alike to also

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consider gender relations in value chain development (Rubin & Manfre, 2014; Stoian, Donovan, Elias, & Blare, 2018). A "value chain describes the full range of activities that are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use" (Kaplinsky & Morris, 2002, 4). In addition to offering a framework for conducting descriptive analyses of quantities, flows, values and actors in a given value chain, value chain analysis also allows for a more normative analysis aimed at identifying how benefits are distributed along the chain, and how unequal patterns of benefit distribution could be changed (Ribot, 1998). It does so by making visible dynamics of inclusion and exclusion along various nodes of the value chain, providing insights into the role of formal and informal institutions in supporting or regulating the chain (Kaplinsky & Morris, 2002) as well as examining linkages and power relations between chain actors and stakeholders (Bolwig, Ponte, Du Toit, Riisgaard, & Halberg, 2010).

The rationale for studying gender in value chains is rooted in the concept of the gendered economy that perceives labor markets and value chains to be operating at the intersection of productive and reproductive spheres (Elson, 1998). Socially constructed gender roles place men as the primary earners in the productive sphere, while women tend to be positioned somewhere between the productive and reproductive spheres (Tallontire, Dolan, Smith, & Barrientos, 2005). Value chains are embedded in and shaped by gender norms, ideologies and power relations on multiple levels. While dynamics vary across contexts, gender inequalities – often influenced by intersecting social relations, including class, ethnicity, generation etc. (Colfer, Sijapati Basnett, & Ihalainen, 2018) – shape the nature and extent of women and men's participation in value chains and their accrued benefits (Ingram et al. 2016). In addition to the moral imperative of addressing gender equality, inequalities along the value chain risk causing inefficiencies in the flow of quality goods (Rubin & Manfre, 2014). Addressing gender equality, then, becomes an important means to enhancing the efficiency and sustainability of a given value chain.

Gender analyses of rural value chains tend to generally revolve around examining the influence of gender relations on women and men's participation and benefits in value chains (Rubin & Manfre, 2014). Scholars have examined whether and where in the value chain women and men are located, as well as identified various entry barriers and enabling conditions to equitable participation in value chains (e.g. Barrientos, Dolan, & Tallontire, 2003; Maertens & Swinnen, 2012; Ingram et al., 2014). There is a growing recognition among scholars that gender dynamics of participation in agricultural or forest-related value chains are often the function of multiple social, cultural and economic factors, operating across scales and often varying by context, commodity or over time (e.g. Rubin & Manfre, 2014; Stoian et al., 2018). Gender inequalities, such as restrictive gender norms and unequal division of reproductive labor, access and control over productive resources, decision-making power and social and political capital, have all been found to limit women's equitable participation and beneficiation in value chains (e.g. Haverhals, Ingram, Elias, Basnett, & Petersen, 2016; Mayoux & Mackie, 2007). These barriers may be enshrined in formal laws and institutions or embedded in social norms, practices and stereotypes (Coles & Mitchell, 2011), and are as such often highly context-dependent (Ingram et al. 2016). Critically, scholars have also illustrated how gender frequently intersects with other social power relations in structuring economic opportunities (Li, 2015; Djoudi & Brockhaus, 2011), pointing to the importance of considering social heterogeneity beyond sex and paying attention to multiple forms of social differentiation (Colfer et al., 2018; Djoudi et al., 2016).

In recent years, development policy prescriptions hence increasingly emphasize enhancing the 'inclusiveness' of value chains. Indeed, a recent review by Stoian et al. (2018) found that economic development and gender equality tend to be treated as two mutually reinforcing objectives among many mainstream development actors. Through enabling women's participation in the productive sphere and offering opportunities to earning independent incomes, more inclusive value chains are seen as a means to achieving a broader social transformation (Barrientos, 2001). The value chain development literature has hence placed a lot of emphasis on assessing women's abilities to benefit from engagement in value chains, particularly through addressing the gender distribution of labor between and within different value chains (Stoian et al., 2018), identifying enabling conditions to more equitable participation and benefit sharing (Terrillon, 2010; Rubin, Manfre, & Barett, 2010), as well as exploring barriers and opportunities to various forms of value chain upgrading (Ingram et al. 2016, Coles & Mitchell, 2011).

However, a number of points can be raised against assuming an unconstrained win-win relationship between value chain engagement and gender equality. First, conflating gender equality with individual women's participation in economic activities diverts attention from heterogeneity among women as well as the broader structural inequalities that women face (Chant & Sweetman, 2012). Assuming a linear progression from income to equality risks trivializing power relations e.g. limiting women's control over income or trade-offs between productive labor and reproductive responsibilities (Stoian et al., 2018). Second, the emphasis on including women in value chains risks neglecting the *terms and conditions of inclusion* (McCarthy, 2010). In Indonesia, for instance, women's entry into the labor force on oil palm plantations was in many cases found to be a result of land poverty coupled with coercive corporate practices. As casual laborers, they were often faced with low salaries, insecure contracts and poor working conditions (McCarthy, 2010; Li, 2015). Bolwig et al. (2010) hence emphasize the need for value chain analyses to consider the *risks* of engagement – alongside of benefits – while Mayoux and Mackie (2007) suggest broadening the focus of the analysis from monetary benefits to also include the nature and conditions of work. Third, and relatedly, increasing shares of women in value chains do not necessarily indicate greater levels of equality or female empowerment. For instance, women's greater involvement in agricultural production has in many contexts been influenced by male outmigration (e.g. Pattnaik, Lahiri-Dutt, Lockie, & Pritchard, 2018). Yet in Mali, Djoudi and Brockhaus (2011) found that gender inequalities regarding control over key productive resources often remained unchanged. Conversely in the Congo Basin, Ingram et al. (2014) noted that while women traditionally dominated a number of forest-product value chains, there was a risk for male take-over of activities as the profitability of the products increased. Finally, these economic activities, including charcoal production, often have a non-negligible environmental impact in terms of forest degradation (Chidumayo & Gumbo, 2013). Efforts to increase socioeconomic benefits of value chain participation thus often need to be balanced against – or constrained by – environmental concerns. Importantly, while recent evidence suggests more gender-inclusive resource management institutions tend to display better environmental performance (Coleman & Mwangi, 2013, 2015; Leisher et al., 2016), gender differences and inequalities may also constrain or dis-incentivize women's contributions to sustainable resource use (e.g. Feka, Manzano, & Dahdouh-Guebas, 2011).

The focus on enabling conditions and environments hence needs to go beyond processes and arrangements that simply enable participation, instead focusing on identifying and analyzing the processes that drive change in the gender composition of value chains; assessing the gendered outcomes of that change in relation to underlying social structures; and illuminating the conditions and arrangements that can help facilitate improved equity and wellbeing along and around the value chain.

Gender in forest, tree and agroforestry value chains

During the recent decade there has been an increase in studies specifically examining the gender dynamics in forest, tree and agroforestry (FTA) value chains. Analyzing a global dataset on forest

product use, Sunderland et al. (2014) find significant evidence for gender specialization in certain forest products or value chain activities. As a general trend, literature on FTA value chains suggests that women – relative to men – tend to be confined in less profitable value chains (Ingram et al., 2014), occupy less remunerative nodes in a given value chain, such as harvesting and retailing (Rubin & Manfre, 2014), run smaller businesses (Haverhals et al., 2016) and have less vertical connections (Rubin & Manfre, 2014).

However, a review by Ingram et al., 2016 finds that existing literature on gender in FTA landscapes tends to be biased towards value chains in which women are already largely involved. Hence, much less is known about ways in which gender roles and relations in various contexts structure participation and outcomes in traditionally male-dominated value chains, including charcoal. In addition, Haverhals et al. (2016) find that much of the value chain literature in the FTA sector is limited to characterizing women's participation, rather than analyzing the ways in which men and women interact in value chain, the norms and power relations that structure that interaction (Haverhals et al., 2016) and the ways in which gender dynamics influence the socioeconomic and environmental impacts of the value chain (Haverhals et al., 2016; Sola et al., 2017). To address these gaps, this paper aims to *consolidate and analyze available information on gender and charcoal value chains*. More specifically, it will seek to answer three distinct questions:

- In what ways does gender influence the extent and nature of women and men's participation in charcoal value chains?
- In what ways does gender influence benefits that women and men derive from their participation?
- What are some of the socioeconomic and environmental outcomes from women and men's participation in charcoal value chains?

Based on the review, the paper aims to *present current understanding on gender and charcoal value chains, identify pertinent knowledge gaps for future research and propose a conceptual framework for integrating gender considerations in woodfuel research.*

Data and methods

To accommodate the critical issues raised in the above discussion, we adapted a conceptual framework from Haverhals et al. (2016) (Fig. 1) to guide the literature review. It highlights the role of multi-level governance arrangements and other contextual factors in setting the 'rules of the game' (Haverhals et al., 2016), and adopts an explicit gender lens to assess how the socioeconomic and institutional environment, often mediated by gender relations, influences the gender dynamics of value chain participation and benefits. However, while the conceptual framework by Haverhals et al. (2016) is designed to directly examine empowerment outcomes attributed to differentiated extent of value chain participation, our conceptual framework has been expanded to consider both quantitative and qualitative aspects of participation. Specifically, it focuses the attention to four distinct, albeit interrelated aspects of value chain engagement. The first aspect, 'extent of participation', seeks to illuminate and explain the vertical and horizontal gender distribution of labor between and within the different nodes within the value chain. For the purpose of this paper, we understand actors performing similar functions in the value chain as occupying the same 'node' (Mitchell, Keane, & Coles, 2009). While the number and character of nodes, as well as the actors involved in them, may vary (see e.g. Ribot, 1998, Eba'a Atyi et al., 2016, Shively, Jagger, Sserunkuuma, Arinaitwe, & Chibwana, 2010), we identify four key nodes that tend to cut across most contexts: charcoal production, transport, trade and retail. However, gender-relevant information pertaining to other possible nodes or activities is also included. Two important limitations should be noted. First, we exclude consumption of charcoal. Second, we consider production – and activities directly related to production, including harvesting and carbonization – as the starting point for our value chain analysis. While tree farming can in certain contexts be closely linked to the charcoal value chain (see e.g. Ndegwa 2010), it still supplies a very limited share of the charcoal value chain across sub-Saharan Africa (Chidumayo & Gumbo, 2013; Sola et al., 2017). The second aspect, 'nature of participation', considers qualitative differences in women and men's participation, with regards to e.g. production technologies, techniques and strategies, horizontal and vertical coordination or market access. The third aspect, 'income', considers gender-differences in income derived from participation, while the fourth, 'outcomes', goes beyond

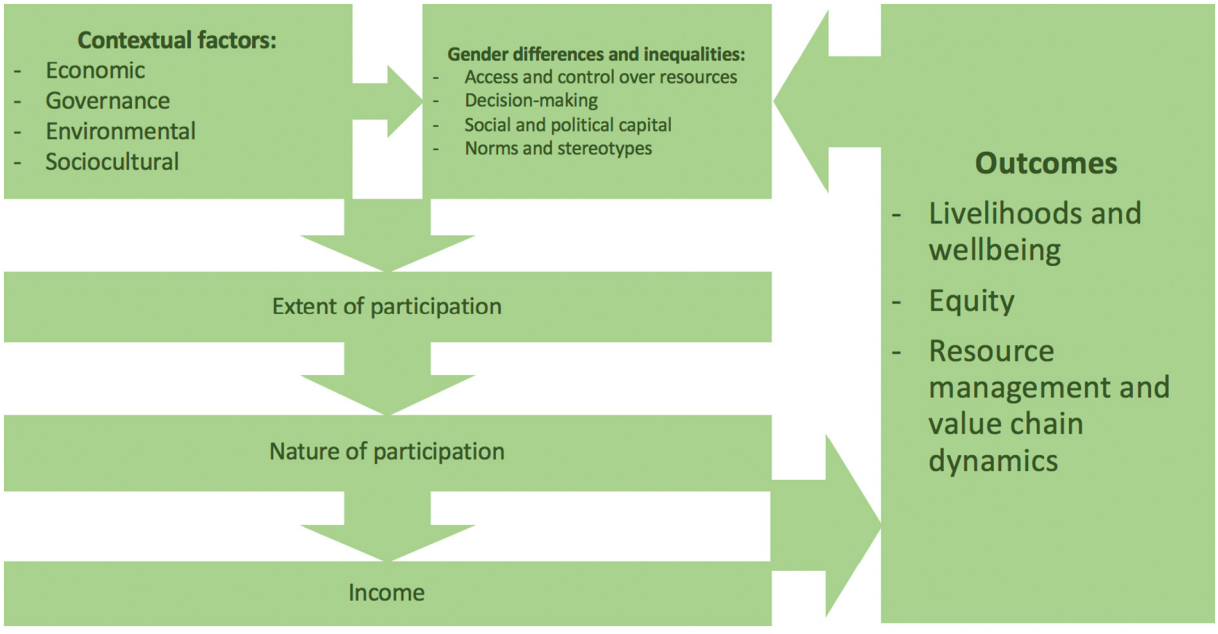

Fig. 1. Conceptual framework for literature review on gender and charcoal value chains. (Adapted from Haverhals et al., 2016).

financial remuneration, encompassing both positive and negative, socioeconomic and environmental outcomes attributed to value chain activities. Particular emphasis is given to information on changes in gender relations arising from the participation (or non-participation) of certain groups in the value chain. Importantly, our framework does not consider income as the sole catalyzer for socioeconomic change, but recognizes that various aspects associated with participation can generate positive or negative outcomes. However, given the centrality of income in debates surrounding the socioeconomic features of charcoal value chain (see e.g. Schure, Levang, & Wiersum, 2014; Jones et al., 2016), we opt to address it as its own component.

In order to gauge the current state of the literature on gender and charcoal value chains, we conducted a three-pronged screening process. First, literature was sought from bibliographic databases, including Web of Science and Google Scholar, using a combination of the following search terms: "charcoal" OR "woodfuel" AND "value chain" OR "(node)" AND "women" OR "female" OR "gender" AND "Africa" or "(SSA country)". In order to capture the large body of published and grey literature that may not appear in online bibliographic databases, relevant institutional databases and websites were also included in the search. Additional literature was identified through references in pertinent publications. Finally, a select number of subject specialists were contacted for additional literature that they believe to be relevant to the topic. A few potential methodological limitations should be highlighted. First, the review only included English publications, which in turn may be a reason for the observed majority of studies based in Eastern and Southern Africa. Second, our search strategy privileges the inclusion of studies that mention either the presence or absence of women. Since the charcoal value chain has conventionally been assumed as male-dominated, it is possible that studies finding the value chain to be completely male-dominated may not have been included in the review.

In total, 96 papers and reports were screened against two preliminary criteria: 1) whether they focus on charcoal value chains or on one or more nodes; 2) whether they provide any empirical information on gender differences and/or relations with respect to the value chain or a specific node. Studies focusing exclusively on charcoal consumption were excluded. This screening yielded a total of 23 studies.

In order to generate descriptive characteristics for the literature on gender and charcoal value chains, we then reviewed the 23 papers against an additional set of criteria, including:

- Focus on one or multiple nodes/activities within the value chain
- Inclusion of any sex-disaggregated information, either quantitative or qualitative, on participation and/or benefits at any node
- Application of any form of gender analysis to explain observed differences between men and women
- Gender as the primary or a significant focus of the paper

Finally, we reviewed the papers based on content analysis, following the key topics of the review questions derived from the conceptual framework. The results from this review are presented in the following section. Here, we draw primarily on the 23 studies containing empirical information on various aspects of women and men's participation in charcoal production and trade. However, since the primary objective of this section is to consolidate available information on gender and charcoal value chains as well as to identify pertinent knowledge gaps, some information has also been included from a number of papers that did not meet the initial review criteria but provide useful contextual information, including e.g. value chain structure, institutional frameworks or environmental impacts.

Table 1 in the following section presents an overview of women's participation across the charcoal value chain, based on case studies in a number of Sub-Saharan countries. While quantitative statistics on women and men's relative participation exist for certain value chains and nodes, the variation in data in terms of scope, data year and methods, presented a challenge in compiling the table. In addition, the context-specific case study data did not allow for extrapolation to country levels. Therefore, we opted to group and present the data on a scale from 1) no women; 2) few women; 3) some women; 4) both men and women; 5) mainly women; 6) only women. As the data on participation comprises both large- and small-n statistics, qualitative accounts and field observations, the categorization had to be based on both quantitative (e.g. below 5%) and qualitative (e.g. "few women") indicators.

Results

State of the literature

The literature screening yielded a number of interesting insights. While a number of studies mentioned 'gender', 'female' or 'women' in different contexts, the first screening yielded only 23 studies (12 of which are published in scientific journals) that collected and presented primary data on women and men's participation in charcoal value chains. These studies are presented in Table 1, together with the countries where the study sites are located. In addition to the studies presented in Table 1, 2 studies had a multi-country/global scope. Out of the 23 reviewed studies, 10 focused on the full value chain, whereas 11 focused exclusively on charcoal production. 13/23 studies used quantitative surveys for primary data collection and 10 of them had sample sizes over 100.

Table 1
Women's participation in charcoal value chains in Sub-Saharan Africa.

Case study	Producer	Transporter	Trader	Retailer	Source
Malawi	Some women	Both men and women	N/A	N/A	Smith, Eigenbrod, Kafumbata, Hudson, & Schreckenberg, 2015; Smith et al., 2017; Fisher, 2004; Zulu, 2010
Uganda	Few women	Few women	Some women	Mainly women	Shively et al., 2010
Mozambique	Some women	Few women	Both men and women	Mainly women	Atanassov, Egas, Falcão, Fernandes, & Mahumane, 2012; Zorrilla-Miras et al., 2018; Jones et al., 2016
Zambia	Some women	Few women	Both men and women	Mainly women	Gumbo et al., 2013; Ihalainen, Mwale, Moombe, & Gumbo, 2018
Kenya	Some women	Some women	Both men and women	Mainly women	Delahunty-Pike, 2012; Ndegwa, Anhuf, Nehren, Ghilardi, & Iiyama, 2016; Oduor, Ngugi, & wa Gathui, 2012; KFS, 2013, Ruuska, 2012
Burkina Faso	Few women	Both men and women	Mainly women	Mainly women	Puentes-Rodriguez, Torssonen, Ramcilovik-Suominen, & Pitkänen, 2017
Tanzania	Some/mostly women	No women	No/some women	Some/mainly women	Sem, 2004; Butz, 2013; Kazimoto, 2015
Mali	Some women	N/A	N/A	Some women	Djoudi & Brockhaus, 2011; Wooten, 2003
Liberia	Some women	Few women	Few women	Mainly women	FAO, forthcoming

It is however noteworthy that across all the studies, much of the information on gender dynamics is based on anecdotal observations or focus group discussions. Indeed, only 10/23 studies collect and present sex-disaggregated statistics on women and men's participation in value chain activities. Other methodological approaches ranged from ethnographic approaches and field observations to semi-structured interviews and participatory workshops. Interestingly, while the bulk of charcoal value chain studies tend to focus on large value chains serving major cities (Smith et al., 2015), the majority of studies including information on gender (14/23) focus on sub-regional or local value chains. Perhaps the most critical finding regarding the literature is however that only eight studies – out of which four focus exclusively on charcoal production – applied gender analysis to explain the gender differences they observe. Five studies were coded as having both gender and charcoal as a primary or significant focus, out of which only one study focused on the entire charcoal value chain.

Extent of women's participation in charcoal value chains in Sub-Saharan Africa

The below table (Table 1) summarizes the reviewed data on women and men's participation in Sub-Saharan charcoal value chains. It is important to note that the table illustrates synthesized data on participation per node from multiple different case studies conducted in a given country. These studies can however be conducted in different regions, focus on different value chain segments or use different methodologies, and in some cases even provide contrasting information on the extent of women's participation (see e.g. Butz, 2013 and Sem, 2004 on charcoal production in Tanzania). The table should hence not be interpreted as representative for each country or used to compare participation between countries. However, the table illustrates two important findings on gender composition in charcoal value chains in Sub-Saharan Africa. First, contrary to common assumptions depicting charcoal business as a 'male-activity', women are indeed involved in all activities across the value chain. Second, as a general trend, women's participation tends to be relatively high in retail, while men tend to dominate production and transport.

While the heavy, labor intensive nature of charcoal production is often understood as the primary reason for male dominance in the activity (e.g. Zulu & Richardson, 2013; Sem, 2004), a number of studies find that where women participate in production, they are involved in all related activities, including felling, crosscutting and kilning (e.g. Smith et al., 2017; Jones et al., 2016; Butz, 2013). Other studies however find gender segregation among production activities, suggesting women tend to play more prominent roles in less physically demanding activities, including planting and managing trees, covering and breaking kilns, as well as collecting and bagging charcoal (e.g. Delahunty-Pike, 2012; Malimbwi & Zahabu, 2008; FAO, forthcoming). In Ghana, Brobbery, Pouliot, Hansen, and Kyereh (2019) find that male-headed households are significantly more likely to be engaged in charcoal production, while the opposite is true for trading – an activity identified as a 'female job' by respondents (Brobbery et al., 2019, 19). However, they also found younger (male-headed) households to be more likely to participate in production than households with older household heads. A few studies suggest a relative overrepresentation of socioeconomically marginalized (and often older, widowed) female heads-of-households among the women involved as main/independent producers, while married women in male-headed households tend to play more supportive roles (e.g. Butz, 2013; Djoudi & Brockhaus, 2011). In Kilifi, Kenya, Ruuska (2012) found that while 27.5% of charcoal in the study site was produced by women, 41.5% of all charcoal was produced with labor inputs from both women and men. In Malawi, Smith et al. (2015) find mainly young, unmarried women to be involved in charcoal ferrying.

Based on our review of the literature on gender and charcoal, reasons for women's participation – or lack of it – in charcoal value chains can be examined through two distinct, yet interlinked perspectives: 1) push and pull factors; and 2) barriers and constraints to equitable participation. Beginning with charcoal production, a number of studies link charcoal to poverty and a lack of other livelihood options (e.g. Herd, 2007; Gumbo et al., 2013; Smith et al., 2017). Low entry costs for engaging in production enables more flexible and occasional production, which in turn are found to be critical to the livelihood strategies of many rural households and women producers in particular (Jones et al., 2016). Some evidence suggests that 'production as a last resort' might be particularly prevalent among female producers. For instance, Herd (2007) finds that female charcoal producers tend to be less educated than their male counterparts as well as non-producing women, while Smith et al. (2017) find female producers to have fewer alternative income sources compared to male producers. In Tanzania and Mali, studies find that a vast majority of women charcoal producers are widowed, divorced or socioeconomically marginalized in other ways, producing charcoal in the absence of alternative income-generating opportunities (Butz, 2013, Djoudi & Brockhaus, 2011). In Malawi, Smith et al. (2015) similarly find that most – male and female – small-scale charcoal transporters, ferrying charcoal from producer villages to urban centers, tend to engage in the activity in absence of alternative livelihood options. Female transporters were however found to have fewer assets than their male counterparts.

Jones et al. (2016) find that while many men in Mozambique were producing as their main livelihood, most female charcoalers were engaged part-time. Contrary to notions of charcoal as a last resort, charcoal production was instead often found to be a proactive way of generating cash to meet larger expenses, ranging from agricultural inputs to solar panels and dowry payments. At the same time, many producers also turned to charcoal to cope with economic shocks that disrupted households' income streams. The authors also find that 75% of the female producers were part of male-headed households, noting financial autonomy from their husbands as a particularly important reason for engaging in production.

It is important to note that significant variations exist in attitudes, norms and roles surrounding charcoal production and trade between different cultural contexts. For instance, in the Maasai community studied by Butz (2013), charcoal production was in fact seen as 'women's work'. In Liberia, FAO (forthcoming) found similar perceptions to exist regarding charcoal vending. In Mali, Wooten (2003) found charcoal production to be one of the few income generating activities open to women. In Mozambique, Jones et al. (2016) similarly find women's participation to be facilitated in part by the absence of gendered rules around charcoal production. The authors suggest that the lack of entrenched gendered rules might be explained by the relative novelty of the activity in the study site.

However, a number of studies also suggest the presence of social stigma against women's participation in the charcoal sector. In Kenya and Tanzania, scholars found that communities often viewed charcoal production as men's work, due to the physical strength perceived to be required for many production activities (Ndegwa et al., 2016; Sem, 2004; Delahunty-Pike, 2012). In Malawi, Smith et al. (2017) suggest that charcoal production is conventionally perceived as a dirty activity, and therefore seen as inappropriate for women. Evidence from ongoing CIFOR research in Zambia suggests that the social stigma associated with charcoal production and trading may be particularly penalizing to younger women (Ihalainen et al., 2018), while Djoudi and Brockhaus (2011) find the same to be true for women from higher social classes in northern Mali. In Liberia, married women's engagement in charcoal production was viewed as a sign of the husband's inability to provide for the family (FAO, forthcoming). In combination with economic hardship faced by many female household heads due to fewer income sources, such perceptions could help explain the fact that female household heads appear overrepresented

among women engaging as 'main producers' (e.g. Fisher, 2004; Butz, 2013).

In addition to the sociocultural context, scholars have also highlighted the potential influence of various governance regimes in influencing challenges and opportunities to women and men's participation. A key enabling factor to women's participation was the lax enforcement of the current licensing regime (Jones et al., 2016). Formal licensing systems premising participation on financial (Jones et al., 2016) and/or social capital (Djoudi & Brockhaus, 2011) may pose relatively higher barriers to women, who tend to have less control over finances and be less politically connected (e.g. Rubin & Manfre, 2014). At the same time, due to capacity constraints among regulatory authorities, licensing of producers has in many Sub-Saharan countries de facto been replaced by taxing of charcoal transport (e.g. Jones et al., 2016; Shively et al., 2010; Gumbo et al., 2013). Informal charcoal transporters, in particular, hence run the risk of negative enforcements if apprehended by the authorities. While profits among transporters and traders tend to be relatively high, a number of authors have hypothesized that the risks associated with engaging in illegal or illicit activities, such as being arrested or subjected to other penalties, can be particularly deterring to women (e.g. Ndegwa et al., 2016; Sem, 2004; Zulu, 2010). While the authors provide no justification for the hypothesis, other scholars have suggested that rural women might be less willing than men to engage in risk-taking behavior due to their relatively higher reproductive responsibilities (FAO, 2016) and/or exposure to gender-based violence (Farnworth, Kantor, Kruijssen, Longley, & Colverson, 2015).

Finally, the review suggests that gender inequalities in terms of accessing and controlling productive resources pose significant constraints to women's equal participation across the value chain. Such inequalities concern e.g. control over land and tree resources (Delahunty-Pike, 2012; Jones et al., 2016), financial capital (FAO, forthcoming), tools (Herd, 2007), vehicles (Delahunty-Pike, 2012; Smith et al., 2015) and other assets, such as mobile phones, which are often needed for communicating with traders (Shively et al., 2010). In addition, Ahearn and Tempelman (2010) also find that women in Africa tend to have less access to family labor, which Jones et al. (2016) and Fisher (2004) note to be of key importance in charcoal production. Importantly, scholars have noted that women's access to resources and markets is also influenced by restrictive gender norms, both limiting women's movement (Djoudi & Brockhaus, 2011) and imposing a higher reproductive labor burden (Kazimoto, 2015). Indeed, our review suggests that female participation may be higher across the different value chain nodes when operations (e.g. accessing wood resources or markets) do not require high degrees of mobility (see Sem, 2004, Smith et al., 2017 on production; Smith et al., 2015, Delahunty-Pike, 2012 on transport; Kazimoto, 2015 on retail).

Nature of participation

As noted in a number of the reviewed studies, gender inequalities restricting women's access and control over productive resources also tend to influence the nature of their participation. For instance, in order to overcome challenges posed by the physical nature of charcoal production as well as women's relatively lower access to family – and in particular masculine – labor (Ahearn & Tempelman, 2010), a few studies suggest that female producers tend to pool or hire labor (e.g. Gumbo et al., 2013; Jones et al., 2016). In Tanzania, Butz (2013) however finds women charcoal producers to often work alone and produce relatively lower volumes of charcoal. Studies in Mozambique and Kenya also note smaller kiln sizes and lower production volumes among female producers in comparison to men (Zorrilla-Miras et al., 2018; Ndegwa et al., 2016). In Mozambique, Zorrilla-Miras et al. (2018) argue this is likely due to women's lower participation in charcoal producer associations. While the study finds production volumes to be significantly higher among association members when compared to non-members, only 5% of female producers belong to an association (compared with 25% of male producers). At the same time, KFS (2013) reports that women make up the majority of charcoal producer associations (CPAs) in Kitui, Kenya, despite the sector being historically largely male-dominated. As membership in CPAs became mandatory after the enactment of the 2009 Charcoal Rules, women's relative overrepresentation could signal their willingness towards engaging in formal charcoal production, in the absence of exclusionary institutional practices.

In addition to producing smaller quantities of charcoal, women were also found to often sell at cheaper local markets (Butz, 2013, Djoudi & Brockhaus, 2011). For instance, in northern Mali, producers were able to access higher profits when selling their products at markets directly to consumers. However, women producers were found to often lack the political connections necessary to obtain production licenses and to be restricted in terms of mobility. Hence, women opted to sell their products at local markets, while men sold their charcoal at regional markets for five times the local market prices (Djoudi & Brockhaus, 2011).

While women's low participation in large-scale transport was confirmed in all reviewed studies, a number of studies indicated higher female participation in small-scale transportation, involving head-loads or other non-motorized means of transport (e.g. Smith et al., 2015; Delahunty-Pike, 2012; Puentes-Rodriguez et al., 2017; Butz, 2013; Atanassov et al., 2012). Indeed, Smith et al. (2015) and Delahunty-Pike (2012) note clear gender inequalities in ownership of transport vehicles (bicycles, motorbikes, trucks). In Burkina Faso, Puentes-Rodriguez et al. (2017) find that formal, licensed transporters are nearly exclusively men, while mostly female, small-scale transporters operate mainly informally, ferrying charcoal over relatively short distances. In Malawi, Smith et al. (2015) similarly find that while large-scale transporters tend to be integrated into large trade networks, small-scale transporters are less connected to producers and traders, simply providing the manual labor required for transporting charcoal from the production site to selling points. The risks incurred by transporters also vary significantly depending on the mode and scale of operations. For large-scale transporters, bribing at various checkpoints is often routine, with bribes amounting up to 8% of the final retail price (Baumert et al., 2016). Given the large volumes handled by large-scale transporters, the economic impact of confiscations is often significant. Small-scale transporters appear to report less frequent experiences with enforcements (Smith et al., 2015). In Malawi, enforcement costs to small-scale transporters occurred in the form of confiscations of charcoal or bicycles, imprisonment, fines and bribes. While transporters carrying headloads (predominantly female) were subjected to confiscations most often, bicycle transporters (male) risked relatively higher penalties as both their charcoal and bicycles could be confiscated. At the same time, male transporters ferrying charcoal on bicycles are able to make more trips in a day compared to women who carry headloads, hence making significantly higher profits. While our review was unable to locate any study discussing gender dynamics among charcoal traders, Kazimoto (2015) finds women retailers to often operate in proximity of their homestead in order to be able to combine their domestic responsibilities with business activities. In Liberia, FAO (forthcoming) argue that women retailers in particular often lack financial capital to buy or rent storage facilities and are hence often limited to operating with lower volumes while still internalizing storage costs in their purchase prices.

Income

While regional variation exists, studies on charcoal value chains in sub-Saharan Africa tend to generally demonstrate a significant vertical segregation in profits between different nodes. Profits tend to converge around middle-nodes (transport, trade, wholesale) while producers and retailers tend to receive lowest profits (Ouédraogo, 2007;

Kambewa, Mataya, Sichinga, & Johnson, 2007; Brouwer & Magane, 1999). In combination with gender dynamics influencing participation across different nodes, this can result in significant gender-differentiation of returns. In Uganda, for instance, Shively et al. (2010) find (male) large-scale transporters' share of profits to average at 45% (e.g. compared to less than 3% captured by producers). Given the lack of gender-focused value chain studies in the charcoal sector, little is known about possible ways in which gender relations influence relationships between actor categories (e.g. price negotiations). To date, limited data also exists on whether women and men from same actor groups receive similar incomes from engaging in the charcoal value chain (Smith et al., 2017). In Uganda, Shively et al. (2010) find a significant, negative correlation between gender and profits at the production node (statistical significance of 'gender' was not established at other nodes). However, the authors only include 4% female producers in their sample. As discussed above, however, female producers tend to produce less than their male counterparts (see e.g. Herd, 2007; SEI, 2002; Zorrilla-Miras et al., 2018; Ndegwa et al., 2016), sell at local markets for lower prices (Butz 2012) and – in some contexts – face constraints in accessing more profitable markets (e.g. Djoudi & Brockhaus, 2011).

The reviewed studies concur with the bulk of the literature on charcoal value chain, suggesting that participation plays a critical role in both women and men's livelihoods – either as a main income-generating activity or an important source for quick cash. Indeed, our findings suggest that women can be relatively more dependent on charcoal income than men due to having even fewer income sources (e.g. Smith et al., 2017; Butz, 2013; Djoudi & Brockhaus, 2011), suggesting that charcoal production and trade can play an important role in alleviating income poverty particularly in female-headed households. However, our review did not identify any studies providing sex-disaggregated data on long-term effects of charcoal income on poverty. At the same time, Jones et al. (2016) point at a high share of female producers in Mozambique engaging on a casual basis rather than full-time. Considering both material and normative constraints to women's participation discussed in above sections, gender-differentiated production and income levels can reflect discriminatory practices and/or differentiated motivations and priorities. Ultimately, the underlying reasons should be critically analyzed rather than simply assumed.

Socioeconomic and environmental outcomes

While sex-disaggregated data on income use is scarce, Smith et al. (2017) and Butz (2013) find female producers to spend mainly on food and other household expenses, while male producers spend the largest share on assets and agricultural inputs (Smith et al., 2017). In Malawi, Smith et al. (2015) find that all small-scale producers, regardless of gender, spend their income mainly on food. There is considerable amounts of evidence from sub-Saharan Africa demonstrating that such gendered spending patterns tend to reflect socially constructed gender roles and labor division within the household (e.g. Quisumbing, Brown, Feldstein, Haddad, & Peña, 1996; Kennedy & Peters, 1992). Hence, while women's engagement in charcoal production and trade can help enhance household food security, these findings cast some doubt over the catalyzing effect of charcoal income on women's capital accumulation and livelihood diversification. However, in Malawi, some women producers also reported investing charcoal income in small businesses (Smith et al., 2017). Importantly, Jones et al. (2016) and Djoudi and Brockhaus (2011) note that charcoal income can contribute towards female producers' financial autonomy. Brobbery et al. (2019) similarly hypothesize that the involvement of women in charcoal trade can contribute towards raising the status of women in rural households. However, such impacts are likely to depend on local gender norms and household dynamics surrounding charcoal production and financial decision-making. While Jones et al. (2016) noted a relative absence of gendered 'rules' around charcoal production, male outmigration – and the resulting relative absence of men – played a key role in Djoudi and Brockhaus' (2011) case. In Zambia, female producers expressed a sense of pride in being able to do what was previously seen as beyond their capabilities. Most men reported general acceptance of women's involvement in charcoal production, particularly in the absence of alternative livelihood options. However, some men complained charcoal producing women neglected their domestic duties (Ihalainen et al., 2018). In Malawi, Smith et al. (2017) observed that women engaged in charcoal production were derided by the community. The economic benefits from charcoal production hence came at a social cost. In Tanzania, Butz (2012) argues that charcoal production in fact reinforces socioeconomic marginalization, as the activity faces opposition among the Maasai community due to cultural and environmental reasons.

Finally, studies also find that the social and environmental impacts associated with charcoal production can have gendered impacts. In Malawi and Zambia, charcoal production was found to negatively impact the availability of mushrooms, caterpillars and other non-timber forest products (NTFPs) traditionally collected and traded by women (Smith et al., 2017; Mulenga, Richardson, Mapemba, & Tembo, 2011). In Senegal, Ribot (1998) finds that the increased scarcity of NTFPs have increased women's labor burden while in Malawi, Smith et al. (2017) find that the responsibility for firewood collection has shifted from women to men due to reduced availability of firewood in the proximity of homesteads. Particularly where collection, processing and trading of NTFPs is an income-generating activity for women (e.g. Mulenga et al., 2011 on Zambia), such impacts may further limit non-charcoal income-generating opportunities available to women. Ribot (1998) also finds that the increased presence of woodcutters in the forests have increased women's vulnerability to sexual abuse.

Discussion

While robust sex-disaggregated data and thorough gender analyses are scarce in the charcoal value chain literature, the reviewed literature clearly suggests that contrary to conventional assumptions, women are involved throughout the charcoal value chains across Sub-Saharan Africa, including in charcoal production activities. However, the literature does suggest some broad tendencies towards vertical gender segregation in value chains, with men dominating production and transportation while retail is largely female-dominated. Field observations from a few of countries suggest the involvement of both men and women as traders and wholesalers, but systematic, sex-disaggregated data on participation is scarce. The segregation of tasks and levels of participation vary significantly between and even within regions. The literature also confirms that gender roles and relations – in interaction with other contextual factors – influence women and men's participation and outcomes in charcoal value chains. Importantly, gender relations often intimately interact with other aspects of social differentiation – including particularly marriage status and generational aspects (e.g. Fisher, 2004; Butz, 2013; Herd, 2007; Smith et al., 2015), as well as social and economic class (e.g. Djoudi & Brockhaus, 2011). However, while the review confirms the critical importance of addressing gender equality throughout the charcoal value chain, studies applying gender analysis to the charcoal sector are few and mainly focused on production.

Charcoal – a value chain like all others?

Based on the review, gender-specific constraints to equitable participation in charcoal value chains mainly relate to gendered norms and stereotypes around division of labor; unequal access and control over productive resources, and; differences in social and political capital. While this is broadly in line with the general literature on gender and agricultural/forestry value chains (e.g. Ingram et al., 2014; Rubin & Manfre, 2014), the review highlights a few critical issues pertaining

particularly to the charcoal sector, calling for revisiting and adapting the initial conceptual framework presented in Fig. 1. These relate especially to the particular motivations behind women and men's participation; the gendered norms surrounding charcoal; the particular role charcoal income plays in rural livelihoods; the formal and informal regulations often surrounding charcoal production and trade, and; the environmental impacts of charcoal production.

First, the reviewed studies tend to support the notion of women's involvement – particularly in production – as a 'last resort'. The thesis is supported by evidence of women's relatively higher dependence on charcoal income and the disproportionate representation of female heads-of-households among participating women. In addition, a number of papers note the prevalence of negative stigma against women's engagement in charcoal production. Jones et al. (2016) however suggest that women, in the absence of restrictive gender norms, can also engage in production as a form of proactive, occasional income generation. However, while women's participation can – in some contexts – be an indication of increased opportunities for women or more equitable gender norms surrounding charcoal production (e.g. Wooten, 2003; Jones et al., 2016), the majority of the reviewed literature would rather suggest that their participation has more to do with poverty and lack of alternatives. As research on a number of forest products in Africa (see e.g. Ingram et al., 2014 on the Congo Basin) has cautioned for an increased risk for male-appropriation of value chains as their profitability increases, future research should also assess if and how gender norms around charcoal evolve along with broader shifts in demand.

At the same time, a few of the reviewed studies suggest that female producers tend to produce less than their male counterparts, while charcoal makes up a higher share of female producers' total income. As discussed earlier, gender dynamics are likely to influence individuals' reasons and opportunities to engaging in charcoal production as well as the barriers they face. While Jones et al. (2016) suggest that the scale of charcoal production cannot be divorced from the motivation behind its production (Jones et al., 2016, 12), more research is needed to understand to what extent both aspirational and constraining factors influence gender differences in production. Further, while charcoal production can often take the shape of a family business with labor contributions from women and men (Ruuska, 2012), more work needs to be done on illuminating the gender dynamics of labor and benefits in relation to the broader household livelihood portfolio. While less work has been done on identifying the motivations of urban-based charcoal traders and retailers, the decision to engage in trading charcoal – as opposed to any other product – is likely largely driven by an assessment of costs and benefits rather than by necessity.

Second and relatedly, a number of scholars have noted that a large majority of charcoal producers engage in the activity casually, rather than on full-time basis. Charcoal income often plays a critical role particularly to rural communities, as a safety net against poor yields and sudden shocks or a source of quick cash for meeting larger expenses (Schure et al., 2014). In line with broader literature on household spending in Sub-Saharan Africa (Quisumbing et al., 1996), our review suggests that female charcoal producers tend to spend a higher proportion of charcoal income on food and household expenses, while men spend more on assets and invest in alternative income-generating activities. Similarly, Smith et al. (2017) find women's charcoal production to peak during months when food insecurity is highest and when school fee payments are due. The ability of rural women to engage in charcoal production can thus be particularly critical in order to maintain the food security and wellbeing of rural households – particularly female-headed households – in times of duress. Importantly, barriers to women's participation and benefits may have disproportionate welfare impacts, particularly given the high numbers of female heads-of-households among producers. At the same time, the review provides inconclusive evidence on the role of charcoal in enabling women to diversify their livelihood portfolios or move into other income-generating activities. While a few papers note that women are feeling a sense of pride in proving they can 'do anything a man can do' (e.g. Delahunty-Pike, 2012) and indeed gaining a degree of financial independence (Jones et al., 2016), the potential for charcoal production to help propel a transformation of unequal economic and social relations between men and women requires further investigation.

Third, charcoal production and trade is under some form of regulations in most countries in Sub-Saharan Africa (Sola et al., 2019). Participation, then, may entail both formal and informal costs and/or risks associated with illegal or informal activities. The review suggests that gender inequalities limiting women's access to productive resources, control over household finances, political connections and mobility may render women producers and retailers particularly constrained in their abilities to comply with formal charcoal regulations. At the same time, some studies suggest that women may be more vulnerable to - or averse of - risks associated with informal or illegal activities, and/or are more likely to lack the financial and social capital required for maneuvering such systems. Alongside profit maximization, then, the nature and extent of women and men's engagement in the charcoal value chain is likely to be influenced by the particular risks and costs associated with participation under a given governance system. Indeed, the reviewed papers highlight significant barriers to equitable participation arising under both formal and informal regimes, suggesting that more attention needs to be devoted to identifying and designing governance arrangements that are adapted to the differentiated needs and aspirations of different groups of women and men across the value chain. Such efforts need to also pay attention to gendered barriers to value chain upgrading discussed throughout this paper. Policy changes that directly or indirectly increase operational costs may work to disproportionately marginalize female actors at both ends of the value chain, as various gender inequalities have been shown to often constrain women's abilities to increase profits through increasing production/sales volumes and accessing better markets.

Further, as noted by a number of scholars, the informal sector in which the charcoal value chain is often situated combined with inconsistent or inadequate regulatory framework, provides an opportunity for financially or politically powerful groups and individuals to exert power over weaker, more marginalized value chain actors (Schure, Ingram, Sakho-Jimbira, Levang, & Wiersum, 2013). Depending on the regulatory context, such power asymmetries have been found to allow stronger actors to push e.g. formal and informal costs to weaker actors – both up- and downstream (Ribot, 1998). While our review suggests that gender inequalities contribute to further marginalization of women among generally less powerful nodes (production, small-scale transport, retail), a few studies also suggest considerable participation of women among large-scale traders. However, few studies adopted a gender focus on traders or investigated the influence of gender in structuring vertical relations.

Fourth, charcoal production often has a significant environmental impact – the effects of which are often borne disproportionately by women (e.g. Mulenga et al., 2011). Scholars have highlighted ways in which deforestation and degradation associated with charcoal production can negatively impact women's income generating opportunities and increase their reproductive labor burden, through decreasing the availability of firewood and other non-timber forest products (e.g. Smith et al., 2017; Mulenga et al., 2011). As women's alternative income sources are reduced as an outcome of charcoal production, more women may hence be pushed towards engaging in charcoal production themselves. At the same time, as trees become scarce and production sites move further from villages, opportunities for participation can become increasingly unattainable due to restrictive gender norms and conflicting reproductive responsibilities.

Placing gender at the core of charcoal value chain analysis

Given the important role charcoal income plays in the livelihood strategies of women and men across Sub-Saharan Africa, identifying

and addressing the many gendered barriers to equal participation and benefits must be considered a key priority to charcoal value chain policies and interventions. Findings on women's motivations for engaging – particularly in production – however suggest that such efforts should be complemented with analyses and interventions aimed at addressing the root causes and inequalities that are increasingly pushing women into the charcoal sector. In combination with the numerous gendered challenges faced by women participating in – and benefitting from – activities across the chain, as well as the inconclusive evidence on the broader gender-transformative potential of participation, these findings support cautioning against assuming a simplistic win-win relationship between value chain engagement and gender equality (e.g. Chant & Sweetman, 2012; McCarthy, 2010; Stoian et al., 2018). In line with Bolwig et al. (2010), Mayoux and Mackie (2007) and others, our review also suggests that the extent and nature of different groups of women and men is often influenced by weighing profits against both financial and social costs and risks. Importantly, such dynamics are often influenced by other intersecting social variables. For instance, negative stigma may be particularly penalizing towards young or married women. Female heads-of-household, on the other hand, may be less inclined to participate in activities involving risks of being arrested or fined, due to their relatively higher dependence on charcoal income and greater domestic responsibilities. Instead of assuming value chain engagement to be solely driven by profit maximization, charcoal value chain studies hence need to pay close attention to 1) the conditions under which women and men participate, 2) the various social, political and financial constraints they face, and 3) the ways in which their aspirations and constraints influence their preferred level of engagement (see Fig. 2. Adapted conceptual framework for addressing gender equity in charcoal value chains).

Importantly, our review also suggests that the influence of gender goes beyond structuring socioeconomic outcomes of value chain engagement. Indeed, gender relations, in combination with various contextual factors, can also play a key role in structuring the geographical scope, efficiency and sustainability of the value chain. For instance, our review suggests that women's participation may be more likely where there is absence of gender norms around charcoal production; where entry costs and risks of negative enforcements are limited; where resources/markets can easily be accessed, and; where participation is not premised on strong vertical or political networks. Indeed, such conditions may be more likely to be met in more localized, sub-regional value chains or more peripheral markets However, our findings suggest that the over-emphasis among scholars and policy debates on major value chains serving large urban centers (Smith et al., 2017) may in fact serve to downplay women's relative participation and gender inequalities in the charcoal sector. Given the critical importance of charcoal as part of both women and men's livelihoods, such omissions may hide the necessity to research and address gender issues at various points of the value chain.

Further, gender relations and inequalities may also impact the efficiency and sustainability of the value chain. For instance, due to a lack of access to tools and labor, women in some contexts were found to use smaller kilns and use less efficient methods for sourcing trees. While our review did not find any paper specifically directly assessing the relationship between gender relations and environmental sustainability, a study on mangrove in Cameroon finds that women's harvesting practices had a relatively higher environmental impact when compared to their male counterparts. This was primarily attributed to women's use of more basic /rudimentary tools, harvesting smaller, younger tree stems close to their homestead (Feka et al., 2011). One of the reviewed studies also suggests that female producers' lower production volumes may correlate with their relative underrepresentation in producer groups (Puentes-Rodriguez et al., 2017). Where production licenses, capacity building or extension services are channeled through producer groups, the underrepresentation of women in such groups may further exacerbate such differences. Due to inequalities in terms of accessing transport vehicles, our review also suggests that female transporters ferry fewer bags per trip, while unequal access to finances

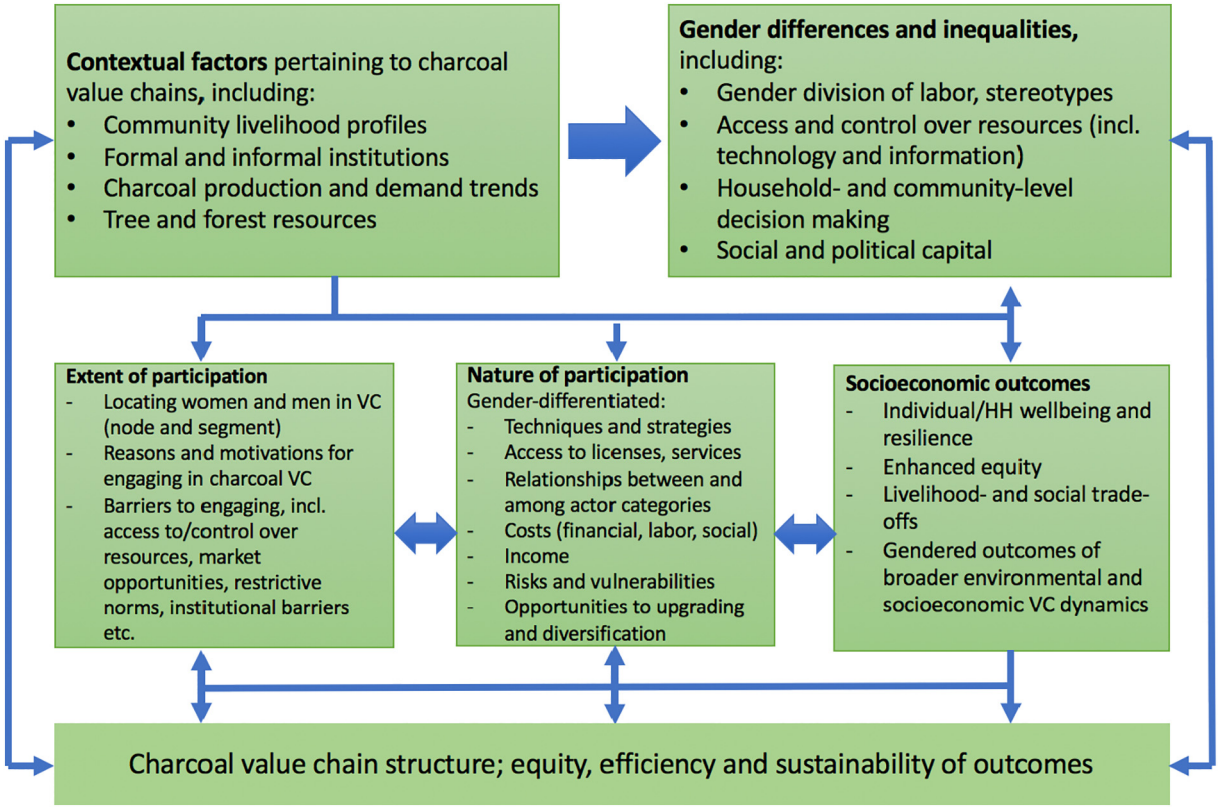

Fig. 2. Adapted conceptual framework for addressing gender equity in charcoal value chains.

limit female retailers' abilities to store and bulk. Finally, while beyond the scope of our review, scholars have also found women to be less likely than men to plant or restore tree resources in contexts where they lack sufficient land rights or labor resources (Kiptot & Franzel, 2012). At the same time, studies also find the opposite to be true when women's resource rights are strengthened (Quisumbing & Kumar, 2014, Coleman and Mwangi, 2015). These findings suggest that gender relations and inequalities along and around the value chain may influence the environmental impacts of value chain activities. Addressing inequalities along and surrounding the value chain need hence not only be considered in terms of enabling more equitable socio-economic outcomes, but also as a core part of efforts aimed at enhancing the sustainability of the chain. At the same time, women with limited access to or command over economic resources may create or take up activities overlooked or neglected by other value chain actors, such as repacking charcoal into smaller bags in order to cater to more marginal markets and segments. Similarly, women pooling labor and resources or hiring male youth in order to overcome physical constraints may introduce new forms of enterprises and jobs in the value chain. Collecting sex-disaggregated data and incorporating gender analysis is thus vital to any charcoal value chain analyses seeking to identify and understand factors influencing the territorial and institutional configuration, resource flows and distribution, as well as socioeconomic and environmental outcomes of the value chain.

A conceptual framework for addressing gender in future research on charcoal value chains

Based on our review and the above discussion, we devised a conceptual framework (Fig. 2.) to help guide future research on gender and charcoal value chains. The framework aims to map out a range of entry points for both quantitative and qualitative gender analysis across the charcoal value chain, as well as suggest potential explanatory factors to observed gender differences. The framework attempts to illustrate the ways in which: 1) gender roles and relations – in combination with a number of contextual factors – influence women and men's motivations and opportunities to participate, as well as costs and benefits associated with their participation; 2) gender differences and inequalities in the value chain influence the very structure, efficiency and sustainability of the value chain; 3) broader gendered norms and relations influence the gender-transformational potential of value chain participation; 4) gender relations may influence women and men's preferences and opportunities to upgrading. The framework points at the importance of a multi-level analysis, ranging from women and men's decision-making power at household level to community-level institutions and norms as well as legal frameworks.

Conclusions

This review set out to interrogate the gender dynamics of participation and benefits across charcoal value chains in Sub-Saharan Africa. The review finds support for women's participation throughout value chains, thereby contrasting conventional views of charcoal as a male activity. However, while dynamics change between different contexts, women's participation tends to be significantly higher in retail, while women tend to constitute a minority in other nodes – often joining the sector in the absence of alternative livelihood opportunities. The review also finds that gender differences exist across various nodes in terms of the scope, nature and outcomes of women and men's involvement. While significant regional differences exist, our study finds that participation and outcomes tend to generally be influenced by gender differences and inequalities in: 1) access to and control over productive resources and income; 2) social and political capital, and; 3) gender roles and responsibilities. Importantly, other factors, such as generation, marital status, wealth and social class, often intersect with gender in influencing such dynamics. These gender dynamics constitute both the social context in which the value chain operates, as well as influence the internal functions and power dynamics of the value chain. At the same time, gender relations are also influenced by – and may themselves influence – the political, economic and environmental features and impacts of the value chain.

Despite the critical importance of seriously considering gender issues in research and policy-making in the charcoal sector, the review has also pointed out a number of critical data gaps. First, we find that there is a lack of robust sex-disaggregated data on participation in the charcoal sector in Sub-Saharan Africa. Second, we find that studies exploring the gender dynamics in the charcoal sector are few, particularly in downstream nodes where women's participation is often higher. Out of the papers reporting on gender differences in participation, only few use gender analysis to explain the observed differences. Third, we find that the complex institutional configurations, environmental impacts, social norms and power relations surrounding the charcoal sector in Sub-Saharan Africa raise a number of gender-specific questions and concerns, which – while deserving deliberate focus – have remained understudied. This study proposes a framework to assist future work in addressing these critical research gaps. Critically, in addition to exploring the gender relations within the value chain, the framework recognizes the need to devote more focus to systematically assess ways in which the broader regulatory/institutional, economic and sociocultural context intersects with gender relations in structuring the extent and nature of women and men's participation. In order to feed into policy debates and help counteract women's marginalization. Such studies need to also identify gendered barriers to complying with regulations and to upgrading their operations to enhance returns and/or mitigating risks.

Declaration of competing interest

The authors declare no conflict of interest.

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