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Abstract

This paper contributes to the literature on private sector adaptation by empirically exploring how female-led micro, small and medium enterprise (MSMEs) in Kenya's semi-arid lands (SALs) experience and respond to climate risk. The paper argues that strong socio-cultural orientations around gender roles and resource use and access, not only confine female-led MSMEs to sectors that experience higher exposure to climate risk – most notably agriculture – but also trigger more pronounced barriers to building resilience within their businesses, including reduced access to land, capital, markets, new technology and educational opportunities. Faced by these barriers, female entrepreneurs may pursue unsustainable forms of coping, as part of which business activity is scaled back through reduced profits, loss of business and the sale of valuable business assets. Such strategies may help enterprises to cope in the short term, but may undermine longer term MSME adaptive capacity. Social networks, such as women's groups and table banking initiatives, appear to be crucial adaptation tools. Additionally, a strong dependency exists between household resilience and business resilience, implying that building resilience at the household level could support adaptive capacity among female-led MSMEs. Supporting the adaptive capacity of women in business should be a policy priority.

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Introduction

The private sector is increasingly gaining attention as a means of furthering global climate change mitigation and adaptation responses. 'The private sector for adaptation' (Pauw and Pegels, 2013: 258), is often afforded greatest attention, as national and international governance fora look to the private sector as a means of harnessing resources, especially in pursuit of low carbon development. In this paper, however, we focus on what Pauw & Pegels label 'domestic private sector adaptation': The processes through which firms institute strategies to manage climate risk within their own operations. Within domestic private sector adaptation, we focus specifically on private sector adaptation among micro, small and medium enterprise (MSME) in SALs.

There are several reasons for adopting this focus. Firstly, 'the private sector' constitutes a wide-ranging term that covers all types of formal and informal businesses, ranging from micro enterprises, such as local entrepreneurs and smallholder farmers, through to multinational companies operating at global scales. As well as focusing primarily on companies based in developed countries, as noted by Crick et al., (2018) the private sector adaptation literature has, to date, tended to focus on larger sized companies (Pricewaterhouse Coopers (PWC), 2010; Tompkins and Eakin, 2012; Averchenkova et al., 2016). Yet adaptive capacity varies widely, being intimately connected with wider social vulnerabilities and heavily constrained by local institutional, regulatory, infrastructural and technological conditions (Ackerman, Kozul-Wright and Vos, 2012). As a result, it is important to disaggregate the private sector when considering adaptation (Crick, Gannon, et al., 2018).

We focus on adaptation among MSMEs, since MSMEs are considered highly vulnerable to climate change, to be among the most affected by extreme weather events and to typically have low adaptive capacity (Wedawatta, Ingirige and Amaratunga, 2010; Crick, Gannon, et al., 2018). Yet MSMEs form a critical part of developing country economies. Accounting for about 80% of total employment (Dougherty-Choux et al., 2015), they provide most livelihood opportunities in sub-Saharan Africa (SSA). Further, MSMEs are considered to be fundamental to more inclusive and equitable development, since they are strongly integrated into communities and hold the potential to make an important contribution to female employment and the social integration of marginalized groups (Crick, Gannon, et al., 2018). MSMEs are also seen as important drivers for societal adaptation and for realising the opportunities of climate change.

Our research focus on MSMEs in Kenya's semi-arid lands (SALs) stems from the recognition that SALs in developing countries, are climate change 'hot spots'; areas where climate change is already having significant and documented impacts, such as longer and more frequent droughts. The IPCC's Fifth Assessment report (IPCC, 2014) has recognized SALs as among the areas that are especially vulnerable to the impacts of climate change. Indeed, in what has been described as the 'triple whammy' of semi-arid regions (Mountfort, 2015), in SALs this high exposure to climate risk is often coupled with lack of development, including poor infrastructure, poor access to markets, and high levels of poverty (De Souza et al., 2015; Tucker et al., 2015; Jobbins et al., 2016; Gannon et al., 2018). An estimated 2 billion people live in the world's drylands; 90% of which live in developing countries (FAO, 2016). The livelihood challenges faced in SALs will be further exacerbated by anthropogenic climate change, so, if implementation of the 2030 Agenda for Sustainable Development is to

fulfil its commitment to 'leave no one behind', the need to identify routes to supporting adaptation and climate resilient development in these areas is especially pressing.

This paper further narrows its focus to give consideration to the ways in which female-owned MSMEs experience and respond to climate risks in SALs. Literature emphasizes that climate change impacts the activities of social groups differently, based on social relations that define roles and access to resources for adaptation and which shape overall adaptive capacity (Agrawal, 2011; Nyukuri, 2016; Omolo, Mafongoya and Ngesa, 2017). These differences have emerged and manifest in the context of established gender roles that often shape what women and men, in different social contexts, are allowed, able, or expected to do, or access.

Female owned MSMEs are increasingly recognized as key in promoting resilience at micro (e.g. household level) and macro scales. In literature that considers female contributions to entrepreneurship, a number of studies indicate that, due to their strategic position in families, women often more efficiently allocate returns from MSMEs to the most critical household assets, including health, education and food security, which themselves shape and enable household and business adaptive capacity (Nichter and Goldmark, 2009; Terry, 2009). Another study suggests that women involved in entrepreneurship activities make relatively higher contributions to family and social welfare than men (Minniti, 2010). In recognition of this strategic role, promotion of female entrepreneurship, through advocacy and micro-credit facilities, is often promoted as a tool through which to not only empower women, but also to address broader poverty reduction and development agendas as well (Kevane and Wydick, 2001). Nevertheless, while a significant body work has already accumulated on women's contribution to entrepreneurship and vulnerability to climate change (Bardasi, Blackden and Guzman, 2007; Terry, 2009), little research or policy attention has been given to exploring how female-led MSMEs experience climate risks – or to identifying options for adaptation.

This paper contributes to addressing this knowledge gap by exploring how female-owned MSMEs in Kenya's SALs respond to climate risks, as well as the roles, resources and entitlements that female-headed MSMEs draw on to enable these responses. It does this with the aim of identifying factors within MSMEs and within MSME business environments that both enable and constrain female experience of MSME adaptive capacity. Given that adaptation is contextually bound and situated, this paper explores these questions through a case study of the semi-arid county of Narok. Situated in the Kenya's Rift Valley, Narok is less than 150kms from Nairobi.

The rest of this paper is organized in a further six sections. The next section provides an overview of methods. The paper then provides a brief overview of the fieldsite, reflecting on general challenges for private sector adaptation in Kenya's SALs. Drawing on empirical research in Narok, it then considers experience of climate risk among female-led MSMEs in Kenya's SALs and the way in which female-led MSMEs respond to climate risk. We then offer insights on some of the challenges to adaptation and climate resilient business development in female-led MSMEs in the hope of identifying priority areas for addressing the broader structural deficits that condition female vulnerability to climate change and barriers that limit adaptive capacity among female entrepreneurs in SALs. Ultimately this paper is going to argue that strong socio-cultural orientations around gender roles and resource use and access,

not only confine female-led MSMEs to sectors – most notably agriculture – that experience higher exposure to climate risk. But it is also going to provide evidence to suggest that women in Kenya’s SALs face additional, and more pronounced, barriers to building resilience within their business activities.

Data collection methods

The first stage of this research involved review of academic and policy literature on female enterprise and private sector adaptation in SALs. The documents were identified through key word searches in databases including Google Scholar and Science Direct. The contents of the documents were coded into various thematic areas around gender roles, representations, and entitlements, among others. Relevant policy documents were also scoped from government archives, with specific attention given to documents outlining climate change response strategies enshrined in climate change papers such as the National Climate Change Action Plan, Kenya’s Nationally Determined Contributions and the Climate Change Act, as well as to MSME-related interventions, such as those relating to environmental and social safeguards underpinning the operations of MSMEs. These documents were also analysed and incorporated into the coding frame. In line with the research questions, the review focused on the role of women in MSMEs, including within Kenya and within SALs specifically, and sought to identify some of the formal and informal structural challenges female-led MSMEs face, as well as options to address these structural challenges and to enhance adaptive capacity.

Literature review was then supplemented by ethnographic fieldwork involving focus group discussions and key informant interviews in Narok county. The focus group discussions took the form of a one-day, in-depth workshop with 17 female entrepreneurs drawn from the three constituencies of Narok county. About two thirds of the participants were involved in agricultural enterprises, including both livestock and crops, while the one third were engaged in non-agricultural MSMEs, such as running a tailoring shop and small construction companies and restaurants within Narok town. The full-day meeting was held at the Maralink Hotel in Narok. The discussions were structured around three main components.

Firstly, to gain insight into the broader conditions in which female entrepreneurship operates in Narok, in plenary, open lines of questioning were pursued (Krueger and Casey, 2000; Johnson and Weller, 2001). Participants were asked to outline their business journeys and reveal moments of change when their MSMEs experienced particular growth, stagnation or even diminishing returns, either due to climatic or non-climatic drivers. They were then asked to reflect specifically on how this business journey may have been shaped by their identity as a female-led business. Since researchers sought to gain an understanding of participant’s engagement with climate risk within their own frame of reference, participants were then engaged more directly, but in as neutral a format as possible, in discussions about how climate impacts their MSMEs.

Participants were then divided into three groups of 6 women, to each discuss specific issues that had arisen in plenary, pertaining to how their businesses respond to climate pressures – as well as to discuss some of the challenges (including financial, technological, institutional, cultural, etc.) they face to managing risk within their business. In these discussions participants were also encouraged to explore

opportunities for building the adaptive capacity of MSMEs, including ideas for potential policy options. These smaller, break-out groups offered participants the opportunity to provide more in-depth accounts of their experiences than the plenary setting had permitted. The final session of the day involved presentations and discussions where each small group presented their findings and allowed the wider audience to verify, elucidate and interrogate their insights. This combination of break-out and plenary approaches proved a useful means of stimulating discussions and triangulating various insights.

Five purposively sampled key informants, with different positions of experience and oversight with respect to female-led MSME activities and management, were also engaged in semi-structured interviews. Three informants were women involved in running both agricultural and non-agricultural MSMEs, while one was a male respondent involved in managing bee keeping cooperatives in Narok that incorporate female-led bee-keeping businesses. The fifth informant was a policy maker. More open lines of questioning were pursued first, with the interview protocol then prompting for insights on enablers, barriers and opportunities for female-led MSMEs.

A one-day stakeholder workshop in Narok was also held, in which thirty stakeholders including county government, development NGO, microfinance and various microenterprises representatives participated. One third of the workshop participants were female, while the others were male. This workshop had a broad remit, including to raise awareness of the Pathways to Resilience in Semi Arid Economies (PRISE) project and to identify potential partnerships. However, this workshop also generated further insights around how MSMEs in Narok experience climate risk and around enabling adaptation for female-led MSMEs. The workshop also served as a useful forum for triangulation, as it involved discussion of preliminary findings from the focus group discussions and interviews. It thus served as a useful tool to explore broader implications of our findings for a wider range of actors in Narok county, as well as elsewhere.

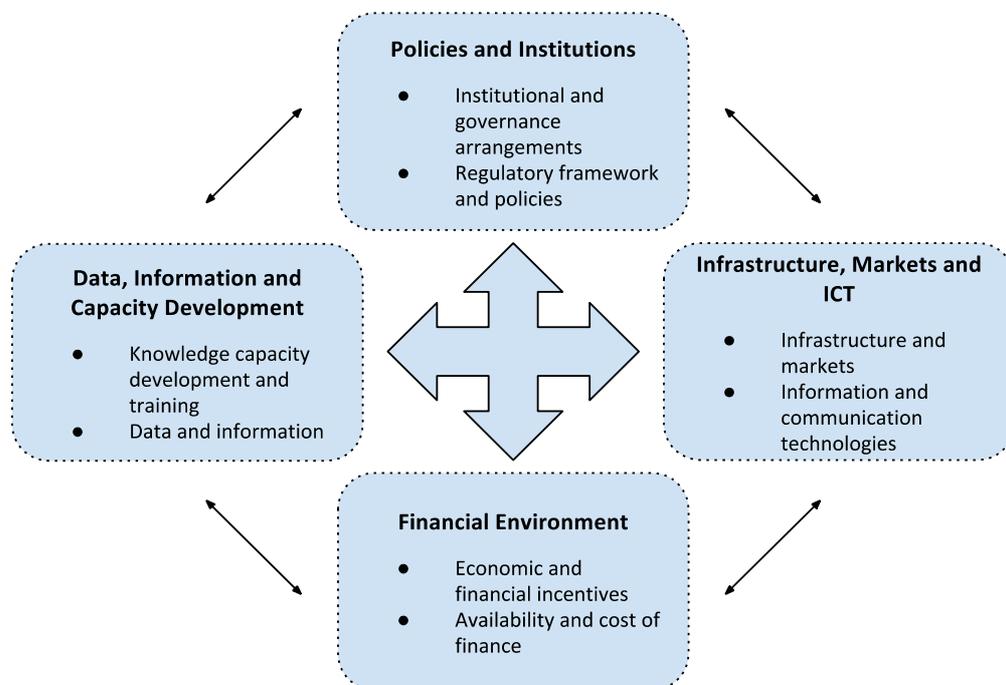
Results

Private sector adaptation in Kenya's SALs

Eighty percent of Kenya's terrestrial land is classified as arid or semi-arid, receiving less than 500mm of rainfall per year (Atela, Quinn and Minang, 2014). Kenya's arid and semi-arid lands are home to over 10 million people whose livelihoods are widely dependent on natural resources and associated enterprises. Agriculture (both livestock and crops) and tourism are key sectors in the national economy (Republic of Kenya, 2010a) and arid and semi-arid economies make important contributions to both of these sectors. Pastoralists in Kenya's arid and semi-arid areas contribute about 70% of Kenya's livestock (Ole Riamit, 2010) and host most of the country's wildlife conservancies, such as the Tsavo national park and Maasai game reserve, which are important sources of tourist revenue to both local and national economies. As is characteristic of semi-arid regions (Wade, Touré and Diop, 2015), Kenya's SALs experience high rainfall variability. Thus, this high social and economic dependence on natural resources, means SALs in Kenya face great vulnerability to climate risk. In Kenya this manifests in cycles of drought and hunger, occurring with seemingly increasing frequency (Republic of Kenya, 2010a).

MSME adaptive capacity – the ability of businesses to adapt to this exposure, to minimize its adverse impacts and to take advantage of new opportunities (c.f. Adger, Arnell and Tompkins, 2005) – is shaped and constrained by diverse social, political and economic processes (Smit and Wandel, 2006), including local socio-cultural circumstances, policies and market arrangements. Recent literature has sought to identify routes to enabling MSMEs to cope with the heightened exposure to climate risk that they will face in areas such as SALs. This literature has highlighted, for example, the need for enabling policies, and an institutional environment that supports individual participants in the private sector (Stenek, Amado and Greenall, 2013; Trabacchi and Stadelmann, 2013; Pauw, 2015; Crick, Gannon, et al., 2018). It has also highlighted the need for climate information, sensible regulatory structures and economic incentives (IFC, 2010; Biagini and Miller, 2013). Also focusing on MSMEs, Crick et al., (2018) seek to synthesise literatures on private sector adaptation and private sector development into a coherent framework to identify ‘building blocks’ of an enabling environment for private sector adaptation and climate resilient development, and to assist in the identification of gaps in enabling conditions for policy intervention. The resulting framework is structured around four interlinked pillars: Policies and institutions; Infrastructure and markets; Financial environment; Information and capabilities (see figure 1).

Figure 1: Core elements of an enabling environment for private sector adaptation and interlinkages across elements



Source: Crick et al., 2018.

The four pillars of Crick et al.'s framework for enabling private sector adaptation can ultimately work to promote or constrain the adaptive capacity of enterprises and, when qualitatively evaluated against Crick et al.'s framework, Kenya as a whole is found to lack many of the conditions that support private sector adaptation (Crick et al., 2016). Key gaps surround the availability and use of data and information, capacity development and training activities and the financial environment. MSMEs in Kenya's SALs are further constrained by limited infrastructure and market development, leading to weak inter-firm linkages and restricted access to new technologies. MSMEs in SALs experience these constraints to their business development and adaptive capacity, regardless of gender. But there is evidence to suggest that some constraints, including access to finance and training opportunities affect female-owned enterprises more severely (Brindley, 2005; Singh and Belwal, 2008; Welsh et al., 2013).

Exposure to climate risk among female-led MSMEs in Narok, Kenya

Literature suggests that the majority of female entrepreneurs in SSA are confined to micro-enterprises, in the informal sector, with limited growth potential (Bardasi, Blackden and Guzman, 2007). It also suggests that female-owned enterprise tends to be concentrated in economic sectors such as agriculture and agricultural processing, which typically require less capital for participation (Bardasi, Blackden and Guzman, 2007; International Labour Organisation, 2015). Our research in Narok reflects these findings, suggesting that most women in Kenya's SALs are confined to agriculture based MSMEs – often involving small scale trade in cereal, milk and poultry products. Through extreme temperatures, high rainfall variability and fluctuations in natural capital, such as grazing and water resources – which may become scarce, unavailable or reprioritized for immediate livelihood needs at times of climate stress – these industries are highly exposed to the effects of climate change.

In the face of this exposure, our focus group participants often linked climate impacts, such as drought and climate-related livestock disease, to losses to their business assets and to reduced growth for their businesses. For example, respondents described drought conditions resulting in loss of livestock products emanating from, low or zero birth rates, reduced production of milk and diminishing market value of animals as a result of weight loss (c.f. McPeak and Barrett, 2001). Reflecting interactions and co-dependencies surrounding resilience within households and businesses in SALs, livestock is not simply a business asset to MSMEs in Narok. Rather it also represents a source of protein, income, savings, security and social status. To lose animals through droughts, therefore, may well represent an economic and social disaster at the household level. Similar challenges occur in relation to lost crops. And, furthermore, because most female-owned businesses around Narok town rely on customers and raw materials from the surrounding areas, participants emphasized that times of reduced productivity, supply chain disruption and agricultural income, coupled with the subsequent reduction in the purchasing power of farmers, also strongly impact non-agricultural MSMEs.

Respondents additionally highlighted that conflict around scarce water and grazing resources at times of drought has resulted in further insecurity in agricultural MSMEs in Narok and placed stress on livelihoods in SALs more broadly. Respondents also reflected that at times of drought, due to vulnerability and hunger, men in Narok – who generally control land resources – often resort to selling off land at 'crisis' values, significantly below the actual value of the lands. MSMEs led by women, can be

significantly affected by such coping strategies, since the money received from land sales is rarely invested into female enterprise and land disposal means that land can no longer be used for farming, or as security to access credit from microfinance institutions. Extreme flooding events have also been witnessed in Narok in the recent past, which participants linked to extensive loss and damage through destruction of transport links – limiting the timely transportation of often perishable goods – and of premises within which business assets, stock and produce were stored.

Ways in which female-led MSMEs in Narok respond to climate risks

Literature on private sector adaptation distinguishes between sustainable forms of adaptation, such as taking out insurance, which seek to maintain business operations at existing levels, and unsustainable coping strategies, such as the distress sale of assets, as part of which business activity is scaled back (Crick, Eskander, et al., 2018). Despite being generally aware of and experiencing climate risk, female MSME owners interviewed in Narok broadly perceived limited adaptation options to be available for their businesses and often described dependency on unsustainable coping strategies at times of climate stress. Respondents, indicated that one main way of responding to climate pressures involved stock reduction at times of water scarcity, to preserve resources and reduce the risk of losses. In response to reduced water availability, tomato traders from Narok South, for example, described reducing their risk of loss and damage by reducing the amount of land under production, so as to limit the area of land in need of irrigation. Yet while such strategies may help businesses to cope in the short term, they do nothing to help build longer term MSME adaptive capacity. Indeed, over time reducing stocks and production may prove counter-productive, as the resulting loss in profits and business that such down-scaling presents may limit the resources that women have available to help them to cope with future climate change impacts – presenting potential longer-term implications for broader household resilience.

At other times, female entrepreneurs we spoke to noted that reducing stocks resulted in reduced profits to an extent that sometimes women may close, or diversify, their businesses, to pursue alternative livelihood options. One major diversification option reported by participants is the charcoal business, in which women engage in charcoal burning, or buy charcoal from charcoal burners, for sale in Narok town. Indeed, our research suggested that women involved in agricultural MSMEs often diversify or shift towards charcoal-based enterprise, believing this to be a livelihood strategy that is less strongly affected by climatic variables. Yet, while providing a short-term coping strategy, charcoal production may also weaken longer term resilience by destroying vegetation, exposing agricultural land to erosion and further diminishing productivity, leading to loss of biodiversity. Reflecting this trend, studies indicate that Kenya's arid and semi-arid areas are now frontiers of deforestation and charcoal production, as demand for charcoal has increased and humid forests have become restricted as 'water towers' for national economic interests (e.g. Republic of Kenya, 2013).

'I am part of a women's group in Narok West involved in tomato production for sale to various institutions and customers in Narok. However, due to drought that happened in the last two years, it has become very difficult to maintain production of tomatoes because of water problems. Most of us have therefore abandoned tomato production and businesses and engage in charcoal burning and trade which has ready markets from hotels and restaurants serving

tourists visiting Maasai Mara Game Park. Through the sale of charcoal, I have managed to buy a motorbike to ease the distribution of charcoal and tomato products to the market'

- Female entrepreneur, Narok May 2017.

Another coping strategy employed in Narok, pertains to land sales, as referenced above. Sale of land is a thriving business in Narok town, with immigrants into the Narok area providing a ready market for land. Participants argued that proceeds from these sales could usefully support their businesses against climatic risk, providing a boost of funds to female-led businesses and even helping them to secure access to other adaptation options and safety nets, such as insurance schemes. However, participants highlighted that the ability of women to benefit from the proceeds of land sales typically depends on the willingness of the male members of their family – who are generally the custodians of the land – to share the proceeds to support female-led businesses. In cases when the participants in our research had benefited from these proceeds, they described having had to negotiate with men to secure this access, at times committing to sharing business proceeds with their husbands. But these women were the exception as, in most cases, female-led MSMEs were said to not receive any direct impact from the sale of land. Sometimes women felt they benefitted indirectly from these sales if the men in their families used some of the proceeds from land sales to purchase food and other basic household items. In such circumstances, female entrepreneurs described a reduced emotional burden, due to the temporarily reduced dependency on their own enterprise to support household needs.

Although family land is predominantly held by men, land disposal remains salient to female entrepreneur's adaptive capacity more broadly, since participants highlighted that their businesses may benefit informally from land and livestock assets. Most participants, for example, reported using land and livestock as informal security for their MSMEs, especially when seeking to access credit from family networks, or from women's group initiatives, such as table banking groups. A number of participants indicated that following recent flooding events, which resulted in destruction of business premises and assets in Narok, female entrepreneurs, including those running small restaurants and tailoring stalls, were able to access capital support from family networks and table banking groups based on the availability of family land as security. But land disposal as an adaptation strategy depletes the resources available for enterprises to protect themselves against future climate risk, thus when land has been sold, the ability of female entrepreneurs to access these informal benefits of land ownership may be lost.

Overall, adaptation behaviours highlighted by participants were largely localized, with participants identifying very limited opportunities for adaptation beyond their immediate environments. Reflecting uptake trends in SSA more broadly (Mahul and Stutley, 2010; Crick, Eskander, et al., 2018), when pressed, the female entrepreneurs we spoke to perceived very limited capability currently for their businesses to access sustainable adaptation strategies, such as business and climate insurance products and other savings safety nets. Typically facing structural exclusion from more formal savings mechanisms, respondents from both agricultural and non-agricultural MSMEs highlighted that they sometimes hoard maize during high harvest seasons for sale during extreme climatic events such as drought. This hoarding of cereals – which is the main staple food in Narok – respondents suggested allows them to fetch higher prices

and returns during climatic extremes, which they characterized as instrumental in cushioning the impacts of adverse climatic conditions.

Participants also highlighted the importance of formal and informal support networks, such as women's groups, in supporting female entrepreneurs in the face of the multiple and concurrent social and economic challenges they experience. Wider literature has suggested that social networking remains a major adaptation tool for women both in rural and urban areas, as women often come together in groups to share and support each other (Atela, 2012). A key example of these networks in Narok manifests in 'merry go round' and table banking initiatives, which bring groups of women together to save and lend money amongst themselves. In table banking, women make collective savings through which they are able to earn interest and access credit to invest in their MSMEs. Participants suggested these networks were an important means of accessing cash for business and household needs. However, most participants felt that money from table banking was not adequate to protect businesses from the impacts of climate extremes; not least because, given the temporally bound nature of climate shocks, resources may be required by businesses concurrently.

Table banking and other women's groups may also undertake a range of other activities with potential to increase the resilience of MSMEs, such as the group purchase of inputs (e.g. drought-resilient seeds) and initiating cooperatives and other common pool resource management initiatives, such as reforestation/afforestation, and greenhouse farming. They may also provide a forum for knowledge sharing and technology demonstration. Women's groups were an important forum for initiating diversification into beekeeping enterprise and the development of beekeeping cooperatives in Narok. The Kenya Hives Limited partnership, for example, develops market linkages and provides capacity building services around bee-hive management and harvest quality to bee-keeping entrepreneurs in the Narok region. Reflecting on this partnership, respondents suggested that implementation of new bee-keeping technologies, often requires approval from men who control land resources and suggested women therefore typically find it difficult to access new bee keeping technologies. Nevertheless, they offered examples where women in the partnership have broken through these cultural barriers and have been able to access and utilise modern hives, which, since they can be shifted from one geographical region to another, are more responsive to climate hazards. Participants detailed that these women have been able to increase their honey production and sales in the face of climate change and are now major suppliers of honey in Narok and its environs. The women that have achieved this business success in honey production, participants suggested had typically received better educational opportunities and were thought to have benefitted from greater exposure to training seminars thorough the partnership, allowing them to learn, share experiences and establish networks.

Challenges that can impede adaptation of female-led MSMEs

As discussed earlier, the adaptive capacity of female-led MSMEs in Kenya's SALs is constrained by many of the same factors that limit male-led MSMEs, such as deficient infrastructure, including power, transportation, water and telecommunications and a gap in access to and use of finance (Stein, Hommes and Pinar Ardic, 2013; Beck and Cull, 2014; Crick, Gannon, et al., 2018). Yet participants in our research identified

several factors that they suggested constituted additional barriers to adaptation for female-led MSMEs in Kenya's SALs.

In general terms, respondents emphasised that socially 'institutionalized' gender roles are a major challenge to female entrepreneurship, with the burden of caring for children and running internal family affairs, as well as meeting household livelihood needs, most often falling on women in Narok. Participants emphasized that these responsibilities present a high opportunity cost, in terms of reducing the time available for women to invest in business development; including in identifying and executing strategies to build resilience to climate risk within their MSMEs. They also emphasized that the additional emotional pressures that arise from facing these responsibilities under conditions of uncertain food and financial security form an additional barrier to adaptation and cited physical impacts on their health, such as headaches and exhaustion, as a consequence of this pressure. Capturing the idea of a 'double vulnerability', female entrepreneurs in our research emphasized that at times of climate stress, their experience of vulnerability occurs simultaneously at the business and household level and is often interconnected. Participants suggested that resilience within female-led MSMEs is therefore intimately linked to resilience within households and thus participants identified that a key route to enabling private sector adaptation among female-led MSMEs, is to build resilience at the household level. Yet they felt this relationship is often overlooked and poorly understood by policy makers.

Participants reported that women's access to entrepreneurship and adaptation resources, such as land, capital and new technologies, is widely restricted by traditional governance systems in Narok. This reflects broader trends in social barriers faced by women entrepreneurs in SALs. As discussed, most women in Kenya's SALs lack ownership rights to land or legally secured entitlements, as these resources are still largely under traditional customary tenure, where men have exclusive right to land inheritance and subsequent ownership. As such, women generally depend on their husbands' land entitlements. This has several further notable implications for the adaptive capacity of female-led MSMEs. Firstly, as exemplified in the example of the Kenya Hives Limited partnership, without land tenure women in Narok are often restricted in their ability to make decisions about the management and development of their business assets, which can prevent them from adopting more climate resilient business strategies.

Further, MSMEs without land tenure may find it challenging to form market linkages and partnerships with other larger companies that operate in formal settings. Land tenure offers legislative protection and resource security, thus larger companies sometimes choose to only work with other businesses with secure entitlements. In Narok, participants identified this dynamic, suggesting that the preference of large companies to work with actors that hold secure tenure results in a vulnerability feedback loop, where male entrepreneurs and private investors become more powerful, and female-led enterprise becomes further marginalised. These ideas also emerged in another Kenyan case study of Maasai and Turkana, inhabiting arid and semi-arid areas such as Kajiado and Turkana, where analysis revealed that most land in these areas has been sold off to private estate investors or farm owners, who have since restricted access to water sources and livelihood resources especially for women (Orindi, Nyong and Herrero, 2007).

An additional consequence of women having limited access to land tenure is that without land tenure to serve as a surety, female entrepreneurs may face further barriers to securing access to credit through formal or informal channels. World Bank Enterprise Survey data found that more than 25% of firms in Africa consider finance their most important constraint (Beck and Cull, 2014) and participants in our research also highlighted lack of capital as a major challenge for female-led MSMEs. The challenge of accessing finance is further exacerbated by female-led MSMEs being more likely to be unregistered and operating in the informal sector: Indeed, there are currently multiple other disadvantages to operating informally, which also include restricted access to new market opportunities, as well as to public sector services (USAID, 2005; Fjose, Grünfeld, Leo and Green, 2010).

Female-led MSMEs also face barriers to accessing new climate resilient technologies, finance and other forms of business safety nets, such as climate insurance products. Female educational attainment is low in Narok and, as such, female entrepreneurs can struggle, for example, to keep records and track their business growth in a manner that would enable them to convince creditors to support them to access new technologies and inputs. These challenges are reflected in the wider private sector adaptation literature, which recognises that internal factors in companies, such as the education of the work force, influences firm's willingness or ability to adapt (Crick, Gannon, et al., 2018).

The factors described above – low education levels and structural exclusion from land, capital, markets and new technologies – help confine most female entrepreneurs in SALs to more limited livelihood and income generating activities which, as discussed, are often those exposed to greatest climate risk. As discussed, these same factors can limit the ability of female entrepreneurs to identify and implement strategies to build resilience to climate risk. But, importantly, they also impede women's agency in decision making and consultative fora, meaning the voices, aspirations and capabilities of female entrepreneurs are not yet being clearly articulated in public policy, legislative and investment domains (Orindi, Nyong and Herrero, 2007).

Following literature that argues that such exclusion and underrepresentation of women in key policy making processes impedes gender-responsive climate-related planning, policy-making and implementation (Atela et al., 2017), participants in our research described this gap in consultation as representing a significant barrier to realising inclusive climate resilient development in SALs. Through their, often concurrent, responsibilities within households, female entrepreneurs were understood to have incomparably close awareness of key livelihood needs, assets, opportunities and stressors, affording them unique and important potential to design and operate MSMEs that are more responsive to the livelihood – and adaptation – needs of SAL households (c.f. Horrell and Krishnan, 2007). This situated insight and experience was deemed important for autonomous adaptation within female-led MSMEs, but, emphasising opportunities for instrumental and substantive benefits to be realized from greater consultation, participants also believed female entrepreneurs are currently underutilized at a societal level in the design of strategies to build adaptation and resilience in SALs. In a similar vein, many of the female entrepreneurs we spoke to believed they suffered from a lack of role models, to demonstrate techniques to identify opportunities arising from climate change and to build resilience into their business operations.

Despite these barriers to consultation, Kenya has a sophisticated business and climate policy landscape and there are provisions aimed at supporting women in business in national policies and strategies. The revised Kenya procurement act of 2010 requires that all public agencies set aside one third of tenders for women and youth entrepreneurs. Similarly, Kenya's constitution now advocates for one-third representation of women in various decision-making platforms, including those related to climate change (Republic of Kenya, 2010b). Kenya's climate change strategies, such as the National Climate Change Action Plan and the Climate Change Act are also accompanied by national recognition of the importance of enhancing gender mainstreaming in climate change actions and of supporting female-led businesses. Nevertheless, our research suggests that there are opportunities to enhance the effectiveness of the implementation of these policies.

Firstly, participants identified aspects of the policy environment which they felt were poorly adapted to suit their needs. Some participants involved in non-agricultural MSMEs, for example, highlighted that opportunities, such as the Women Enterprise Fund, established by the Kenyan government, mainly targets the poorest women in society, but provides limited opportunity for slightly larger and more established – but still vulnerable – businesses (see also Fjose, Grünfeld, Leo and Green, 2010). Since large enterprises within the formal sector find it easier to access more formal bank loans, this creates a 'missing middle' when it comes to accessing finance for businesses in Africa (Intellectap, 2015; Crick, Gannon, et al., 2018). Secondly, a small number of respondents expressed hope that policies such as the 'one third procurement rule' may hold particular potential to help break down cultural barriers and to spur robust and resilient financial, technological and knowledge opportunities for women entrepreneurs in Narok and elsewhere. However, these broader policy incentives and platforms were suggested to be inadequately implemented, monitored and enforced. More national policies on gender may therefore not be the answer to dismantle socio-cultural barriers to inclusive private sector adaptation. Instead, the way forward may require a move away from simple policy statements, to designing and reinforcing clearer and more inclusive implementation platforms, which ensure that the broader enabling frameworks, established in national policy, are mainstreamed and implemented at ground-level.

Conclusion

The paper has presented empirical evidence on ways in which female-led MSMEs in Narok experience and respond to climate risk and it has highlighted some of the challenges that they face to climate change adaptation. This research has shown that climate risk is strongly felt by female-led MSMEs in Narok and participants often link climate impacts such as drought, flooding and climate-related disasters to losses to their business assets and to reduced business growth. Exposure is heightened by the concentration of female-led MSMEs in agricultural sectors that are highly vulnerable to climate change, although non-agricultural MSMEs also experience spill over impacts of climate extremes, such as conflict, supply chain disruption and depressed local markets.

Socially institutionalized gender roles limit female entrepreneurs' access to land, capital, markets, new technology and educational opportunities and typically confine female-led MSMEs to smaller, informal enterprise, which furthers their structural

exclusion. Despite participants recognizing that women have high awareness of livelihood needs, assets, opportunities and stressors – and thus that they hold unique potential to build climate resilience into the livelihoods of communities in SALs – these factors also limit the ability of female entrepreneurs to advocate for their interests at household and policy levels. This impedes the opportunity for female entrepreneurs to shape more gender responsive policy making and a more supportive enabling environment, which participants suggested can serve to perpetuate, and further enhance, female vulnerability.

In the face of the many barriers to adaptation that they face, female entrepreneurs in Narok often depend upon unsustainable forms of coping at times of climate stress, through which business activity is scaled back. Such strategies, such as reducing production to limit the risk of loss and damage, may help enterprises to cope in the short term, but they do nothing to help build longer term MSME adaptive capacity. Indeed, through reduced profits, loss of business and the sale of valuable business assets such as land, some of the coping strategies female entrepreneurs in Narok adopt, may undermine the longer-term resilience of livelihoods in SALs.

Collective action and collaboration through formal and informal social networks is currently an important private sector adaptation tool for women in Narok. Women's groups and lending networks offer a means of sharing knowledge, of identifying new opportunities to diversify enterprise and of pooling resources to facilitate the introduction of new climate resilient technologies and to build market linkages. Social networking is likely to remain an important adaptation tool for female entrepreneurs, however our research shows that those who are best able to maximize the opportunities of these networks are still those that benefit from a wider suite of broader enabling factors, such as higher educational attainment. Kenya recognizes the need to support female entrepreneurs in various national policies, including in national climate change legislation. However, these policies are currently poorly implemented and mainstreamed at ground level, with more work needed for the benefits of these policies to be realized in real terms. Future action seeking to build adaptive capacity among female-led MSMEs in SALs should recognize the links between climate resilience in female-led enterprise and resilience at the level of households, as building resilience at the household level is likely to serve as a key route to enabling private sector adaptation among female-led MSMEs.

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