

Qualitative gender evaluation of agricultural intensification practices in northern Ghana

Akua O. Britwum and Angela D. Akorsu



Produced by

International Institute of Tropical Agriculture

Published by

International Institute of Tropical Agriculture

December 2016

www.africa-rising.net

The Africa Research in Sustainable Intensification for the Next Generation (Africa RISING) program comprises three research-for-development projects supported by the United States Agency for International Development as part of the US Government's Feed the Future initiative.

Through action research and development partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

The three regional projects are led by the International Institute of Tropical Agriculture (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). The International Food Policy Research Institute leads the program's monitoring, evaluation, and impact assessment. <http://africa-rising.net/>



This document is licensed for use under the Creative Commons Attribution 4.0 International Licence.

This document was made possible with support from the American people delivered through the United States Agency for International Development (USAID) as part of the US Government's Feed the Future Initiative. The contents are the responsibility of the producing organization and do not necessarily reflect the opinion of USAID or the US Government.

Contents

Abbreviations	i
Executive summary	ii
Introduction	1
Literature review	3
Agricultural production and the gender question.....	3
Explaining gendered resource access: the social relations approach	5
Gender and agricultural production.....	6
Women and productive resources in Ghana.....	7
Gender and the land question.....	9
Legal regimes and women’s land access	10
Women and access to non-land agricultural resources.....	13
Credit and women’s agricultural production	13
Extension services and women farmers.....	14
Women’s labor and agricultural productivity	14
Gender relations and agricultural innovations.....	15
Innovation adoption and gender orders	17
Gender and agricultural intensification practices: issues arising.....	18
Study approach, methodology, and limitations	19
Study area.....	19
Study design, methods, and instruments.....	19
Validation of study findings.....	21
Study limitations.....	21
Discussion of findings	22
Demographic background of participating farmers	22
Farmers’ technology evaluation criteria	24
Female farmers’ criteria for evaluating suitability of agricultural practices	24
Male farmers’ criteria for evaluating suitability of agricultural practices.....	29
Explaining gender differences in evaluation criteria.....	32
Explaining gender differences in adoption of new practices	33
Gender dynamics, resource access and innovation uptake	35
Gender differences in adapting new technologies adopted.....	38
Gender differences in accessing and participating in learning new technologies	40

Explaining gender differences in information access and participation in learning	43
Emerging Issues	45
Gender differences in observed criteria for evaluating innovation suitability	46
Gender, productive resource access, and control and innovation uptake	47
Female and male farmers’ propensity to adapt agricultural practices	48
Gender dynamics of information access and learning about agricultural practices.....	48
Recommendations	50
Dealing with gender differences in observed criteria for evaluating innovation suitability	50
Tackling gender in productive resource access and control in innovation uptake	50
Overcoming differentials in female and male farmers’ propensity to adapt agricultural practices	51
Dealing with the gender dynamics of information access and learning about agricultural practices	51
References	53

Abbreviations

ADVANCE	Agricultural Development and Value Chain Enhancement
Africa RISING	Africa Research In Sustainable Intensification for the Next Generation
FAO	Food and Agricultural Organization
GSS	Ghana Statistical Service
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
MOFA	Ministry of Food and Agriculture
RELC	Research Extension Liaison Committees
TOR	Terms of reference
USAID	United States Agency for International Development
WIAD	Women in Agricultural Development

Executive summary

What are the gender implications of Africa RISING’s agricultural intensification practices in target communities in Northern Ghana? In 2015 the project set out to evaluate this question based on four broad investigation areas:

1. Gender differences in the criteria farmers use to evaluate the suitability of new practices.
2. The impact of gendered access and control over productive resources on the adoption of Africa RISING practices.
3. Gender considerations informing the adaptation of practices by male and female farmers.
4. Gender differences in access to information and learning about agricultural innovations.

The evaluation was conducted in six target communities in the Northern, Upper East, and Upper West regions. A total of 119 individual farmers were covered in 12 focus group discussions. Data were supplemented by 31 key informant interviews. In three workshops held in May 2016 research participants validated the results. The analytical framework was informed by Kabeer’s social relations approach exploring how rules set by the state, market, community, and household define gender orders underlying women’s reaction to agricultural interventions.

Findings show that farmers’ main criteria for evaluating crop varieties were the place of the crop in family meals, its position in agricultural production, its market value, and its ability to withstand unstable weather conditions and pests. Moreover, the potential to increase yields and the suitability for cultivation of multiple crops on a piece of land mattered. The adoption of high yielding, short maturing maize was most dramatic for women, since it reduced their dependence on men. Access to community-based resources like land, labor, storage, and markets were gendered. The same held true for externally based resources such as capital or credit, technology, and extension services. Limited access to larger plots of land constrained women’s ability to up-scale from baby trials.

Only a few cases of adaptation of Africa RISING’s practices were observed. Respondents either did not see the need to do so or technical officers did not permit. Men reported altering the number of rows cropped with cereals and legumes and changing fertilizer application. In terms of access to information and learning, women were generally more eager to learn about innovations because of their meal provisioning roles. Women were more likely to gain information from sources that rely on interactive human contact while males had a broader variety of sources including input dealers, extension officers, radios, mobile phones, and lead farmers. Domestic chores, costs of accessing information as well as restrictive husbands frequently limit women’s opportunities for learning. Dissemination approaches for Africa RISING’s innovations appeared top down and male-centered with few instances of peer exchange.

Recommendations of the evaluation include:

- Explore markets for “female crops”, introduce farming technology like tractors, ploughs, and spraying machines, and provide women with skills to operate them.
- Promote women’s groups with specific capacity building to access land from traditional authorities and operate them as learning spaces; re-constitute the Magagya’s role to serve as a mobilizing point for women’s productive needs.

- Support the Ministry of Food and Agriculture’s Directorate of Women in Agricultural Development to institute a monitoring mechanism for its policy goals and recruit additional female AEAs and provide them a place on the R4D platforms.
- Set up an avenue for discussing policy assumptions and their ability to address gendered constraints underlying women’s differential access and control to agricultural resources.
- Institute special gender awareness training for technical officers and support technical officers to identify and promote adaptation of technologies in target communities.
- Encourage on various platforms, a discussion on how new technologies fit into existing practices and associated challenges faced in their adoption.
- Consider the introduction of small ruminants in the second phase of the project.
- Ensure that the conception, planning, and execution of the second phase responds to clearly set goals that are responsive to gendered constraints embedded in the rules of state, market, community, and households.

Introduction

This report is in fulfillment of a major requirement detailed in one of the terms of reference (TOR) of the consultancy agreement between the authors and the Africa Research In Sustainable Intensification for the Next Generation (Africa RISING) project of the International Institute of Tropical Agriculture (IITA). Launched in 2011, Africa RISING seeks to increase food production, improve livelihoods, and enhance the nutrition of smallholder farmers in ways that conserve the natural resource base. In Ghana the project has been implemented in 25 communities in the Northern, Upper East, and Upper West regions.

The TOR detailing the scope and content of the evaluation charged the consultant to undertake a literature review, an empirical study, and a synthesis of both. The field research was expected to answer four broad evaluation questions:

1. Any gender differences in the observed criteria farmers use to evaluate the suitability of new agricultural practices.
2. How gendered access to and control over productive resources impact the adoption or rejection of agricultural practices introduced by Africa RISING.
3. What gender considerations inform the possibility of female and male farmers to adapt agricultural practices introduced by Africa RISING.
4. Any existing gender differentials in accessing information and learning about agricultural practices in the study communities.

The main interest of the evaluation was gender and labor force allocation, access to productive resources, and participation in decision-making. An additional concern was highlighting the existence or otherwise of inter- and intra-regional differences. Such interests demanded an understanding of the systems and structures underlying the positioning of females and males within the study communities. It was also necessary to understand the interrelations of various institutions at play in the transmission of innovations within and outside the study communities. Contesting the framing of women in development practice, Okali (2012) is at pains to show that the kind of analytical frames used lead to results that can impact interventions and their outcomes. According to Okali (2012), out of the existing gender analytical frameworks that guide research feeding into development planning and practice, it is only Kabeer's (1994) social relations approach that insists on an interrogation of the broad social context of communities. Such an engagement, she insists, is important to understand the social relations that shape particular outcomes. The analytical framework of this evaluation therefore was informed by Kabeer's social relations approach which demands an understanding of how four main institutions—the state, market, community, and household—set the rules for resource allocation. We were interested in how institutional rules define gender orders and the forms of access and control rights women and men are allowed.

This report provides the results of the literature review, analysis of the qualitative data collected, as well as recommendations in respect of Africa RISING's intensification practices and their interaction with gender dynamics at household and community levels. It outlines also follow-up issues emerging from examinations of data derived from the evaluation questions. The structure of this report, in fulfillment of the TOR, is in two main parts. The first, the literature review, and the second, the detailed report and analysis of primary data collected in six target communities of the Northern, Upper East, and Upper West regions, where Africa

RISING's interventions are based. There are six main sections; the first details its background and focus. The second section, which is the literature review, discusses concerns in existing literature about the place of women within agricultural production in African countries such as Ghana. Some conceptual and analytical tools that allow for a deeper examination of the core issues underlying women's access to, and, most importantly, control over productive resources in agriculture are also presented in the literature review. The review provides a brief overview of debates on women's inferior land rights, recognizing the key role land plays in providing access to other agricultural resources as well as in securing rural livelihoods. Studies reviewed note that women's land rights are deeply embedded in household sexual division of labor, which dovetails into agricultural production. The emerging gendered dimensions of accessing non-land resources such as credit, labor, and extension services are outlined. The last section of the literature review raises the observations, which note that adopting agricultural innovations is determined by the systems and structures underlying gender relations.

The third section covers the study approach, data gathering, and analytical procedures. Section four details the findings of the study structured around the four main evaluation questions, beginning with a discussion of the demographic background of respondents. This fourth section presents findings on issues informing female and male technology evaluating criteria as well as differences in female and male propensity to adopt and adapt innovations introduced by Africa RISING in the study communities. The discussions take into consideration the role differential resource and information access play in structuring learning, participation, and finally technology uptake. The findings reveal how female and male provisioning roles built into the farming systems shape their resource access and control and finally their response to innovation. Field findings give credence to literature concluding that the ability of agricultural innovations to allow women greater independence in pursuing their productive activities lies in the alternatives they provide them to circumvent existing patriarchal relations that are at the base of male power evident in household provisioning. Applying the social relations approach to unravel meaning from the data gathered (section five) revealed that gender orders structured around household provisioning are further constrained by state institutional capacity that Africa RISING uses to deliver innovations to farmers in the project communities. Thus, community- and household-based values systems that shape gender orders are just as important as market and state rules that configure resource access in the project communities. For the future, we recommend in section six, the setting of clear gender-responsive goals with matching monitoring indicators to guide the conception, planning, and execution of the second phase of Africa RISING's intervention program.

Literature review

Agricultural production and the gender question

Agriculture forms the largest production sector in Ghana, employing 42 percent of Ghana's working people (GSS 2013). The recent national and population housing census found 49 percent of Ghana's agricultural labor force to be female and 51 percent male. Females, however, dominate subsistence production, constituting 70 percent of its labor force. They also form the majority of the operators in food distribution and marketing (65 percent) (GSS 2013). The main agricultural workforce in Ghana are peasant farmers, very few operate as waged laborers. Women in agriculture are mainly unpaid household laborers, with the majority working on their husbands' farms (Duncan and Brants 2004).

There are additional concerns for Africa's agricultural labor force. Beyond low productivity is the operation of patriarchal systems that pose huge challenges for women's access to productive resources (Koira 2014). Ghana, like other countries in the West African sub-region, is signatory to international conventions guaranteeing women's rights and has enshrined constitutional provisions that recognize equality of opportunities as well as political and legal rights of citizens. Yet, norms and deeply entrenched patriarchal cultural practices deny women the opportunity to exercise their full rights as citizens (Koira 2014). Women as a result, do not have equal access to productive resources for agricultural production.

Ghana recognizes the challenges of agricultural productivity and women's place within the sector in its efforts at national development. Ghana's food and agriculture policy, for example, acknowledges women's contribution to the sector and the gendered constraints under which they carry out their agricultural activities. The 2007 policy notes that:

Majority of women in agriculture have limited access to land, labour and capital due to cultural and institutional factors. Access to land is often restricted to usufruct rights only; women cannot provide collateral for credit because they may not have legal ownership of tangible assets. Agricultural produce traders are mostly women; yet official credit programmes do not usually cover trading activities. Their reproductive roles, which are usually defined by culture, interfere with their productive roles in terms of time for the latter (Ministry of Food and Agriculture 2007).

A number of efforts have been made to assist farmers and additionally promote women's rights within the agriculture sector (Ministry of Food and Agriculture 2007; Duncan and Brants 2004). Out of the seven technical directorates of the Ministry, one is devoted entirely to women farmers. This is the Women in Agricultural Development Directorate backed by policy. The most recent, Gender in Agriculture Development Strategy II, was launched on 27 January 2016. A number of strategies outlined by the ministry include gender mainstreaming in all these policies and programs, affirmative action provisions, and sensitization of staff. It acknowledges that gender sensitization and training programs held for various categories of staff are increasing individual awareness, but have not yet translated into practice (Ministry of Food and Agriculture 2007). The Ministry's policy blames the persistence of gender inequality in the agricultural sector on the fact that:

... programmes and projects are not systematically formulated around different needs, interests, roles, responsibilities, status, and influence in society of women and men. Female representation is very low in MoFA, with women making up just 16% of the total workforce, and 9.5% located at a high enough status to participate in decision making. Dissemination of new and improved technologies through extension services is highly unbalanced between women and men farmers, with as little as 20% of services reaching women. [Research Extension Liaison Committees] RELCs do not focus much on gender issues nor on Women in Agricultural Development (WIAD) activities during prioritization activities (Ministry of Food and Agriculture 2007).

Other shortfalls on the part of the Ministry identified were the implementation of the Gender and Agriculture Development Strategy, described as slow and with a narrow focus. The rest were the weak coordination and collaboration of identified stakeholders, the absence of a monitoring framework for holding implementers accountable as well as the lack of a review implementation process (Ministry of Food and Agriculture 2007).

Africa RISING's initiatives fall in line with the concerns of the Ghana Government over its agriculture sector. The interventions of Africa RISING are geared towards improving technological inputs, early maturing and resistant seed varieties, agricultural chemicals (fertilizers, pesticides), and equipment. Skills' development to ensure the appropriate use of new technologies as well as the adoption of practices that enhance productivity are also key parts. A fundamental aspect of Africa RISING's intervention is the introduction of agricultural innovations to facilitate community well being. As announced by Ellis-Jones, Okali, and Agyeman (2014), Africa RISING seeks to end poverty and hunger among smallholder households in Northern Ghana, by enabling the adoption of intensive and diversified farming. Its interests are to improve food, nutrition, and income for the benefit of women and children. It targets smallholder farmers through a variety of work packages on production, food storage and processing, nutrition information as well as marketing (Ellis-Jones et al. 2014). These work packages, in all, were developed out of Africa RISING's Program Framework 2012–2016, which seeks to address identified farmer constraints through the introduction of participatory integrated systems. Specific activities include improving soil fertility through cereal–legume cropping and intensifying the raising of livestock. Efforts focusing on food processing include attempts to reduce food spoilage, introducing new products, and value addition.

Africa RISING's attempt to deepen its intervention through targeting, more specifically, the connection between gender constructs and how they impact the adoption of intensification practices in the target communities is a logical concern. The project document specifies these main goals as an attempt to increase food production, improve livelihoods, and enhance the nutritional status of smallholder farmers, and at the same time, conserve time and natural resources. Such goals speak to the developmental challenges of the three northern regions of Ghana, where the project is based. Having a dedicated gender focus is important for realizing such goals, since women form a key productive force in the regions where Africa RISING's interventions are based. They work, however, under severe social and economic constraints.

Explaining gendered resource access: the social relations approach

The second part of this task is the collection and analysis of primary data from selected beneficiary communities, six in all, drawn from the Northern, Upper East, and Upper West regions. The chosen framework for the analysis was an adaption of the social relations approach as outlined by Kabeer (1994). This informed the data gathering and analysis of primary data presented in the second part of this report. Kabeer's social relations approach is an attempt to explore, for greater clarity, the structuring of gender inequality in order to direct policy. According to Kotey and Tsikata (1998), a social relations approach is useful in discussions on women's resource rights. It allows extensive insights of the social structuring of women and men, while recognizing the role power relations play in determining access to and control over productive resources. Such analysis according to Okali (2012) is important to move away from discourses that simplify the complex social interrelations shaping the lives of women and men in rural agricultural production systems. For her, it is important to "return to the wider social context to determine and understand actual outcomes, and to learn more about the processes involved" (Okali 2012: 8). She explains that for policies to effect change in women's social position they should be informed by an approach which "reinforces the need to shift attention away from households and marital relations to other institutional sites where limited research has been undertaken to date, but where much of the discussion of change in the agricultural sector is situated" (Okali 2012: 15).

The social relations approach proceeds on the assumption that institutional rules, often stable over time, set routines for executing social tasks in all communities. Social rules set the parameters for division of labor—the assignment of social responsibilities to specific social groups based on gender, class, age, and ethnicity. Peoples' response to the rules so set over time became so engrained in their actions that they become self-fulfilling, legitimizing the hierarchical ordering of unequal distribution of rewards attached to such social roles. The division of labor by sex is so embedded within society that it appears natural, making people believe that gender roles are biologically determined.

A significant part of the social relations approach for analyzing gender relations is its conceptual tools. The first we highlight, for the purposes of this work, is the phrase, "social relations". Kabeer's (1994) original formation used this phrase to refer to the positional structuring of groups of people within a given community based on socially constituted systemic differences. These differences, at one stage, give some groups power and privilege over others, while simultaneously disadvantaging others. Thus, embedded in the term social relations are power relations.

The second concept, part of this analytical frame, is the term institutions. And here we find Veeman and Politylo's (2003: 322) definition; that institutions are "social decision systems that provide rules for the use of resources and for the distribution of resultant income or other benefit streams" most appropriate for our specific context. Kabeer outlines four institutions, two formal and two informal, as structuring women's lives with set rules for resource access and control. They are the state, market, community, and household. They do not act in isolation, but are intricately intertwined. Hampel-Milagrosa and Frickestein (2008) argue that social norms regarding valued resources penetrate and influence profoundly, even formal institutional resource allocation structures.

We shall therefore, in our examination of field data, show how the four institutions shape the gender orders that structure women's rights to existing agricultural resources. We use the term gender orders to refer to norms and traditions that determine who is considered a "proper" woman or man and their place in a particular community. Gender orders include culturally specific notions of appropriate behavior and gender responsibilities and rights. Our attention will focus on how gender social relations structure women's participation, adoption, as well as information sources for accessing Africa RISING interventions. Additional concepts that inform data analysis in this report are access to and control over resources included in the social relations approach. These are important feminists' conceptual tools, which help unravel power relations over resource use. Thus, adopting a social relations approach to the study of female and male household members as regards roles and division of labor in general and particularly in agricultural tasks, will provide useful insights into women's resource rights in agricultural communities in northern Ghana. Unraveling the extent to which social relations shape women's participation in Africa RISING's projects should assist in identifying how to confront some of the deeply entrenched rules and practices that determine women's participation in agricultural tasks and in turn shape women's bargaining power over productive resources within their households and the broader community.

Gender and agricultural production

Literature shows that globally there are differentiated patterns of female and male participation in agriculture (Bryceson 1995; Young 1993). The seminal publication by Boserup (1970), first highlighted these differences as situated in farming production systems, marked by technology. With time however, the differentiations are understood as being more complex. Later Young (1993) explained that farm production worldwide is marked by variations in socioeconomic as well as agroecological systems. Gender divisions in farming tend to be shaped by notions of female and male abilities and are therefore more likely to reflect traditional sex divisions within the domestic realm. Again, according to her, levels of mobility granted women determine the nature and amount of agricultural tasks they will perform (Young 1993).

Young varied Boserup's categorization of female, male, and mixed farming systems to forms of labor organization in agriculture. She introduced the concepts of sex segregation and sex sequential farming systems, noting that the two operate simultaneously (Young 1993). Sex sequential farming systems, she explains, drive different labor inputs from females and males at specific stages in farming on the same plot of land. Women therefore perform farm tasks like weeding, fertilizer application, harvesting, and processing farm produce. Men's tasks include land clearing and preparation (ploughing and mound making), weedicide application, and pesticide spraying. Sex-segregated production in agriculture, Young notes, is assigning the production of certain crops or livestock to women or men alone. Male crops tend to shore up their provider roles. She cautions, together with others, that such differentiations in agricultural tasks and produce however are not rigid and breakdown easily in the face of a number of factors. These include changing socioeconomic situations, such as out migration and the market value of crops, and the adoption of new technologies (Doss 2002).

Existing literature in Ghana captures sex-segregated and sequential divisions in crop and livestock production (Duncan 2004; Duncan and Brants 2004). In Ghana, crops usually attributed to men are the main staples, or those grown for local or international markets such as cocoa,

yam, millet, or sorghum and women operate with legumes and vegetables (Duncan 2004; Britwum et al. 2006). They note at the same time that women are not wholly absent from cash crop production; they participate in their own right or as unpaid household laborers on their husbands' farms or as waged workers on commercial farms.

The main concern here is the usefulness of the commonly accepted constructs of gendered cropping systems in existing literature for policy making. Doss' exploration of the distinctions in women and men's cropping systems offers useful lessons. She notes that distinguishing female and male crops is not a straightforward issue, explaining that "[t]he cultural constructs of crops as men's and women's crops may not, however, match current practices in African households" (Doss 2002: 1987). For her, "there are gendered patterns of cropping, but the patterns are more complex than simply that some specific crops are grown by either men or women" (Doss 2002: 1988).

A number of issues stand out then in assigning crops as women's or men's. They include considerations such as the relative importance of crops for women and men farmers even within the same farm households as well as the mode in which farmers are categorized. Doss believes that such issues are important to inform policy about the gendered issues within cropping systems. In order to assign crops by gender, she defines farmers by household headship, holder of land, and farm revenue control. Her final conclusion is that:

No crops stand out as being either men's crops or women's crops, other than rice and sorghum in the savannah zone. Yet, the proportion of women as farmers varies across crops. This implies that although there are no clearly defined men's and women's crops, agricultural policies are not gender neutral if they focus on some crops rather than others (Doss 2002: 1992).

Whatever sex-differentiated systems operate in a particular community, it is generally observed that female agricultural tasks are normally linked to tasks with lower value, while male tasks confer ownership claims to land and market-oriented products. The important lesson from Doss is the observation that policy making should be more concerned about gender relations within cropping patterns and other forms of social relations that differentiate women. Thus it is the crop and its importance to different categories of women because of their social positioning and the way they feed into their gendered provisioning roles that should inform policy. In order to do this, more robust forms of gender analysis that move beyond what women and men do and the relative resource base is important for informing policy.

Women and productive resources in Ghana

Existing literature on economic participation in Africa notes sharp gender differences in access to productive resources, most pronounced in agricultural communities. Studies on Ghana include those that cover general assets like that of Oduro et al. (2011). Others such as Duncan (2004), Duncan and Brants (2004) as well as Apusigah (2009) focus on women in agricultural production. A substantial number however, examine gender and the land question, noting the significant role of land in agricultural communities in Ghana. Notable ones are Britwum et al. (2014), Tsikata (2008), Minkah-Premo and Dwuona-Hammond (2005), Kotey and Owusu-Yeboah (2003), and Manuh et al. (1997). They all point to considerable differences in access to land for residential and agricultural purposes for women and men.

The fact of women's unequal land access is sometimes contested (Britwum et al. 2014). The majority of authors writing on the subject like Tsikata (2008), Runger (2006), Sarpong (2006), Kotey and Owusu-Yeboah (2003), Quisumbing et al. (1999), and Bortei-Doku Aryeetey (2002) note that women's access is deeply constrained. Tsikata (2008) observes how a small body of influential literature disputes the claim that gender relations constrain women's land access. Millar et al. (2007) and Benneh et al. (1995), for instance, reject outright claims that portray men as owners of farmlands and women as cultivators. They insist that in most cases, even men never have outright ownership of land. There are also claims that land commoditization is transforming women's inferior land rights since all who have the means can own land through market purchase and register the title in their name. Rejecting these conclusions, Tsikata (2009) insists that such observations are erroneous deriving from the failure of writers to distinguish between ownership (legal title), access (ability to use), and control (the right to use and determine use). Making a distinction between access and control, Tsikata shows that women can use land for farming and keep the proceeds as they want, however, they only have use right, under the discretion of their husbands or family heads, and if they are tenants, then their landowners. The last two tend to be male. In some cases, access precludes even the right to determine what to grow. Gender divisions in agricultural tasks make men automatic owners of land. The main route for conferring customary ownership is land clearing. This is a male task in all farming communities in Ghana (Duncan 2004).

Ghana's land reform project pays attention to strengthening individual legal ownership through titling. However, Minkah-Premo and Dwuona-Hammond's study, which examined land titling, reveals that few women have registered land in their name (2005). Land titling processes tend to exclude women since fewer women can afford to purchase land as easily as men (Tsikata, 2008; Runger 2006; Sarpong 2006). When women purchase land, this and other studies show that they tend to register it in the names of male relations rather than their individual names (Minkah-Premo and Dwuona-Hammond 2005).

Beyond women's human rights, there are efficiency concerns in the discourse of gendered access to productive resources. Studies such as Kelkar (2013) and Doss and Morris (2001) note that removing gendered constraints to productive resources not only enhances women's productivity beyond men's, but have more direct benefits to household well-being. Thus, it is noted that:

...if women enjoyed the same level of inputs as men, this would lead to higher yields and to potential benefits for themselves and for Ghana's rural economy. ... The as yet untapped nature of this potential is an opportunity cost and demonstrates the importance of gender equity measures not only for women's welfare, but also for developing rural economies at large (ADVANCE 2013: 32).

The observation about the beneficial outcome of women's productive work for household well being stresses both the human rights and efficiency dimension of improving women's productivity (Doss and Morris 2001). A concern, we believe, underscores Africa RISING's interest in undertaking a gender analysis of its interventions so far and how the gender sensitivity of its second phase can be enhanced.

Gender and the land question

Women and men's unequal access to and control over land have attracted attention for a number of reasons. First, land is the main resource in all farming systems. Second, some observers note that access to land usually determines access to other productive resources (Dittoh 2000; Duncan and Brants 2004). Land in Ghana is communally owned and most subsistence farms are on such lands, governed by customary law, specific to each community (Aryeetey et al. 2007). Statutory law recognizes customary rules and practices, a fact enshrined in Ghana's constitution, which gives Ghana what is called a legally plural system (Woodman 1996). Certain customary norms determine women's right to land. The most important factors identified are inheritance systems, land availability, conception of women's agricultural productivity, and the notion about women's claim to be recognized as agricultural workers in their own right.

Literature notes that in Ghana, a distinct sexual division of labor exists in all spheres of production, including the agricultural sector: a fact that has implications for the rules underlying access to and control over productive resources. The use of land clearing as a means of acquiring usufruct rights over agricultural land under customary law, for instance, is disadvantageous to women in gaining direct access to land, since land clearing is predominantly a male task. In the case of northern Ghana, the belief in the sanctity of land, with the associated rites and rituals performed prior to land allocation, is another route that grants male control over communal land. Such rites are male roles and give men power in decisions over land allocation and use (Britwum et al. 2014; Apusigah 2009).

Women's involvement in productive activities is often viewed as secondary or supplementary to those of men, based on the notion that males are solely responsible for household provisioning. This assumption legitimizes unequal access to agricultural resources. Dittoh (2000) reports that even in cases where the women constitute the main source of agricultural labor, they still are regarded as assistants. As a consequence, women tend to gain smaller and less fertile plots of land for their own farming activities (Manuh et al. 1997; Whitehead 1984). But women are incorporated into agricultural systems differently. Apusigah's discussion of livelihood-based interests in land notes variations in women's incorporation in productive activities in Ghana's three northern regions where the study was based. Her argument is based on Sen's notion that "the household as a political space remains a contentious site due to the privileging of some interests and under-privileging of others. ... this has been found to yield unequal entitlements and capabilities" (Apusigah, 2009: 53). Her analysis shows how rules structuring marital obligations within farm households around gender divisions of labour are also set within community-based culturally specific authority systems. Thus, despite the critical role women play in household provisioning, their positioning as secondary producers is derived from the notion that the soup ingredients they provide are not as important for household survival as cereal staples and yam. Britwum et al. (2014) explain that while a lack of carbohydrate staples such as maize, millet, rice, sorghum, and yam (supposedly male crops) results in starvation and might lead to death, vegetable privation is not life threatening and its immediate absence in the diet is not readily perceptible. This fact is used to justify the allocation of relatively smaller and less fertile plots of land to women. According to Apusigah (2009), the sexual division of agricultural labor is often advantageous for men in securing a longer term usufruct right over agricultural land. For instance, while women require annual renegotiation for use of land after

each harvest, their male counterparts, who may be growing cash or market-oriented crops, have longer security of their lands (Kotey and Tsikata 1998; Benneh et al. 1995).

... the social positioning of women and land-labour ascriptions in the farm household are important determinants of their livelihoods im/possibilities. As members of farm families, their livelihoods options and choices are determined largely by the cultural constructions of their labour in relation to land (2009: 65).

Such positioning of women and men in relation to farm production subsumes female land access within that of their household provisioning roles. Their access to land and reciprocal labor of their husbands in the first place, and in the second, the nature of land they are entitled to, is largely informed by such divisions of labor.

Apusigah notes some inter-regional differentiations and points to how in the Upper East and West Regions, women are considered farm hands, with strict marital obligations to work on their husbands' or household farms, performing several agricultural tasks. In this system, women have dual cultivation roles, work on their so-called personal farms, usually smaller, and that of the household (husband's). In the Northern Region and among the Gonjas and Nanumbas of Upper East Region, Apusigah identifies instances where women are considered non-farm hands and therefore have no culturally specific "on-farm cultivation responsibilities" (Apusigah, 2009: 57). Women here are seen as helpers on their husbands' farms. In these communities, women are hired independently to work on farms. Wives can be rewarded for providing services on the farms of their husbands. As non-farm hands, women's entitlement to communal lands is severely curtailed and as farm hands, their entitlements stop at the quality and size of land available once male interests have been served.

Beyond household and community prescribed roles that structure women as non/farm hands and their corresponding entitlements, are natural and market forces. Land availability of course determines the amount and quality of land women can access after male interests have been served. A situation, influenced by climate change, and in recent times, determined by market forces and the push towards urbanization, that is putting pressure on land available for cultivation.

Legal regimes and women's land access

One of the issues underlying discourses contesting women's inferior land rights is that legal plurality allows the application of customary rules with tenets that some insist, are inherently egalitarian. Customary practices some say embody the principle of social justice and grant equality of access for both sexes (Benneh et al. 1995). Literature has it that about 80 percent of rural land in Ghana is regulated under customary law, where leaders of landholding groups such as lineage heads and chiefs are expected to distribute land equally to all members of their respective landholding groups (FAO 2013). All who acquire such land only have "use rights or customary freehold regardless of their sex" (ADVANCE 2013: 27). The customary land rules have significant ethnic variations (FAO 2013). The FAO report notes, however, the similarities in the tenure systems operating in the Northern, Upper East, and Upper West regions, and that they differ considerably from those of the rest of the country.

Literature reviewed shows that marriage restricts women's ability to benefit from customary access to land (Britwum et al. 2014). Marriage can rid women of their access to lineage lands for a number of reasons. These include the location of the marital home, the type of marriage, and the woman's status within that marriage. Most Ghanaian working women spend a significant amount of their adult life in marriage (Kotey and Tsikata 1998). The tendency is to consider women temporal members of their natal home and strangers in marital communities due to rules for reckoning descent that exclude an affine (Kotey & Tsikata 1998). In Ghana, two main systems of reckoning descent operate, the matrilineal covering most of the Akan groups in Southern Ghana and the patrilineal where the main ethnic groups within the three northern regions are located. Women in northern Ghana are first and foremost members of their paternal ethnic groups but lose their customary use right to lineage land when they marry and move to join their husbands. None of the ethnic groups grant wives equal rights to lineage land of their husbands except in isolated cases. Their access to land through their husbands' lineage is often contingent on the success of the marriage. Women's main access to land within the three study regions was dependent on their relations with male relatives, their fathers through whom they claim membership to their natal lineage, and husbands who can cede land from their landholding groups to wives to cultivate crops for the household cooking pot.

Women do not have uniform access to land even within the same marriage. Other factors deriving from maternity, a woman's childbearing status, and the sex of her children, can all influence her access to land for a number of reasons (Whitehead and Tsikata 2003). Women with male children in northern Ghana have better access to land since all lineage systems pass on property to males (Manuh et al. 1997). Widows without children, and more so without male children, are the worse off when it comes to maintaining claims over plots of land accessed through the largesse of a deceased husband (Adolwine and Dudima 2010). More problematic are the land rights of daughters, step and adopted daughters as well as women in consensual relationships (Britwum et. al. 2014).

Outside the realm of customary norms, there are factors operating in concert to undermine the limited access that customary practices offer women seeking land for agricultural purposes. We will classify these factors as market forces, using the social relations framework. They are identified in literature as shifts in land use and management largely driven by private profit-seeking interests. They include pressures on land from urbanization and commercial farming as well as the extractive industries, mining both legal and illegal (Yaro 2009). These are the market pressures driving land commodification and removing most lands from the ambit of the communal land holding groups. According to Britwum et al. (2014), as the economic value of land increases, conflict among traditional leaders, clans, and their members deepens and undoubtedly, women's land rights worsen. Thus, increasingly, male heads are converting their traditional trust holding positions to individualized titles. Land is sold out for residential and commercial purposes, leaving little for anyone, including women. This situation is further worsened by rapid population growth. The Northern Region which was known for its relative land abundance is today one of the fastest regions experiencing growth, with Tamale, the regional capital, noted in Ghana's last census, as the third fastest growing city (GSS 2013). Urbanization threatens women's access for the simple reason that theirs are usually lands on the fringe of the communities and are the first to go under peri-urban expansion. Yaro (2009) observes that factors beyond peri-urbanization, such as government land claims, further limit women's access to agricultural land in northern Ghana.

Formal institutional structures exhibit gender-related discrimination in land governance in Ghana. Britwum et al. (2014) posit that this is due to the gendered nature and outlook of the formal institutions. State institutions, for example, lack accurate information about the state of women's land rights. Empirical evidence shows that in Ghana, the incidence of registration of land titles and deeds by men far outnumber that of women. For instance, Runger (2006) reports that most land titles registered are in the name of men. This is confirmed by Tsikata (2008), who notes that significant disparities exist with the numbers of women and men in land titling and registration in both Accra and Kumasi. Minkah-Premo and Dwuona-Hammond (2005) also noted that in many cases women register land belonging to them jointly with their husbands or solely in the names of their husbands and other male relatives.

Women's land right problems persist even under reforms. It is said that the emphasis on efficiency concerns in land tenure reforms lead to a change in the rules of the game intensifying women's land rights problems in a different way (Tsikata 2008; Larbi 2006). Pointing out persistent gender inequalities in land tenure in on-going reforms as they have been under customary law, Larbi (2006) notes that:

The Land Administration Program is not a direct intervention in land tenure in terms of re-arranging and re-shaping land relationships and rights and interests in land, even though a lot of the interventions have far reaching implications for land tenure. It is not clear how in the long term, interventions ... would affect rights and interests in land including secondary and derived rights (Larbi 2006: 9).

In these words, Larbi is raising concerns about the absence of dedicated attention of the reform processes to groups of persons like women and migrants, whose land rights are secondary and derived from primary holders. Limited as legal provisions for securing women's gendered land rights are, low literacy levels further constrains their access to vital information about existing legal provisions that can facilitate some measure of land rights. The modes of enforcement of such rights, and even knowledge about the state institutions responsible for the enforcement of such rights, often elude women (Sarpong 2006).

There are significant variations in women and men's land holding patterns beyond unequal access. According to a report of the Agricultural Development and Value Chain Enhancement report (ADVANCE 2013), the main characteristic of farming in Ghana is that about 80 percent of agricultural activities are on small subsistence farms averaging 1.2 hectares with little mechanization. The report notes further that males hold more farms than females and their farms are likely to be larger. Men hold 8.1 times more of the medium and large-sized farms of five acres or more. Even though women's farms tend to be smaller they are more likely, according to the report, to be market-oriented. A significant observation is that the Upper East Region happens to be a region where female held farms are on average larger than those of their male counterparts (ADVANCE 2013). This observation requires further investigation to ascertain the factors accounting for this situation. The Upper East Region of Ghana is experiencing the highest pressures on land with some places identified by Apusigah (2009) as where women are more likely to operate as non-farm hands.

Even though research notes discriminatory access to resources structured around social gender relations, a number of them do acknowledge that women are not entirely helpless and have been utilizing existing avenues to access land in their own right. Some women in Ghana secure

land through inheritance from their male relatives. Duncan and Brants (2004) have identified sharecropping as another means of securing agricultural land in some southern farming communities. A third means identified is land purchase. It appears that the alternatives tend to be region specific; with women in Southern Ghana having a greater range of alternatives. Miller et al. (2007) argue that, in Northern Ghana, cases of land inheritance are so rare and cannot constitute a reliable means for Northern women's access to land. Apusigah (2009) as well as the ADVANCE report (2013: 30) note that sharecropping is uncommon in northern Ghana. By this, they were implying that sharecropping is not an agricultural land-securing avenue for women in the three northern regions. Also, relative to the situation in southern Ghana, land markets—the outright sale of land—are not as developed in northern Ghana (Apusigah 2009; Duncan and Brants 2004). These findings appear to suggest that, for women in Northern Ghana who could afford to buy land, it is difficult to do so within the context of gendered power relations in productivity and the spirituality associated with land allocation. Thus Britwum et al. (2014), quoting Prah (1995), indicate that whereas 50 percent of land titleholders in Ashanti Region are women, northern women constitute only two percent.

Women and access to non-land agricultural resources

Critical to agricultural production are other productive resources beyond land such as labor and time, credit and financial resources, extension services, technology, and infrastructural facilities (Duncan 2004). Their distribution, however, is determined by a number of factors with gender playing a key role. A number of publications have expressed concern over marked differences between women and men to such resources noting that women's lower yields could be due to gender-specific inhibitions to agricultural resources other than land (Agarwal 2011; FAO 2011; Kumase et al. 2008; Duncan 2004; Duncan and Brants 2004; Bortei-Doku Aryeetey 2002; Quisumbing et al. 1999).

Credit and women's agricultural production

Agricultural production worldwide is fast becoming capital intensive creating a rising need for cash among agricultural producers. Literature states that the most inhibiting productive resource constraint is the lack of credit to pay for agricultural inputs like tractor and ploughing services, agro-chemicals, and seed varieties (Britwum et al. 2014). Credit also provides the needed capital to access other productive resources like land and labor. In fact, it is noted that about 97 percent of loans raised for rural agriculture are for the acquisition of agricultural inputs (ADVANCE 2013). But credit is hardly available to farmers in Ghana. Available credit tends to be restricted to large-scale cash crop farmers with small-scale food crop farmers hardly able to access formal lending from financial institutions (Adolwine and Dudima 2010). The lending policies of the formal institutions are unfavorable to small-scale rural farmers generally. Both female and male subsistence farmers depend mainly on non-formal sources like relatives, friends, and moneylenders. However, according to an FAO report, there exist gender disparities in credit access “with men overall having better access to formal credit sources (public sector and private banks) compared to women” (FAO 2013; 7). Also noted are differences in female and male credit sources. Male market-oriented farms, according to the ADVANCE report, have better access to public sector credit (ADVANCE 2013).

The drive to improve women's access to credit has resulted in a proliferation of micro-credit schemes with different players spanning state, donor, private individuals, NGOs, and cooperative schemes (FAO 2013: 2011). Women are not evenly disadvantaged in terms of credit

access. Women involved in market-oriented farming are reported as having better access to NGO and cooperative sources than men (FAO 2013). The lending activity of NGOs is heavily concentrated in income-generating projects within the food processing industry. Women who are involved in food processing are more likely to benefit from the numerous credit schemes set up by NGOs working to ease access to credit for rural women (Britwum et al. 2006; Duncan 2004). Age is an additional factor and younger women have been noted to face additional obstacles to credit than their older counterparts in similar standing (Koira 2014).

Limitations to credit are noted to inhibit women's ability to efficiently utilize the small plots of land they are able to access. According to Padmanabhan (2004), women's ability to cultivate cash crops can in turn enhance their capacity to access other agricultural assets like land. Cash income enables women to overcome credit scarcity and facilitates access to the known critical productive resources like labor, improved seed varieties, and agrochemicals.

Extension services and women farmers

Extension delivery in Ghana is a problem for all farmers. There are, however, regional as well as ecological differences in the intensity of extension shortfalls. Farmers in the forest zones are recorded as having better access than those in the coastal and savannah zones. Such disparities, largely traced to colonial rule, have not seen much improvement since (Duncan 2004). In addition to regional disparities, the FAO (2013) notes that gender differences in extension services tend to be more pronounced than other resources. The publication cites in support a survey by the World Bank and the International Food Policy Research Institute, conducted in 2010, which shows that contact between extension officers and farmers is generally low and even lower for women. The study noted that the proportion of male farmers visited by extension officers ranged between 10 and 13 percent as against less than 2 percent for female farmers. The female farmers mentioned were farmers in female-headed households and female spouses in male-headed households (FAO 2013). In Ghana, studies explain that the lack of parity in accessing extension services for women is due to a number of reasons. These reasons become more intense in Ghana's northern regions (Bortey-Doku Aryeetey 2013). The first is the sheer absence of women extension officers. In communities with entrenched patriarchal values, like the Northern Region, for example, cultural restrictions on the extent to which female farmers can interact with male extension officers further constricts women's access to extension services. Again, extension services concentrate on cash crops to the neglect of locally consumed foods or subsistence crops, an area where men dominate and where few women dare to venture at the risk of offending culturally established norms (Kelkar 2013; Agarwal 2011).

Women's labor and agricultural productivity

Labor needs on most rural farms according to Anaglol et al. (2014) are mainly for manual tasks like land preparation, planting, and harvesting. Such labor is met either through unpaid household labor or waged workers. Within all farming systems the social as well as economic relations that structure labor relations are part of the system of determining rewards for other resources and the beneficial outcomes of agricultural products. Here again literature shows marked differences in the access of women and men to labor, and time available for farm-related tasks. Two main factors that structure labor relations are access to additional cash to hire labor and traditional rights that grant access to the free labor of others (Britwum et al. 2014). The general observation of most findings is that males tend to have better access to labor than women (Anaglol et al. 2014). Again there are differences in the forms of labor employed on

female and male farms. With women more likely to rely on unpaid household labor and mutual self-help groups.

A number of factors have been identified over the years as affecting a woman's right to her own labor and that of others in her household and the community generally (Duncan 2004; Apusigah 2009). These include the disappearance of reciprocal labor relations between kin and neighbors, marriage, male migration, and reduced access to cash that can be used to pay hired labor (Duncan 2004; Duncan and Brants 2004). First and foremost is what Apusigah describes as the cultural appropriation of women's labor, which defines their farm roles as supplementing men's provider responsibilities (Apusigah 2009). Thus conjugal arrangements for household provisioning as well as the sexual division of domestic tasks govern women's time use and their labor responsibilities (Britwum et al. 2006). In a number of cultural settings in Ghana, marriage confers rights of husbands to the labor of their wives within farm households (Britwum et al. 2014). Again women's unequal share of domestic work reduces their time for farm activities where household provisioning require her to have her own farm separate from the household farm, which is normally conceived as the male head's. Zakaria et al. (2015) note in their study in Northern Ghana how women were more likely than men to work eight hours per day.

Gender relations and agricultural innovations

Though contributing immensely to agricultural productivity, agricultural innovations and improved technologies, according to existing literature, are often out of reach of most rural women and were hardly patronized by them. For example, it has been reported that women farmers are less likely than men to adopt improved crop varieties, use fertilizer, and apply agricultural chemicals. Doss and Morris (2001), in a study on maize production in Ghana, discovered that 39 percent of women maize farmers had adopted improved varieties. This was against 59 percent of male farmers. Their adoption of new crop varieties was the outcome of access to agricultural resources like land, extension services, and labor; in the study by Doss and Morris, it was family labor. The reasons ascribed for low levels of fertilizer application include lower educational attainment in tandem with reduced access to information (Quisumbing et al. 1999). Lower formal education among women can be traced to the social construction of the sexes and the assumption that boys need more education for their future breadwinning roles, and that girls do not need formal education to function well in their reproductive roles. While inability to read the language of agricultural innovation and technologies affect women's access to such information, it is important to note that their multiple roles further limit their time to avail themselves of such information where it is available and in a form they can access.

Adoption and adaptation of agricultural innovations and technologies such as fertilizer use, improved seeds, irrigation, and mechanized farming are ideal for those who have the financial wherewithal. Bugri (2004) suggests that in northern Ghana, the focus of intervention is mostly on men because they tend to produce cash crops. Benneh et al. (1995) describe this situation as excluding the rural poor; the majority of whom are women. Duncan and Brants (2004) confirm this observation in their Volta Region study when they note that, as subsistence farmers, women are often marginalized in the introduction of productive technologies, information, storage facilities, and even markets. Morris et al. (1999) noted in their study on the adoption of maize technologies, three main factors: technology characteristics, farming environment, and the farmer. The characteristics of the technology they identified included its complexity, profitability, riskiness, divisibility, and compatibility with other technologies. In the specific case

of the farming environment, the determining factors were the agroclimatic conditions, prevailing cropping systems, degree of commercialization of agriculture, farmer knowledge, and the availability of physical inputs. In the case of farmer characteristics, they noted that the underlying factors were structured by ethnicity and culture, wealth, education, and gender (Morris et al. 1999).

They noted no observed differences between women and men in two areas, specifically in the adoption of crop varieties and row planting as against fertilizer application. However for them:

...the observed gender-linked differences in the rates of adoption are not attributable to inherent characteristics of the technologies themselves; rather the differences result from the fact that women in Ghana have less secure access than men to land, labor, and credit, enjoy relatively fewer contacts with the extension service, and receive less formal education (Morris et al. 1999: 34).

Morris et al. (1999) pleaded caution in their reaction to the conclusions of Doss and Morris (1998) that institutional factors and resource constraints influenced decisions to adopt technology and not gender. For them, to the extent that access to resources remained gendered, women and men's differential adoption of agricultural innovations can be said to be located more in gender power relations.

A key point is the fact that agricultural innovations are not gender neutral and can either entrench existing gender orders or undermine them. New crop varieties also bring with them, new demands such as irrigation, agrochemicals, and levels of labor intensity (Padmanabhan 2004). These, of course, affect labor relations in terms of whose tasks get displaced and who has to take up additional roles. New crop varieties can produce forms of gender segregation and alter the sex sequence in which women and men perform farming activities. New varieties may not appeal to women for the simple reason that they come embedded with traditional gendered barriers that they face in agriculture (Padmanabhan 2004). Beyond gender differences in the rate of adoption of innovations, there are differences in the types of agricultural technologies adopted. The determining factor is the agricultural task technology is replacing. It becomes a matter of the technology and its ability to address women's access barriers. A main point here is the type of additional tasks improved varieties call for. These might include intensive cropping systems involving the use of agrochemicals, pesticides, fertilizer, and weedicide application. The new tasks and implication for women's time use burden is one problem; the other is the additional cost. Women's preference for local varieties and rejection of improved seeds, according to Padmanabhan (2004), serve as ways of getting round access barriers to agrochemical inputs and new markets. New crop varieties have cost implications and are therefore not suited for subsistence economies where food markets are undeveloped. Local varieties are not dependent on agricultural chemicals.

Innovation adoption and gender orders

The utility of crop varieties is an additional consideration informing its uptake by women. In predominantly subsistent economies any crop or varieties introduced must respond to household provisioning need. Padmanabhan (2004), in her discussions on crop innovations and gender relations among the Dagombas and Kusasis in the Northern and the Upper East Regions, outlined household meal provisioning as the key issue. She identified the key gender modifiers for structuring women's meal provisioning as maternity, conjugal status, and age. Thus, household provisioning is fully integrated into life-cycle changes around puberty, marriage, and motherhood. A further dimension is the fact that being subsistence economies, these gendered constructs become fully incorporated in the production systems of the people. The first is the nature of crops grown and second is the kind of agricultural tasks performed even where women and men farm the same plots of land. Thus, the traditional cropping systems structured around cereals and legumes respond to food staples and soil management practices.

Gender constructs in Northern Ghana are located not only in the production of staples but their storage, distribution, and preparation for household consumption. Quoting Goody, Padmanabhan (2004) insists that the time and energy required in food preparation is an additional factor underlying the constructs of gender around food provisioning. Among the Kusasis and Dagombas, male power is deeply embedded in the production and distribution of the main staples, millet and sorghum. Men are perceived first as the main providers and the main cereal staples enjoy high status and corresponding value. In fact, this is evidenced in the position of the sorghum barn and its significance in rituals. Women are barred from entering the barns and only do so during widowhood rites. Womanhood is structured around the main soup ingredient dawadawa. In the Northern Region, the acquisition of the dawadawa seeds falls under male control (Apusigah 2009).

The adoption of new varieties then, is a response to existing provisioning systems and the extent to which such varieties lend themselves as viable alternatives to local staples. An additional consideration is their market appeal and the extent to which the returns for the sale of such varieties allow farmers to recoup losses and purchase the food ingredients. In this case, improved varieties that are viable only as market-oriented crops might have a different appeal from those that can be substituted for local, key staple ingredients in household meals. Crops then do not have the same value and depend to a large measure on their place in the family meal as well as their market value. The main crops in family meals in the three northern regions beyond the cereal staples of millet and sorghum are maize and rice, vegetables like okra, and legumes such as beans and groundnut. Dawadawa serves as a soup ingredient.

Earlier discussions have raised the point about how inter- and intraregional difference arises from gender orders around household provisioning and the ability of new crops to replace known staples. In the three northern regions, this has been built around maize as a substitute for millet. Calling this staple replacing, Padmanabhan (2004) explains it as the process where the introduction of new crops or seed varieties shifts gender restrictions in crop segregation. Such occurrences can either intensify women's restrictions for the production of certain crops or usurp patriarchal restrictions that bar women from cultivating certain crops. Thus, the agricultural innovations do make a direct impact in the constructions of gender. The case of soybean replacing *dawadawa*, the main soup ingredient is one such example Padmanabhan (2004) explored at length.

There are, in addition, intra-gender power relations within households that arise out of the provisioning role and shore up male power. In this instance, it is the relations between mother and daughter-in-law. The notion that a woman qualifies to pick up the laborious process of preparing *dawadawa* into *kpalago* only when she has had three children is a case in point (Padmanabhan 2004). Further to this fact is that the mother-in-law has to initiate the wife who so qualifies on attainment of motherhood into this skill. This practice serves to make marriage an important event for women to acquire provisioning skills. In this instance, it is not a question of gender and access to productive agricultural resources and women's lack thereof but rather, how such resources turn into elements in gender constructs.

Gender and agricultural intensification practices: issues arising

The main finding of this literature review is the place of social gender relations in the uptake of agricultural innovations in the project regions in Ghana and the rest of West Africa. These will be highlighted in this section to inform the main evaluation questions directing the collection of primary data in the selected Africa RISING project communities. The first of the four evaluation questions seeks to explore the criteria that female and male farmers use to determine the suitability of an innovation for adoption. The second targets the place of gender roles in adoption as well as resource access. The third question seeks to unravel female and male differences in innovation adaptation and the reasons for their choices. The fourth and last question is interested in community sources of information about agricultural practices, access to information, and learning spaces for innovation adoption.

The review captured various explanations for women's limited access to resources highlighting the core place of social gender relations in structuring unequal female and male access. Variations in intensity of access barriers were determined by existing gender orders around household provisioning. Land access was deeply entrenched within social norms and customs, deriving from the customary rules that govern household provisioning, which require both women and men to make contributions towards the family meal. Male provisioning roles override females'—a fact that was dominant within the three northern regions. Male farming activities and crops attract more value and therefore are favored when it comes to the distribution of resources. Women's provisioning according to traditional norms, however, was not considered crucial to family survival and therefore not worthy of investments like time, money, and other agricultural inputs, especially land.

These findings call for greater attention to existing gender orders and how innovations sit in relation to female and male provisioning roles and their corresponding agricultural tasks. The ensuing evaluation questions to be explored should be framed within the existing gender orders, which govern the production systems of various crops and livestock. Detailed questions that should inform primary data gathering therefore are:

- Which gender roles are undergoing change as a result of the introduction of specific innovations?
- What is the implication of such changes to women's time use burdens, among others?
- Which new gender roles introduced by the adoption of Africa RISING technologies are likely to empower women and which ones are likely to enhance male power?

These questions are important for exploring how gender orders can, to choose the words of Padmanabhan (2004), "make or unmake gender".

Study approach, methodology, and limitations

This section of the report focuses on the methodology for data gathering. Specifically, the study area, the design, and methods as well as the instruments used in gathering primary data from Africa RISING intervention communities. The section concludes with a brief outline of the limitations of the study.

Study area

The study was conducted in the three northern regions of Ghana: Northern, Upper East, and Upper West Regions. These are the regions where Africa RISING interventions are based in Ghana. The study area comprised six communities in six districts in the three northern regions. The chosen districts were Savelugu-Nanton and Tolon Kumbungu for the Northern Region; Bongo and Kassena Nankana for the Upper East Region; and Wa West and Nadowli for the Upper West Region (Table 1). The specific communities were Tibali and Tingoli in the Northern Region, Gia and Samboligo in Upper East, and Passe and Goli in the Upper West (Table 1). The choice of communities was informed by a number of considerations. The first had to do with communities where most of the Africa RISING trials have been introduced and where farmers had demonstrated a high level of participation. The second was about covering communities already sampled for a quantitative study on adoption to facilitate cross-validation. The third was the need to avoid research fatigue. It was important to choose communities without frequent contact with researchers or Africa RISING's operational teams.

Table 1: Study communities by region, district, and language spoken.

Region	District	Community	Local Language
Northern	Savelugu-Nanton	Tibaali	Dagbani
	Tolon-Kumbungu	Tingoli	
Upper East	Bongo	Gia	Dagaare
	Kassena Nankana	Samboligo	
Upper West	Wa West	Passe	Kassim
	Nadowli	Goli	

Source: Fieldwork 2015.

Study design, methods, and instruments

The broad study design used for primary data gathering was qualitative. This was the requirement stated in the TOR of the contract necessitated by the need to complement the quantitative assessment that Africa RISING had engaged. Qualitative research is rooted in the belief that reality is socially constructed and purely quantitative approaches are limited in the manner in which they can unravel such social constructs, in particular women's realities. The qualitative design therefore sought to distil female farmers' experiences in relation to their male counterparts in the study communities. Secondary sources, a review of scholarly literature and publications of some development organizations, proved useful in providing a retrospective view of the issues, which informed the data collection questions as well as insights into teasing out meaning from primary data gathered.

Primary data gathering methods, largely determined by the requirements of the TOR were qualitative, employing focus group discussions (FGDs) and key informant interviews (KII). Four

FGDs were conducted in each region in the local languages of the participants. They covered two female and two male groups. This gave a total of 12 FGDs in all. Participants for the focus group discussions were drawn from farmers participating in Africa RISING projects in the study communities. Focus group discussions were later supplemented by ranking exercises, where participants were engaged to rank their preference for Africa RISING interventions.

The respondents for the KII covered in the six study districts were also outlined in the TOR guiding the study. They were:

- The District Directors of Agriculture
- Agricultural Extension Agent
- R4D Platform Member
- Female Traditional Leaders (Magagyia)
- Africa RISING Community Facilitators.

A total of 31 key informant interviews were conducted (Table 2). Interviews with the community facilitators, female traditional leaders (Magagyas), and the R4D platform members were conducted by the facilitation team in the respective local languages. The first main data gathering occurred in November 2015 and was followed by the ranking exercise in December of the same year.

Table 2: Key informant respondents covered.

Region	Key Informant Interview Respondents					
	District Directors' of Agriculture	Agricultural Extension Agent	R4D Member	Traditional Female Leader	Community Facilitator	Total
Northern	2	3	2	2	2	11
Upper East	2	2	2	2	2	10
Upper West	2	2	2	2	2	10
Total	6	7	6	6	6	31

Source: Field data 2015.

The interviews with the District/Metropolitan Directors of Agriculture, the Agricultural Extension Agents, as well as the R4D members in the Northern and Upper West Regions were conducted in the English language. Out of the 31 KII participants, 10 were females and the rest males. They included one female District Director of Agriculture, two agricultural extension agents, and one R4D member. The inclusion of Magagyas (leaders of female groups) instead of traditional leaders, who were predominantly male, was informed by the need to increase female participation in the study. This was especially necessary because almost all the agricultural extension officers as well as district/metropolitan directors of agriculture were males.

The two types of qualitative data gathering instruments used were the FGD and key informants interview guides. The FGD guide used for both the female and male FGDs was organized into five sub-sections, namely; gender demography, access to productive resources, sources and access to information and participation in learning activities, adoption and adaptation of technologies, and technology evaluation criteria informing adoption. The FGD guide made it possible for participating farmers to assess themselves in relation to the Africa RISING

interventions. The ranking exercise required research participants with the aid of photographs, to order their preferences for various agricultural products and processes. The pictures included legume and cereal farming methods and practices.

Three separate key informant interview guides (KIIG) were developed for the different categories of respondents. There was one KIIG for the agricultural extension agents (AEAs) and the district directors of agriculture (DDAs). There was another used to gather data from Africa RISING's community facilitators and another for Africa RISING's R4D platform members. Questions on the KIIG guides required these key insiders to assess Africa RISING's interventions and how female and male farmers related to them.

Validation of study findings

After the initial analysis and presentation of the study findings, the data was further subjected to validation in participants' workshops in each of the three northern regions. The purpose was to substantiate the accuracy of the findings and fill in data gaps. Validation workshops held in May 2016 were in Wa for the Upper West Region, Navrongo for Upper East, and Tamale for the Northern Region. During the validation, research findings were presented in plenary sessions, structured according to the evaluation questions specified in the TOR. The plenary sessions were followed by female and male breakout sessions. With the help of carefully designed illustrative banners depicting findings around productive resources, information sources, crops, farming practices, and farming methods, further ranking and discussions ensued. The results constitute rich data and helped to fill data gaps. The participants hardly objected to any of the findings presented but made additions to some findings and explained further the importance of others. There were sessions for recap of the main issues emerging from the sex-segregated breakout sessions. These were followed by reaction sessions, which allowed the participants to further clarify some emerging issues.

Study limitations

The main limitation of this qualitative study was the language barrier between the consultants and the actual project beneficiaries. Having to depend on third parties for information from the participants undoubtedly affected the depth of reflexivity on the part of the consultants in the analysis. A second limitation of the study was the heavy male proportion of key person respondents. Out of five main target groups identified only one was all female; these were the female community leaders, the Magagyias. The rest as office holders in male-dominated spaces were mainly men. One way of dealing with this situation was to interview an additional AEA who happened to be female. This brought the number of interviews for this category of respondents to 13 instead of 12 (Table 2). The use of FGDs as the main data gathering method submerged individual voices, making the analysis of data gathered for individual respondents impossible. This fact constrains intersectional analysis comparing women by other forms of identity beyond their sex, like age and religious background. Our findings however, should serve as pointers that inform policy. These limitations notwithstanding, the use of group methods allowed spot data checks for reliability and validity, since members of the group were able to collectively bring up issues that could have been submerged in individual contacts. A separate ranking exercise as well as findings' validation workshops allowed a deeper interrogation of research findings with the study communities. It was also possible to fill in some data gaps.

Discussion of findings

The findings and insights gained from the qualitative empirical data gathering are presented in this section. The contents of this section are based on data gathered from the various FGDs and the KIIs, and additional insights from the validation workshops. The section is organized accordingly by themes of the evaluation questions detailed in the TOR. The section begins with a presentation of some general demographic characteristics of participants from the study communities. This is followed by discussions on issues relating to the four thematic areas informing the evaluation questions in the TOR.



*Participants in a group photo at the end of a validation exercise in Tamale.
Photo Credit: Michael Dakwa*

Demographic background of participating farmers

The issues examined included the usual demographic information like sex, age, marital status, religion, dominant marriage and household types, family size, educational attainment, and main occupation. Table 3 is a composite presentation of some of the characteristics of the individual farmers covered in the FGDs. A total of 119 individual farmers were covered in the 12 FGDs (Table 3). Generally, there were more female participants (52.9%) than male participants (47.1%) in the FGDs across the regions. In the Northern Region however, more male participants (53.3%) than females (46.7%) were covered in the four FGDs.

On the whole celibacy was not a preferred situation for participants covered in the study. The majority (79.8%) were married, with a higher proportion of Northern Region participants (about 93%) reporting being in marital relations. This was followed by 77 percent in the Upper East Region, and 74 percent in the Upper West Region. A little over 13 percent were widowed while

a few (2.5%) were separated. One male research participant however indicated that he had never been in a marital union (Table 3). There were instances of widow inheritance reported during the demographic data gathering. Generally, marriages tended to be monogamous with nearly 56 percent of married FGD participants reporting that they were in monogamous relations. A further probe into religion and marriage type showed no strong links. Thus all religious types reported incidents of polygynous relations although their proportions in relation to monogamy were lower.

Table 3: Demographic data of individual farmers in the six study communities

	Northern Region		Upper East Region		Upper West Region		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Sex								
Female	14	46.7	22	56.4	27	54.0	63	52.9
Male	16	53.3	17	43.6	23	46.0	56	47.1
Total	30	100.0	39	100.0	50	100.0	119	100.0
Marital status								
Married	28	93.3	30	76.9	37	74.0	95	79.8
Separated	0	0	1	2.6	2	4.0	3	2.5
Divorced	0	0	4	10.3	0	0	4	3.4
Widowed	1	3.3	4	10.3	11	22.0	16	13.4
Never	1	3.3	0	0	0	0	1	0.8
Total	30	100.0	39	100.0	50	100.0	119	100
Religion								
African Tradition	0	0	10	25.6	7	14.0	17	14.3
Islam	27	90.0	1	2.6	8	16.0	36	30.3
Christian	3	10.0	28	71.8	35	70.0	66	55.5
Total	30	100.0	39	100.0	50	100.0	119	100.0

Source: Field data 2015.

The minimum age of participants was 18 while the maximum was 90. The median age was 45; however, participants in the Upper East (43 years) and Upper West (41.5 years) regions had their average age below the median age (Table 4). Such differences cannot be used, however, as the basis for making any associations with emerging trends from the data gathered since research participants in the main were purposively selected.

Table 4. Age descriptions of FGD participants

	Northern Region	Upper East Region	Upper West Region	Overall
N	30	39	50	119
Mean	48.6	46.6	44.9	46.4
Median	45.0	43.0	41.5	45.0
Mode	45	40	41	50
Minimum	26	23	18	18
Maximum	85	90	80	90

Source: Field data 2015.

Farmers' technology evaluation criteria



How do male and female farmers evaluate different technologies? Photo credit: Michael Dakwa

This section seeks to provide answers to the first evaluation question directed at distilling how social gender relations might determine the criteria farmers use to evaluate the suitability of new technologies for uptake. The specific questions detailed in the TOR are: Which criteria do female farmers use when evaluating new agricultural practices for suitability? Which criteria do male farmers use when evaluating new agricultural practices for suitability? How can gender differences in evaluation criteria be explained?

Female farmers' criteria for evaluating suitability of agricultural practices

We present the findings for each region and comment on emerging regional similarities and differences when addressing the last part of this evaluation question. First, we begin with discussion on crop types and varieties and later farming methods and practices for women in the three regions separately.

Crop types and varieties

Women in the three data gathering sessions, focus group discussions, ranking as well as the validation workshops, identified the use of a crop in the family meal and how it was placed in the traditional gender divisions in agricultural production, as constituting the main criteria for evaluating the suitability of new crop varieties for uptake. Other considerations were the market value, that is, the ease with which a crop could be sold to raise income. They were attracted to early maturing varieties. Such crops are able to withstand drought and the unstable weather patterns that have been affecting the region over the past years. Though these considerations were common for all women in the six study communities there were variations in the details of how they influenced the final uptake of the various crops.

In the Northern Region, the specific communities covered as mentioned earlier were Tingoli and Tibali. Here groundnut was placed first for women, because in addition to being an important soup ingredient, it was used to prepare a wide variety of dishes (Table 5A). It was an important income-earning crop. Early maturing groundnut varieties also constituted important hunger gap crops.

Table 5A: Female ranking: crop types

Crop Types	NORTHERN		UPPER WEST		UPPER EAST	
	Tibali	Tingoli	Goli	Passe	Gia	Samboligo
Groundnut	1 st	1 st	3 rd	2 nd	1 st	2 nd
Maize	2 nd	2 nd	1 st	1 st	2 nd	1 st
Cowpea	3 rd	4 th	2 nd	4 th	3 rd	6 th
Soybean	4 th	3 rd	5 th	3 rd	6 th	4 th
Millet	6 th	5 th	6 th	5 th	5 th	3 rd
Sorghum	5 th	6 th	4 th	6 th	4 th	5 th

Source: Field data 2015.

Maize and soybean were new crops that did not fall within the traditional sex-segregated crops and had been taken up by women. In fact, maize was the favorite cereal for women in both communities (Table 5A), first, for its higher yield and second, its early maturity. Women at Tibali preferred cowpea to soybean, blaming lack of market and low use in the family diet. Cowpeas, they said, cooked faster. Millet was ranked last because it was considered difficult to cultivate, especially harvest, and had a short shelf life. It was easily attacked by pests even before harvest. For women at Tingoli however, soybean had an additional attraction over cowpea; this was its longer shelf life due to its ability to resist pests. Gender role provisioning was an important consideration in the uptake of crop types for women in the two Northern Region communities. Crop ability to overcome drought and resist pests was also an important criterion for evaluating the suitability of a crop for uptake. New crops introduced were maize, soybean, and black-eyed cowpeas. Women do not farm millet and sorghum, traditional male crops, even though they claimed no taboos barred them from doing so.

For us women, what goes into the cooking pot is the most important consideration in choosing a crop. For us Tibali women, land is an issue so we grow what is important for our meals.... Maize is our staple cereal and it is used to prepare a number of dishes, groundnut is easy to prepare and it is a soup ingredient that goes with all the cereal dishes like tuo zafi¹.

There was a slight variation in crop ranking for women in the Upper West Region. The reasons underlying their choices, however, were similar to those for their counterparts in the Northern Region. Here again the place of the crop in the family diet, variety of dishes it can be used to prepare, market value, and shelf life were important considerations informing crop preferences. For Goli women, an additional criterion was ease with which the crop can be prepared for eating. Maize was the first choice crop for women in both Goli and Passe because it was the key ingredient used in preparing the family meal and could be sold for income in the local market. Groundnut was a preferred crop for its multiplicity of use and low preparation demands. Additional attractions included the fact that it could be eaten raw and sold to raise income. Cowpea was attractive for its even greater variety of use in meal preparation and rituals. In fact, women of Passe had difficulty choosing between the three legumes; groundnut, cowpea, and soybean. Soybean could be used in a wider variety of dishes but had a drawback: like cowpea, soybean required cooking before eating, but its preparation, unlike that of cowpea, was time consuming.

¹Validation workshop participant, Tamale, May 2016.

The ease of planting was also a factor that women took into consideration when adopting a particular crop (Table 5A). Millet and sorghum were least preferred by women because of the demands of production; they require mounds which are male tasks; it is a taboo for women to prepare mounds. Millet and sorghum are male crops and women have limited access and control over these crops during storage because men store them in barns. Women are barred by tradition from entering millet and sorghum barns. Male family members are the only ones who can issue out these cereals to women for cooking from the barns. Yield, maturity, and shelf life also informed crop preference. Maize yields were higher and together with groundnut had shorter days to maturity; while cowpea, with shorter days to maturity, required special attention during planting and storage. Passe women would have ranked cowpea as the second preferred crop but for its numerous cultivation problems.

In the Upper East Region, the specific study communities of Gia and Samboligo, crop utilization, yield, and ease of preparation for cultivation were important considerations informing adoption of improved varieties. Here, utilization, the extent to which the crop can be used for feeding the household and the variety of dishes it could be used to prepare, topped all the factors. As subsistence farmers, the crops planted should constitute an ingredient in the meals prepared for household consumption. Having a ready market where excess harvest can be sold to earn income was another important consideration. Thus groundnut and maize were the favorites; maize as the main cereal staple and groundnut an important ingredient in soup preparation. Here again groundnut was preferred for multiplicity of use and the fact that it serves as snack for children. An additional consideration for Samboligo women was that it was easy to cultivate. It only requires weeding once after planting, harvesting was an easy task, and it had short maturity. Soybean was not a favorite in both communities. Not only did women find it difficult to cultivate and harvest, it was difficult to prepare and, most importantly, it cannot be eaten raw. Thus millet and sorghum ranked higher than soybean. Though millet and sorghum were traditional crops and after harvest men were the ones who stored these grains, women were not barred from their cultivation and in the two communities, women actually planted millet and sorghum and harvested the crops from their farms and stored it for their use. They were however barred from entering their husbands' grain barns and could be accused of stealing if they did. They could enter only during widowhood or with express permission when their husbands had travelled. Crop maturity time and yield were also important criteria for women. Their choices were informed by the levels of crop resilience against drought and variable weather conditions. Millet and sorghum scored low because of their lower yields. Where there was greater understanding of how to use soybean, it received a high ranking. It was ranked least by women in Gia because they had very little use for it; they found it difficult to grow and had no market for it.

The outcome of the ranking exercise and validation workshops confirmed largely the observations of the Northern Region key persons that women will usually consider in order of priority: utilization of crop in the household meal preparation, market for selling farm produce, land access for planting the crops being introduced, higher yields, and mobilization of additional resources accompanying the cultivation of the particular crop being introduced. Upper East Region women reported a preference for groundnut, maize, and cowpea because of their high utility, since they can be eaten even before they mature. It appears that adoption of high yielding, short maturing maize was most dramatic for the women because it reduced their dependence on their husbands. Women farmers found growing maize economically

empowering. In Goli female focus group discussion participants noted that “if he [husband] drops one bag of maize and my flour finish, I just go to fetch from my stock, unlike in the past when the millet was stored in the barn and he has to fetch for me”².

Likewise, the Bongo DDA observed that in his district “women like to consider high yields, profits, and utilization; the extent to which the crop can be used for food”. He further explained, “they eat what they grow. In this case, the taste of new varieties counts as well as preparation time.” Thus, “there is a preference for the new variety of cowpea nicknamed *omondo* because it cooks fast”³. Other factors like cost, familiarity with the new variety and its production techniques, and availability of inputs were cited in key person interviews with AEAs as important criteria that inform technology adoption. Yield is important for the adoption of crop varieties. The ability of the crop variety to counter some of the major agricultural problems of a particular community especially climatic change was one of important considerations in evaluating crop suitability for uptake. Such crops must however fit within their traditional feeding patterns and failing that, provide income. The financial burden for planting was not cited among the key criteria informing crop adoption.

Farming methods and practices

Yield was the most important consideration informing adoption of farming methods. Methods proven to increase yield were the ones most likely to be adopted. Women in both communities of the Northern Region, in addition to yield, preferred farming methods that allowed several crops to be planted at the same time (Table 5B). They need so many ingredients to prepare family meals especially the soup, female participants explained during the ranking exercise. Monocropping was considered a waste of time and land. The additional advantage was insurance against crop failure due to climatic changes. In case of drought some crop was sure to be resistant and provide food for the family.

Table 5B: Female ranking: farming methods

Farming Methods	Northern		Upper West		Upper East	
	Tibale	Tingoli	Goli	Passe	Gia	Samboligo
Mixed Cropping	3 rd	2 nd	1 st	2 nd	1 st	1 st
Row Planting and Spacing	1 st	1 st	2 nd	3 rd	3 rd	2 nd
Strip Cropping	2 nd	3 rd	3 rd	1 st	2 nd	3 rd

Source: Field data 2015.

All farming methods introduced by Africa RISING were acceptable and had the potential to address the stated concerns. In terms of ranking, the farming methods most preferred by Tibali and Tingoli women farmers were row planting and crop spacing. This was followed by mixed cropping; strip cropping was the least preferred for both female farmers in Tingoli and Tibali (Table 5B). Women in the two Upper East Region communities of Gia and Samboligo found mixed cropping to produce higher yields than strip cropping. Again in Goli in the Upper West, strip cropping was ranked last because it was believed that maize produces heat leading to poor crop performance when intercropped with cowpea, for example (Table 5B). Women at Passe, however, preferred strip to row. An additional attraction to mixed cropping was the fact that it allowed a variety of crops to be cultivated on one plot of land.

²Female FGD, Goli, November 2016.

³Interview with DDA Bongo, November 2015.

We do not have enough land so we like to farm a variety of crops at the same time. We have been planting in rows long before Africa RISING's interventions so we understand the benefits of row planting. Bullock for ploughing makes row planting easier. We only plant in the rows created by the plough. Bullocks are good for smaller farms and tractors for large tracks of land⁴.



Photo credit: Michael Dakwa

Women's choice of farm method was informed by what they considered to be practices that produce higher yields. Other considerations were the amount of sunlight allowed to shorter leguminous crops when intercropped with cereals that tended to be higher and how easy it was to adopt a particular practice. The preference for row planting and crop spacing was because they allowed easy movement around crops, facilitating planting and other agriculture activities.

Criteria for choosing farming practices were informed by a major agricultural problem in the three regions: soil fertility. Fertilizer application featured first for all communities except for women in Tibali whose most preferred farming practice was weedicide application. Pesticide spraying was ranked last because as the women explained, only cowpea required pesticide application. Weeds affect all crops and soil fertility was important for plants to grow. Tibali women felt that it was important to clear weeds before applying fertilizer. In addition, weedicide enabled them to overcome their labor constraints. For Tingoli women, soil fertility was primary and weedicide application, secondary. Using manual forms of weed control was less of a problem. Weedicide and pesticide spraying were male tasks. Women of Tingoli had to rely on male relations to spray their farms, a fact that can cause delay, because men had to complete such tasks on their farms first. In Tibali, women hire men who do this for a fee. The women of Tibali agree that they do not have the knowledge and will welcome any move to equip them with skills to apply agricultural chemicals through spraying.

Table 5C: Female ranking: farming practices

Farm practices	Northern		Upper West		Upper East	
	Tibale	Tingoli	Goli	Passe	Gia	Samboligo
Fertilizer Application	2 nd	1 st				
Spraying Weedicide	1 st	2 nd	3 rd	3 rd	2 nd	2 nd
Spraying Pesticides	3 rd	3 rd	2 nd	2 nd	3 rd	3 rd

Source: Field data 2015.

⁴Female workshop participant, Wa, May 2016

The concern for soil fertility meant that women in Gia and Samboligo placed fertilizer application above all practices. Some, in addition, apply foliar fertilizer. In fact, Gia women participants at the validation workshop in Navrongo, explained that “you have to kill the weeds first before you can see the pests”⁵. Women of Goli explained that not all crops need pesticides, “... the weeds also take up nutrients from the soil, they will compete with plants for any additional nourishment that the fertilizer provides”⁶. Farming is time bound, delaying a particular farm task can compromise crop yield. Women farmers of Goli explained that sometimes services like ploughing are delayed because men have to be serviced first. They have to work on their husbands’ farms before theirs, so planting or weeding can be delayed. Having independent access to weedicides can reduce this dependence.

For women, adoption decisions are informed by their gendered positioning within the agricultural production systems of their respective communities. Other issues were the main agricultural constraints within the regions, soil fertility, and climate change. Women’s gender positioning further constrained these challenges. First the nature of the land they could access as well as labor, including their own. Land quality had serious implications for crop yield. Next to yield, utilization, and market outlets were the other criteria that informed adoption. A fact, related to their gendered provisioning roles within farm households. High yields provide two benefits: more food for household feeding and more income from the sale of the products that have a ready market and fetch a good price. Utilization and yield stand out more over markets and value for the crop. As they explained, you have to produce in excess first before you can sell. Other considerations were labor force demands. But such considerations become unimportant for women if practices lead to high yields and produce a surplus they can sell to raise income.

Male farmers’ criteria for evaluating suitability of agricultural practices

Men, just like women, had the gendered provisioning role uppermost in their minds when making decisions about an agricultural technology for uptake. The main considerations informing the choice of new crop varieties, farming methods, and practices were for men just as much gendered as for women.

Crop varieties

Thus men preferred high-yielding cereal varieties and those that had a ready market. Thus maize was the first choice for men in all the six study communities. Maize was the most preferred because it was the main staple. Men were by tradition expected to provide the main cereal staples, which used to be sorghum and millet until the introduction of fast-maturing maize varieties. Men were attracted by the early maturing, high yielding maize varieties with a ready market to sell surplus production for cash. In addition, maize had better resistance to pests than millet, they explained. Groundnut placed second for men in Tibali in the Northern Region and Gia in the Upper East Region and third for Goli and Passe men in the Upper West Region and Samboligo in the Upper East Region (Table 6A). Preference for sorghum was higher compared to millet because the latter had longer maturity and fewer ritual uses. Groundnut again was the favorite legume for men just as for the women because of its place in meal preparation and the fact that its preparation was not demanding.

⁵Validation workshop, Navrongo, May 2016

⁶Validation workshop, Wa, May 2016

There was less agreement about the place of specific crops especially the legumes, in terms of ranking but the issues informing preference were the same. Yield, maturity duration, market, production costs, and pest resistance were factors that made groundnut attractive for men in a number of the communities. Groundnut, cowpea, and soybean were cheap to grow because they did not demand fertilizer application. For Tibali and Tingoli men this informed their preference for soybean, especially the cash they could raise from its sale (Table 6A).

Table 6A: Male ranking crop types

Crops	NORTHERN		UPPER WEST		UPPER EAST	
	Tibale	Tingoli	Goli	Passe	Gia	Samboligo
Maize	1 st					
Groundnut	2 nd	4 th	3 rd	3 rd	2 nd	3 rd
Millet	6 th	2 nd	5 th	6 th	3 rd	2 nd
Sorghum	4 th	6 th	4 th	2 nd	5 th	6 th
Cowpea	5 th	5 th	2 nd	5 th	4 th	4 th
Soybean	3 rd	3 rd	6 th	4 th	6 th	5 th

Source: Field data 2015.

There were marked differences in terms of choice of crops for men with the exception of maize, which scored a consistent first for all the communities. Cowpea receiving low recognition in three out of the six communities was ranked second in Goli because it was easy to prepare. Men in Goli, Gia, and Samboligo ranked soybeans low because they either found it difficult to cultivate or sell off in the local markets to raise income (Table 6A). An emerging development was a new variety of high-yielding sorghum that was gaining ground in the Northern Region even among female farmers. This new variety does not require fertilizer application and according to males at the validation workshop might come to replace maize in future. Maize requires fertilizer and it is becoming costly. This underscores the production cost as an issue for men more than women.

Farming methods and practices

For men, the key criteria in making choices about which farming method to adopt were the nature of the farming technique and its impact on yields. Men will adopt a practice once they observe that it will produce high yield. Mixed cropping was ranked first for male farmers in Tingoli and Passe, second for their Goli and Gia counterparts, and third for the other two (Table 6B). Key persons like the facilitator insist, “we can see that single cropping does better than mixing many crops on the same plot”. Thus strip cropping was ranked last by men in four out of the six communities (Table 6B). Men in Gia of the Upper West Region and Tingoli in the Northern Region found strip cropping unsuitable; they did not think that the crops were adequately ventilated when tall crops are intercropped with short ones. They found the spaces left between crops wasteful. Men also found investment in land preparation for strip cropping a waste of time. The impact of row planting on crop yield, for men in communities such as Tibali, Goli, and Gia was more visible than that of strip cropping (Table 6B). Row planting was believed to produce higher yields and made plant care like weeding and fertilizer application easy.

Table 6B: Male ranking: farming methods

Farming Methods	Northern		Upper West		Upper East	
	Tibale	Tingoli	Goli	Passe	Gia	Samboligo
Row Planting and Spacing	1 st	2 nd	1 st	2 nd	1 st	2 nd
Strip Cropping	2 nd	3 rd	3 rd	3 rd	3 rd	1 st
Mixed Cropping	3 rd	1 st	2 nd	1 st	2 nd	3 rd

Source: Field data 2015.

Though there was group acceptance among men for the new methods introduced by Africa RISING during ranking and the validation workshops, some male farmers expressed personal reservations about the methods introduced by Africa RISING. Some explained that row planting was demanding, time consuming, and a waste of land. Cereals overshadow legumes when mixed cropped, cutting out sunshine and lowering yield of the legumes. Land use was a deep concern for all but more especially Samboligo men who insisted during the validation workshop, that they had less land than their Gia counterparts. They felt however that women’s preference for mixed cropping was due to their need of more ingredients for their soup. Women had to plant a greater variety of crops. “You can always tell women’s farms by the number of crops you find on a plot of land” observed men at the Upper West validation workshop. “Women like to plant every crop”. They explained. This discussion raised questions about how far men were convinced about the farming methods they had been introduced to and the extent to which adoption will be sustainable over time.

Adoption of farming practices such as fertilizer application and spraying by men was just as for women; informed by the need to ensure crop survival and increase yield. Soil fertility was an issue for communities in Northern Region. All crops need fertile soils and are affected by weeds, but only a few need pesticides. For men in all communities (except Tibali) fertilizer application ranked first (Table 6C). Weedicide spraying was first for Tibali and second for Tingoli, Passe, and Gia men. The Samboligo and Goli men ranked it least. These were the two communities that ranked pesticide application second. For the other four communities the majority of crops grown, they explained, were pest resistant.

Table 6C: Male ranking: farm practices

Farm practices	Northern		Upper West		Upper East	
	Tibali	Tingoli	Goli	Passe	Gia	Samboligo
Fertilizer Application	2 nd	1 st				
Spraying Weedicide	1 st	2 nd	3 rd	2 nd	2 nd	3 rd
Spraying Pesticides	3 rd	3 rd	2 nd	3 rd	3 rd	2 nd

Source: Field data 2015.

Farming practices were gendered tasks, with fertilizer application considered a women’s task in all the communities. The reasons, men explained, were due to the fact that women were used to bending down to perform household and farm tasks such as sweeping and sowing. Applying fertilizer requires the same skill and so comes easily to women. Spraying is perceived to be

difficult and so men were responsible for spraying weedicide and pesticide. Women were obliged to apply fertilizer on their husbands' farms before they did so for their own farms. In some communities, men do so on their farms and that of their wives, in others the practice was commercialized and both women and men paid to get it done on their farms. Availability of inputs was another key criterion for male farmers. Thus, according to one farmer, "Apart from ploughing for you they [Africa RISING] give everything you need, e.g., chemicals and seeds. Africa RISING is the best so far..." This suggests that availability of inputs influences men's choices.

Explaining gender differences in evaluation criteria



How farmers evaluated different types of crops during one of the FGDs. Photo credit: Michael Dakwa.

The evaluation criteria for both women and men were informed by their gendered positioning within the agricultural production systems of their respective communities. Farm household provisioning, deeply embedded in agricultural production relations, in particular between husbands and wives, shaped agricultural preferences. Other issues were the main agricultural constraints within the regions, soil fertility, and climate change. Women's gender positioning further constrained these challenges. First the nature of the land they could access as well as their control over labor including their own. Land quality had serious implications for crop yield. Next to yield, utilization and market outlets were the other criteria that informed adoption. Gendered provisioning roles made household sustenance an important evaluation criterion for particular crop varieties or farming practices and methods. High yields provided two benefits: more food for household feeding and more income from the sale of the products that have a ready market and fetch a good price. Women had to provide soup ingredients; men were responsible for cereal staples. The differences in crop preferences therefore played into

traditionally designated female and male crops. Ability to raise income also featured for both but more so for men as also did the ease of cultivation and preparation of crops into meals for women. For women, multiple use of a crop in meal preparation was an additional consideration that was more important for them than for men.

In the specific case of gender differences informing evaluation criteria for farming practices and methods, the considerations tended to be same for women and men. Yield stood out more over cultivation ease, labor force demands, and input availability and costs. Yields were important in that beyond feeding, the household surplus can be sold for income, making markets a crucial adoption criterion. Availability of markets to sell the crop and its market value constitute key technology evaluation criteria for men more than women. As women explained you have to produce in excess first before you can sell. And for most women production levels are low. Women were prepared to forego additional requirements like time and costs once the yields are high and can feed directly into their household food preparation roles. Thus the fact that food is readily available for the household, in particular for children, is considered by women a reward for the time invested in planting. For women then, the acceptance criteria were related to their reproductive role as the Magagiya of Passe said: “We the women accept new technologies first and fast because the children worry us when they are hungry. If there is food in the house, we don’t have any problem”⁷. Just as the FGD group at Passe put it: “We take care of our children. No child goes to the father when he/she is hungry so why would we not accept things fast to take care of them?”⁸ This is why crop utilization features so much more for women than for men. For men it is income earning, a continuation of the so-called provider role. The main issues therefore were crop utility and place in household meals, gender divisions in farm tasks, and farm productivity.

Explaining gender differences in adoption of new practices

The second evaluation question seeks to explain gender differences affecting the adoption of new practices introduced by Africa RISING. The broad evaluation question, broken into three, seeks answers to specific issues such as: Which Africa RISING practices have been/have not been adopted by male farmers? Which Africa RISING practices have been/have not been adopted by female farmers? Why have female or male farmers adopted/rejected certain practices and what is the relationship with gender dynamics in terms of labor allocation, income distribution, access to resources and to information, as well as other key aspects of gender analysis? The following subsections present our findings on these questions.

Africa RISING practices adopted by male farmers

An important consideration informing the adoption of Africa RISING practices is yield and ease of picking up the new practices. The trials are important and as the R4D platform member put it, “We compared what we produce to what we used to get using the traditional farming methods and we realized that the modern technologies are easy and can be adopted successfully. They give us more yields...”. Row planting and spacing were the most important practices adopted by farmers; the effect on their farms they insist is easy to see. In the specific case of new crops and high yielding varieties, the Bongo DDA notes that “five to ten years ago, there was no maize production here in our district. Now maize has taken over from sorghum. This is better because maize is more productive in terms of yield.” Maize was reported to respond better to fertilizer

⁷KII, Passe November 2015

⁸FGD Passe, November 2015

application than sorghum. Maize was considered to have a more appealing taste than the traditional sorghum.

Very few Africa RISING technologies have been rejected in the communities for the simple reason that they have been found to deliver high yields. The trials provide a useful basis to assess effectiveness. According to the Passe R4D platform member:

I am always invited to Africa RISING's office in Wa where I receive training. I in turn have to train my colleagues. We practice whatever training we receive, and that is why the farming activities are growing in this society. It is really growing because we were twenty in the past, now we are seventy in number. Officials sometimes come here to educate us on farming activities like spacing, fertilizer application, and how to take good care of the farm. We also work hard on our farms by following Africa RISING farming methods, spacing, line-line sowing (row planting) that bring about bumper harvests. Africa RISING's methods are good because they bring about bumper harvests. We work less and get more produce due to the way we follow their farming practices.

Our findings revealed that male adoption of Africa RISING agricultural practice was contingent on their attitude towards the innovation being introduced. Men, various groups of respondents noted, feel new methods challenged their knowledge base. They therefore take longer to come to terms with new ideas and practices that differ from the existing ones they are used to. Male attitudes therefore were identified as a barrier for adoption of Africa RISING practices in the Northern Region. According to the two DDAs, men in the Northern Region were more likely to resist new methods. Men they explained were expected to have superior knowledge and farming skills, a fact that is derived from their traditional roles in agriculture and better contact with extension services of the Ministry of Food and Agriculture and other related agencies that have been introducing innovations for agriculture workers in Ghana. This so-called superior knowledge tends to create an attitude that stands in their way and blocks their reception to new ideas that appear to challenge what they are used to.

One farm practice, however, that appeared unpopular was crop spacing among male farmers especially for soybean production. The respondents in the Northern and Upper West regions have had cause to complain. There were reports from farmers that spacing requirements between crops, especially soybean, were too demanding and a waste of land. For the Goli male focus group discussion participants the spacing requirements are ... "unsuitable because it is like a waste of land to us". Similar concerns about land-use efficiency and crop spacing as well as row planting emerged during the Upper East Region validation workshop. Where there was pressure on land like at Samboligo, the benefit of crop spacing was likely to be contested. At Goli again there were concerns about the crop rotation period of three years, which some farmers had observed was too long. Others reported crop loss due to factors they could not explain. The fact that Africa RISING was research based was also lost on farmers for whom survival was an immediate concern and therefore tended to overshadow long-term benefits. A number were yet to scale up so they kept to their traditional crops and traditional methods of farming because the Africa RISING farms are "not big enough for us" reported a male R4D platform member at Goli. Thus findings appear to suggest rejection was more located with men than women.

Africa RISING practices adopted by female farmers

An important finding was the insistence by the majority of the respondents that women were more likely to adopt Africa RISING technologies than men. Generally, female and male respondents, key persons, and FGD participants stated that women farmers adopt technology faster than men. Thus for a Samboligo R4D member “both participate but the women do not joke with their time; because by nature women want to always learn and know it very well than men”. Women were reported to be adopting all Africa RISING technologies accompanying the planting of the crops that have been introduced. These included pesticide spraying, strip cropping, and rotation. According to the women, “the method of sowing is very good, and we go by that because it is less tiring”. Even though they reported having a higher preference for mixed rather than strip cropping, they noted, “we find mixed cropping to be very good especially with maize and beans mixed. It is good because the beans also get the fertilizer from the maize and we get plenty of beans and maize in the end.” The type of crops planted in mixed cropping systems was an issue for women. There was a higher preference for mixed cropping maize with cowpea than with soybean. Women insisted that the soybean yield is low when stripped cropped with maize. Women at Passe reported, “it does not get enough air”.

Even though technical officers found adoption of Africa RISING technologies higher among women than men, married women, they explained in some instances, could only adopt if their husbands so desired “because they own no farms and work as farm hands on their husbands”. They described married women as passive adopters since they went along with their husbands. Those who did adopt owned their plots and had smaller farm sizes. However, the main criterion that was used to reject Africa RISING farm practices was when both women and men were convinced it would not support higher yields.

Gender dynamics, resource access, and innovation uptake

We explore in this section key issues about gendered access to resources and its relationship with adoption or rejection of farm practices. The specific issues of information sources and how they affect adoption will be covered in the section discussing Evaluation Question 4 where gender differences in accessing and participating in learning new technologies for uptake are interrogated in greater detail. First we discuss the main productive resources identified in the study community highlighting gender issues informing their access and control. Later we discuss their likely impact on adoption of interventions, noting regional differences, where evident.

We identified two main groups of productive resources that we termed community based and the others, externally derived. Community-based resources were locally owned by members of the communities. Access to such resources was governed by the traditional system regulating agricultural production. Community-based resources included land, labor, time, storage, and markets. Productive resources external to the communities were those that required external support to acquire. They were capital or credit, technology, and extension services. Other external productive resources were transportation and processing and irrigation facilities. In tables 7A and 7B female and male farmers, respectively, identified the relative importance of these resources for their agricultural livelihoods.

Table 7A: Female ranking of productive resources

Productive resources	Northern		Upper West		Upper East	
	Tibali	Tingoli	Goli	Passe	Gia	Samboligo
Capital	3	2	4	2	1	1
Land	1	3	1	1	6	4
Technology	2	1	3	4	5	6
Labor	6	6	2	3	4	2
Markets	4	4	6	5	2	3
Extension	5	5	5	6	3	5

Source: Field data: 2015 and 2016.

Table 7B: Male ranking of productive resources

Productive resources	Northern		Upper West		Upper East	
	Tibali	Tingoli	Goli	Passe	Gia	Samboligo
Capital	1	1	2	2	1	1
Technology	2	2	1	1	4	2
Extension	3	3	3	3	2	4
Markets	4	4	4	4	6	3
Labor	5	5	5	5	5	6
Land	6	6	6	6	3	5

Source: Field data 2015 and 2016.

The most important considerations informing the importance attached to a particular productive resource was ease of access. Technology for land preparation, capital, and land were productive resources posing challenges for women. While for men the three most important productive resources were capital, technology, and extension services. Land access was the least challenge for men in four out of the six communities. Even in Gia, where land was acknowledged as scarce, it was placed third for men and last for women. Technology to plough the land for farming, though ranked differently, was deemed critical for farming. Tractors and bullock ploughs, research and workshop participants insisted, were important for land preparation ensuring that large tracts of land could be cleared in a short period. Such technology for land preparation made it possible for women to farm crops that were the preserve of men, like sorghum and millet, because traditionally they were cropped on mounds. Mound making was a male task in some communities. Traditional rules made this task a taboo for women in the Upper West Region, for example. Ploughing by tractor or bullocks allowed crops to be planted on flat land, a practice that removed gender barriers preventing women from farming crops such as sorghum and millet. But plough technologies were reportedly scarce in the study communities. Scarcity can mark up the cost of access. Increased costs meant few women could access ploughing technologies and where they could their access was constrained by time. Farming is time based according to Tibali women, planting at the wrong time can compromise yield. Tractors therefore are the first thoughts of farmers when the season sets in. Tractors serve the additional purpose of transporting farm inputs and produce and helped farmers overcome labor shortages, which they explained have been exacerbated by enrolling their children in school. The additional constraint for women was that the tractors had to first prepare the land belonging to men before theirs, thus delaying planting for them.

Men as the primary holders of land had fewer issues about land acquisition. Findings from the primary data collection, confirmed the literature reviewed about women's inferior land access and lack of control. Age and marital status emerged strongly as the most important demographic characteristics in determining women's access to farmland and other agricultural recourses, as well as directing their decisions regarding agricultural practices. The vast majority did not own land or exercised little control over the land they used for farming activities, since such land was mostly allocated by their husbands. Women will often get land from their husbands' families or seek land through their husbands. This secondary right to land for women no doubt had implications for young unmarried women in the sense that they cannot access land. Women in polygamous marriages had to share their husbands' allotments. There were instances of widow inheritance reported during the demographic data gathering. Widows could retain access to their deceased husbands' allotment or pass it on to their sons if they had older male children. Thus one respondent explained during the FGDs in the Upper East region that should she be widowed her deceased husband's land would pass on to her son, who could then grant her access to the land. In the Upper East Region, one agricultural extension agent reported, "older women are more likely to take land from their natal families". Our findings also suggest that marriage influences the extent to which a woman can decide whether or not to adopt a particular agricultural technology.

In addition to their secondary access women tend to get smaller plots of land and sometimes the less fertile land. The reason, it was explained, was that women were not members of their husbands' families. They were deemed strangers. "The men are the landlords and you have to go them to acquire land; even when your husband has no land to give you and you have to step outside your husband's family, he has to do so on your behalf," explained women at Passe.

Labor posed a challenge for women farmers first because they have lost access to children's labor and second because they have to work on their husbands' farms first before they work on theirs. Migration of young persons from the communities was noted as a fact depleting labor force. The practice of communal support had collapsed due to waged labor and the cost involved in providing meals for the communal working group. Women find the cost of meal provisions high; a cost that can go into hiring labor to prepare the land. Capital was considered important because it allowed access to all other productive resources. Women's access was constrained by the nature of crops they farmed and their ability to farm in excess of their consumption needs. Men had additional sources of income besides the crops, like livestock, cattle, and other ruminants that can be sold to raise income on the quick.

Markets were therefore important for earning income from the sale of farming produce. However, lack of diversity in crops produced meant the markets were easily flooded, creating a glut and depressing prices. An interesting development was that women were slowly gaining better access to credit as a result of a number of micro-credit schemes that have encouraged group formation. Accessing credit through their groups was easier, a fact that men at the validation workshop in the Upper West Region noted with envy. In the main though, women's access to productive resources were constrained by their gendered positioning with the farm households that structured their productive roles as secondary to that of their husbands.

The main issues informing adoption or rejection, we have noted, were crop type and their ability to fit into women and men's gendered spaces in family provisioning. Thus women, as discussed earlier, were adopting improved varieties of legumes, cowpeas and groundnuts, traditional

crops associated with their farming tasks and meal preparation. They were, however, adopting new crops like maize and soybeans, which fell outside the traditional gender divisions. Other gendered issues were their marital status. Thus married women living with their husbands were the least likely to adopt a crop or practice if their husbands had not or refused to. Women need their husbands' approval to alter farming practices and methods. Reporting widows as intransigent and more likely to oppose the authority of husbands, male FGD participants affirmed, 'it is only the widows we marry who sometimes have problems with the farming methods but our real wives do just that'.

Some farmers, both female and male, rejected strip cropping because they insisted that the late maturing crops interfered with yields of early maturing ones when intercropped on the same plot. According to women in Goli strip cropped cowpeas, for example, 'didn't do well because the second crop was not sown early, therefore we could not harvest anything'. Soybeans appeared to be the only crop introduced that suffered rejection within certain communities in the Upper East Region. Production demands were the reason men failed to adopt it in certain communities, men farmers had difficulty complying with distance between crops and found harvesting too demanding. Then there was the question of use in the family meal and ease of preparation, and market for the crop. Time use constraints came second to use and markets.

New developments that allowed women to circumvent traditional rules were important considerations affecting their decisions to adopt interventions. Otherwise women were careful to ensure that the interventions enhanced their provisioning roles. But perhaps the most important barrier to adoption was women's ability to upscale beyond baby trails. Here access to the productive resource land played up. Most women had difficulty accessing larger plots of land that is the criteria for up scaling Africa RISING's bundle of innovations and opted out because they could not meet the land size requirements. As a cereal, maize's ability to replace sorghum and millet in preparation of the main dish *Tuo Zafi* of the three regions is enormous. Soybeans, unfortunately, did not have the same capacity. Even though some women mentioned soybeans during FGDs as having better resistance to pest and its use as a substitute for *dawadawa* in soup preparation, such factors did not enhance its adoption status. Such considerations notwithstanding, a number of respondents explained that they had no control over the types of crops chosen in the intervention. It is the resources that Africa RISING provides that at the end of day determine which crops women and men will plant. Their preferences hardly came to play sometimes.

Gender differences in adapting new technologies

This section presents findings to answer the third evaluation question, addressing propensity to adapt Africa RISING technologies. The details of evaluation question 3 as spelt out in the terms of reference were: Have female farmers adapted certain Africa RISING practices to make them more suitable for their use? Have male farmers adapted certain Africa RISING practices to make them more suitable for their use? If yes, how have male versus female farmers adapted these practices for their purposes? Why have they adapted them?

On the whole the motivation to adapt Africa RISING practices presented to farmers was a question of what flexibility AEAs allowed. Thus, in the Northern Region it was noted that the attitude of AEAs' played a crucial role determining whether farmers will adapt or not. Some were permissive and will allow farmers to exercise initiative. The technical officer in the Northern Region, for example, claimed that he recognized and respected farmers' prior

knowledge; according to him 'you know these people have been farming for a long time and their experience too can be important sources of some good agricultural practices.' Some AEAs were emphatic about outlawing any attempts at adaptation. They even presented all attempts to alter practices taught as signs of indiscipline that could result in disqualifying farmers from participation in Africa RISING projects. 'No, no; I encourage them to do as they have been told and not to alter the Africa RISING methods' one AEA insisted.

There were some reported cases of adaptation notwithstanding the objections of technical officers cited above. A number of respondents reported male farmers as more prone to adapt technology introduced than females. As one DDA reported 'Women hardly adapt. For them, they accept the technologies as they are'. In the other regions however, there were no observed differences in the propensity for females or males to adapt.

Adaptations were possible in the timing of tasks, when to plant crops, and here farmers relied on their traditional knowledge to predict the rainfall patterns. Other few instances of adaptation reported were in the area of strip cropping and crop spacing; with more men than women farmers altering the number of strips or rows between plants, in the Wa West District, for example. In the Upper East Region women in FGDs reported that they were just as likely as men to make changes in the recommended spacing between rows. Another area was in fertilizer application, where they designed practical means to prevent rain runoff from washing away the fertilizer applied in the fields. Thus they will bury the fertilizer rather than broadcast during application or raise mounds to block rainwater flow that might wash away the fertilizer. Here also female and male respondents in Samboligo all reported raising mounds to prevent rainwater from carrying away the fertilizer applied in the fields. Others reported the use of manure in addition to fertilizer.

On the whole it appeared that few farmers whether female or male saw the need to adapt technology. Male focus group discussants insisted that they had no reason to vary the practices introduced by Africa RISING in fact they '... go by Africa RISING innovations because it brings about good yields.' A number are making no effort to adapt because they did not see the need to, as female participants in the focus group discussion explained:



We are doing exactly what Africa RISING has taught us to do. Sowing line by line, spacing the crops to give air to the plants, mixing the crops and all they taught us. This is because we get good yields.

Photo credit: Michael Dakwa

In fact, some reported of a reduction in time spent farming. They made the point about working less and gaining more in terms of yield. Thus, a number of respondents saw little need to vary the methods introduced.

Gender differences in accessing and participating in learning new technologies

The last evaluation question targets access to information. It is interested in the information sources for learning about Africa RISING innovations as well as levels of participation and how gender influences female and male information sources. Additional issues of interest were how the gender differences were structuring access to information vital for participation in learning new technologies introduced by Africa RISING. The details of this evaluation question are as follows: Evaluation Question 4: In each community, what are the most important sources of information and learning about agricultural practices? How do female farmers have access to information and participate in learning? How do male farmers have access to information and participate in learning? How can gender differences in access to information and participation be explained?

Women and men's agricultural information sources and learning spaces

Women were identified at most female and male data gathering sessions as being more eager than men to learn about agricultural innovations for several reasons. Women were more anxious and concerned with food availability for household consumption. Consistently respondents mentioned the fact that women attended meetings more than men. Women were noted to be more conscientious with their time. According to the Sambologo R4D platform member 'they do not joke with their time' and 'women always want to learn'. Women are more serious with learning new things that will improve agricultural practices, the Sambologo Magagyia explains: "The pain is on the women so when they hear of any help they are serious to do it to alleviate their poverty. We can't joke with things that concern food". The general consensus at the ranking and validation sessions was that women tend to learn faster than men, because they have to implement all the farming practices after ploughing has been completed. Men had a tendency to be complacent with old practices and therefore less eager to learn new things.

Information sources served as learning spaces for farmers in the study communities. During the validation workshops, information sources identified from the field data collection was shared for confirmation. All the sources were confirmed as important. The main emerging trend from the three field data collection exercises was that for women, sources with human contact were most effective, while for men electronic media like mobile phones and radios were preferred. It was also confirmed at the validation sessions in all the three regions that women participated better in interactive female only learning spaces. In fact agricultural extension agents explained that women would ask and answer questions so long as it was an all-women-meeting. They were however inhibited in mixed sex groups and less inclined to offer opinion or seek clarification.

In all the communities, channels provided by the Ministry of Food and Agriculture (MoFA) were identified as major sources of information for learning about Africa RISING's agricultural practices. 'They [Africa RISING] are using MoFA's existing channels of communication' the Kassena Nankana DDA explained. In the communities, FGD participants acknowledged that their information sources were technical officers. The responses to the question about how they

heard of Africa RISING practices; were ‘we were called to a meeting;’ ‘they brought someone to train us’ ‘someone came and asked us to write our names and they brought us seeds and fertilizer’. Some were more personal mentioning the ‘agriculture people’ or ‘our assemblyman or farmers’ leader’.

The extension service channel, though effective, was hindered by the number of technical officers available. None of the districts had their full complement of technical officers. The agricultural ministry was severely constrained, the DDAs explained. The Kassena Nankana District Director complained that “instead of the 36 required agriculture extension assistants, we have only nine, all men”. The Savelugu District Director reported: “I have 15 agriculture extension assistants instead of the 32 required. Only one out of the lot was a woman and she had just been promoted to the rank of a supervisor.” Nadowli District had three extension officers and three supervisors, but there was only one woman among them. Participation in Africa RISING project did not relieve officers of their normal responsibilities to the Ministry.

To get round the shortfall in technical officers, meetings had become important sources of information. Most communities had farmers’ groups (farmer-based organizations). Such groups usually comprised women and men as members; others were single sex, usually women’s groups. The groups held regular meetings, which served as platforms for disseminating information on agriculture practices. Farmers’ meetings were held within the communities, in the chief’s house, or at social centers. The meetings could either be at the instance of Africa RISING or the Ministry of Agriculture, or in some instances community members could call meetings on their own initiative as the R4D member at Sambologo said, “...they look for a day and invite the Africa RISING to come and talk to them”. Other forums for holding meetings were field days and here the local chiefs played a mobilizing role. Community level meetings would be addressed by technical officers from the Ministry of Food and Agriculture, R4D platform members, or designated input dealers who have been licensed by the Plant Protection and Regulatory Services of the Ministry of Food and Agriculture to provide information on their products to farmers.

In addition to the institutionalized channels of the Ministry of Food and Agriculture, Africa RISING used its own officers who interacted directly with the communities to teach new practices to farmers. Facilitators and R4D members however derived their information from meetings organized in their respective district capitals. The Africa RISING facilitator and R4D platform member at Goli explains:

I get access to information about agricultural practices through the meetings organized by Africa Rising officials. ... I also get access to information about these practices through my interaction with the agriculture extension officer because he wants us to know how to sustain our crop production.

Female extension officers were reported to be more effective in reaching women farmers to provide information on agricultural innovations, since cultural norms barred married women from speaking to strange men. Most extension officers in the districts were men; group meetings were used to overcome this traditional constraint.

The main farmer education interventions we have outlined so far were as the Savelugu DDA observed, all top down approaches. There were others, however, that allowed peer exchange of

ideas and information sharing; they included informal interaction among fellow farmers. Others acting as information sources were local leaders such as the Magagya as well as chairpersons of farmer-based organizations in the communities. For women, husbands were additional sources of information. Direct observation was another important learning forum. Farmers get information from observing the outcome of farm practices on their colleagues' farms. A fact that made Africa RISING demonstration plots important learning spaces. This route was identified in the Upper West Region as being more effective for older men resistant to change.

Despite the effectiveness of human contact, the validation workshops brought out additional issues of the benefit of electronic media, especially mobile phones and radios. Discussion programs on radio were another information source on agricultural practices in use in the study communities. Radios are effective if the programs are targeted and broadcast at a time when women would have ended their domestic chores. Women then plan to make time to listen to scheduled broadcasts. Some districts reported special arrangements with radio stations to broadcast farmer education programs. Nadowli DDA, for example, reported a programmed two-hour weekly slot used to educate farmers. The program was broadcast in English and the local languages. In Gia, for example, the presence of a community radio facilitated access for all. Another instance of radio use that was considered effective was cited in the Upper East Region where Africa RISING supplied radios earlier in the project. Women used to carry them everywhere including their farms. All the radios were out of use they reported with regret. The preference for radios was the intensity of information they carried. Radios carry a lot of information but timing matters, and here there was some disagreement about the time of day most suitable for women. The preference for women in Tingoli was early mornings and for Tibali women it was in the evening when all household chores were over. This points to the need to consult women over the most appropriate time since community specific situations might affect women's domestic scheduling.

But women in the Upper West Region, for example, insisted that the most effective information source was the mobile phone; they explained that mobile phones allow access to other sources. Since it is targeted, there is a better chance for the message to reach the person for whom it is intended. Additionally they explained;

... you need it to mobilize people to attend meetings and mobile phones are effective for this; radios are good but you should have the time to sit and listen; if you don't there is no guarantee that some important message of use to you will be delivered if you are not there to hear it for yourself; then, sometimes you might even forget to listen to the radio. Mobile phones are useful in times of emergencies, for example, we got lost on our way here [to the workshop venue]; thanks to the mobile phone we found our way with ease.

The mobile phone is an important source used by farmers to request information or assistance for agriculture/farm-related challenges. Community facilitators and Africa RISING officers as well as AEAs also used mobile phones to communicate. "Sometimes ..., they [Africa RISING officers] call me on phone to disseminate information to my colleagues" the Goli R4D platform member explained. Mobile phones had practical relevance in granting access to information on weather conditions and about when to plant. Male farmers were more likely to use the mobile phones to contact technical officers for assistance. They were of little use to female farmers because most women had none, and the few who did especially in Goli and Samboligo had no electricity to charge the phones. They could only charge on market days and this had to be done at a fee.

The Savelugu District had an additional medium, a mobile cinema van that was used to support farmer education. According to the Savelugu DDA, “the women love to watch the educational programs”. Participants pointed out that the use of the mobile cinema vans had its challenges, first was the timing and second frequency of use. Very few remember having accessed information from this source. Women in some communities like the Upper West would have difficulty attending at night, first was getting their husbands permission and second was dealing with childcare.

The main constraints affecting women’s use of electronic media were gendered. Few women had the income to buy phones and radios. Some communities did not have electricity for charging phones. Then there was the bigger issue of women’s domestic roles constraining access to radios in particular. According to men in the validation workshops, women are usually away fetching water or fuel wood or busy cooking to pay attention to radio programs. Another concern was that husbands were averse to allowing their wives to own phones and some would bar their wives from watching mobile cinemas at night. Extension officers are therefore the best option in the light of the difficulties with accessing radios and phones and so are group meetings, which women use to share information. Other sources are peer exchanges where individual women share information about innovations at the person-to-person level, especially women leaders. But for Gia, women meetings were not effective because people do not attend meetings or turn up late when they do. For practical purposes however, they conceded that the most effective source of information for women was peer contact and women leaders who have a good understanding of the issues.

Female leaders like the Magagyia have direct links with the Africa RISING officers and can get to the district capitals to access specialized training. They are expected to pass on such information to women within the community. Female groups were more likely to mention Africa RISING or what they identified as “some agriculture people” as their sources of information. The use of meetings as an information disseminating point on agricultural practices was useful for women, so were other women and especially the Magagyia. Another source was their husbands.

Male information sources identified were agricultural extension officers, input dealers, radios mobile phones, and lead farmers of the farmer-based organizations. The fact that all technical officers were mainly men facilitated male access to information. Men were more likely to call the AEAs and even provide them with money to buy fuel to travel to their communities on their motorbikes to assist with agricultural problems.

Explaining gender differences in information access and participation in learning

All the human information sources mentioned had men as the main carriers. Men dominated as technical officers in the Ministry of Food and Agriculture and in Africa RISING personnel in contact with the communities. The R4D platform, an important management system at the community level for dealing with farmer issues around the Africa RISING project, is male dominated. But for the special position of the Magagyia, women would have been virtually absent from this structure. Even here Magagyias operate as sources of information for reaching women and less as the women’s mouthpiece on issues related to their participation and access to resources to facilitate their participation in the projects.

Information access was also determined by the institutional location of farmers within the chain of operation of the Africa RISING project. Gender differences in information sources took an institutional dimension with persons highly placed socially having better access. Thus one's position within the chain of operation of the project determines what information sources can be accessed and the nature of information that will be available at each source. Agricultural officers use lead farmers who then organize farmers in the community. Thus the Magagya of Goli whose husband was the community facilitator, reported that, "My husband is free with some agricultural officers who have taught him some methods of farming."

Existing relations with agricultural officers have a gender dimension first in terms of the fact that they were mainly men and, secondly, that they were few and therefore unable to make contact with the communities as they should. Then the need to provide fuel for technical officers to visit their farms served to disadvantage farmers who could not afford such. Women's lower income levels also put them out of touch with a number of information sources like mobile phones and radios. Bicycles and motorbikes for travelling to meetings put men at an advantage. As was explained the distance to district offices could be a deterrent for persons without a means of transport in places where roads were bad and public transport system was non-existent.

Women's housekeeping roles were an additional barrier to agriculture information. AEA in the Tolon District noted, "participation among women is low because of the demands on their time. Mostly when I go, they are away at the stream, clinic, market; and even when they come they wait for their men to talk".

Another factor that further limits women's access to relevant agricultural information is the use of English language in some of the meetings. According to one DDA, "when it comes to participation in learning, there are more men and this is because some of our trainings are done in English and we target literate farmers, most of whom are men" (DW/DDA). Then most community farmer-based production groups were said to be organized around the production of market-oriented crops, an area where men dominate. Women's groups were more likely to operate around processing activities. Female access to information in mixed sex groups was less effective than in single sex groups. A number of DDAs were unhappy about their inability to reach women. The Tolon DDA explained:

We are not reaching women enough since Africa RISING resources are as minimal as that of the government. They just give the Agricultural Extension Assistants fuel. Meanwhile the work is difficult so they are getting demoralized. Whatever it is, we could do better with accessing women. Women need to be singled out and targeted. We also need more female Agriculture Extension Assistants because male farmers get suspicious when male assistants are interacting with the women.

Emerging Issues

As noted earlier, Kabeer's Social Relations Approach was the conceptual framework adopted for analyzing field data. This conceptual tool is useful for studies seeking to unravel power relations embedded in socially constituted differences within social groups. We identified analytical categories of formal and informal institutions of state, market, community, and household that act in concert to set rules to justify differential access to, and control over, resources. At the core of our analysis were forms of gender orders, which emerged out of the rules set. Gender orders, we explained, are standardized appropriate behaviors and expectations for women and men in each social setting. Our interests were the forms of privilege and advantage emerging from gender differentiations within the study communities. We believed such a focus would lead to findings that can assist Africa RISING to determine how existing gender orders impact the adoption of its intensification practices. The rest of this section utilizes this framework to analyze the findings towards this end. The discussions are reported under the four main evaluation questions set out for this report. The questions were directed at seeking answers to how socially constituted gender differences might account for how female and male farmers adopt and adapt Africa RISING's innovations. The specific issues explored were around variations in farmers' evaluation criteria as well differential access to and control over productive agricultural resources, including information and learning conditions. We discuss these in relation to the institutional arrangements adopted for delivering intensification practices.

Institutional arrangements for delivering intensification practices, we have explained, account for the rules legitimizing existing power relations regulating resource distribution. Africa RISING utilizes existing structures of the Ministry of Food and Agriculture to reach farmers in its intervention communities. Again Africa RISING employs the services of private agents to provide such inputs as seed varieties; agro-chemicals, weedicides, pesticides, and fertilizer. Africa RISING therefore straddles state and market institutions. Farmers use community and household structures to implement the innovations. Thus all the institutions identified by Kabeer as important for rule setting in resource access and control, played significant roles in Africa RISING project implementation. There are inherent gender constraints that will feed into project implementation and uptake within this mode of operation, despite some apparent advantages.

Africa RISING's partnership with the Ministry is important in granting access to farmers and shoring up the credibility of the project. Again it provides access to a team of staff with some level of gender awareness and understanding of women-specific constraints in the agriculture sector. However there are a number of internal gender constraints within this partnership that will impact the gender responsiveness of future strategies and practices. First, is the structure of the Ministry for Food and Agriculture, and how, despite years of dedicated attention in policy and institutional set up, efforts to improve the conditions under which women participate in agricultural production fall short of set goals. For example, attempts by the state to reach female farmers through its Women in Agriculture Development Technical Directorate are challenged by the sheer dearth of officers. This fact affects information access and learning spaces for women. The use of private agents also poses challenges for long-term sustainability of innovations especially after project closure. Since the motive of input dealers is profit, the extent to which they may remain with innovations that serve to provide alternatives to existing gender orders should be a source of concern. The question is how far the supply of an input that serves to empower women will be upheld if it does not yield the needed profit. Again we note

that attraction to Africa RISING's interventions is based on the fact that, as research participants explained, the inputs were given out free at no cost to farmers.

Gender differences in observed criteria for evaluating innovation suitability

We observed that the main issues shaping criteria for evaluating innovation suitability for adoption were how crop types and farm practices fitted into existing constructions of gender orders. Vital systems shaping these orders were household provisioning as outlined in productive and reproductive roles. The key institutional structures underlying the observed criteria for evaluating the suitability or otherwise of new agricultural practices by farmers were located within the rules set by the two main informal institutions: the community and the household. Community interactions and household organization were based on social rules and norms that determine women and men's provisioning roles, both productive and reproductive, and what was considered acceptable conduct for persons occupying set positions in the study communities.

The rules that determined female and male roles within the household setting and at the community levels were those governing marriage; wife and husband's responsibility in household provisioning, especially meals. The rules were supported by the norms that granted access to, and control of, the most important agricultural resource, land. As patrilineal societies were expected to move women from their natal communities to live with their husbands on marriage, they have no entitlement to their natal lineage lands. Household provisioning rules assigned women and men to specific roles and these in turn determined their agricultural tasks. According to the existing gender orders, men were the main providers of the household. Their farms were conceived as the main source of household sustenance. They were the primary farmers and women secondary farmers or farm assistants to their husbands. The plots of land on women-farmed soup ingredients (vegetables and legumes) were designated as their individual farms. These rules placed male crops in hierarchical position over and above female crops, legitimizing male entitlement to larger and better farmlands than women. The rules, in addition, gave men primary access to women's labor and it was unheard of for women to refuse to offer their labor on so-called household farms.

Crops were associated with women or men primarily because of their relation to the responsibilities in providing the family meal. Farming practices were used to legitimate male control over crops, like mold making for sorghum and millet, for example, and in certain cases customary rules like taboos were used to keep women away from performing such tasks.

Female provisioning roles, structured within the farm household by existing traditions, supported by the rules of marriage and female conduct in the household and community, were key issues informing the criteria for adoption of new technologies. Females' responsibility for soup ingredients, for example, pushed them to identify more with legumes such as groundnut, cowpea, and soybean as well as vegetables.

Linked to provisioning were land quality and climate change. They informed adoption criteria for the simple reason that they underscored crop yield. Thus maturity duration of crop varieties and farm practices that supported high yields were important considerations. For women, the place of crop utilization in the criteria setting ladder for making innovation choices was linked to the

rules that assigned them heavy responsibility for household social reproduction, giving them primary responsibility for the family meals.

Gender, productive resource access and control, and innovation uptake

We noted that two sets of resources were based on the institutions responsible for their regulation and distribution. We identified community-based resources, like land and labor, and external resources, like credit, technology, extension services, irrigation, transportation, and processing facilities. The distribution of community-based resources, our findings revealed, depended on local customary rules on household provisioning. While external productive resources were located more within the realm of the state. As explained, traditional rules informing gender responsibilities in providing family meals grant males more privileges in accessing a critical agricultural resource, land, in all the study communities. As patrilineal societies, land was passed through the male line, male gender roles as providers of staples for the household meal, justified their access to larger plots of land than those available to women. This was buttressed by the rules of marital residence that required women to live with their husbands. Marital status becomes a factor creating differences among women, informing their ability to adopt and adapt technologies. Land access through men is a limiting factor for women since they need their husbands' permission in order to adopt technologies. Widowhood allowed women to escape the rules of submitting to men. But this widowhood advantage was offset by land access and the likelihood that women might not have land to farm on at all. This calls for further interrogation in future studies.

Beyond access to land is the nature of land and size. Land size is a key criterion for qualifying to participate in Africa RISING technology, beginning with the baby trials and later moving on to upscaling. Upscaling is contingent on land size. Women's ability to upscale then is located more within traditional rule setting than personal choices. Where land is scarce women might fail to qualify to upscale. This suggests that rule-setting criteria by Africa RISING for qualifying farmers to participate in its interventions have to be tested for its gendered impact.

External resources were constrained first by the ability of the state to provide them to all farmers and use of the market to deliver them. We have discussed at length constraints in extension delivery and its implications for women farmers in particular. The use of market to provide inputs like tractors, chemicals, and improved variety, we noted also, produces differences in uptake. The ability to pay becomes an important criterion for access. In fact the success of Africa RISING in the communities, we were told, was due to the fact that important inputs were given out free.

Overcoming access brings to the fore the need to deal with the traditional division of labor. The ability of technology to transcend gender norms becomes important. There were instances where innovations were beginning to break the rules controlling women and men's agricultural tasks. This was along the introduction of crops that break women's dependence on men (maize and soybean). These crops fall outside the traditional crop divisions and allowed women to earn independent income. An additional gender order-breaking avenue was the introduction of ploughing that allowed women to plant on flat land and not on mounds. Such findings call for deeper understanding of how to support women beyond their ability to perform their

traditional roles better. How to break down gender barriers structuring their discriminatory access to agricultural resources is an area where research is needed to provide additional insights.

Female and male farmers' propensity to adapt agricultural practices

The data suggests that adaptation of Africa RISING practices is dependent on the attitude of the AEs and the extent to which they allow it. Generally, adaptations are not encouraged by most AEs and so it is not common practice among farmers in general, whether male or female. Few instances reported were around timing, fertilizer broadcasting, and spaces between intercropped plants. We contend however that if avenues were provided for adaptation, the same factors that influence women's adoption could inhibit women from adapting innovations easily. If a woman farms alongside her husband, for instance, she cannot decide to adopt and adapt technologies easily without her husband's consent. The rules of marital conduct will not support this. Since few women were living alone and farming their individual plots, questions of adaptation have to be routed through gendered rules and women's ability to navigate existing gender orders.

Gender dynamics of information access and learning about agricultural practices

Perhaps it is in the discussion of our findings on gender differences in access to information that the institutionalized gender biases from formal systems play up most. It is obvious from the data on information sources and access, as well as participation in learning about agricultural innovations and practices that deep-seated gendered differences exist in information access for women and men. These differences stem from:

- Male dominance in the information sources.
- The paucity of human-resource capacity of the state institution, Ministry of Food and Agriculture, and its women's organ, the Women in Agriculture Directorate, as well as their institutionalized gender bias.
- Cost of accessing information by means of technology, radio, and mobile phones.
- The burden of women's domestic and care work.
- Use of English language in some instances.
- Nature and composition of farmer groups used for information dissemination.

These were only superficial explanations to the gender differences in accessing information and participating in learning. The underlying foundations can be traced to social gender relations with the institutionalized gender orders. Thus, rules governing female behavior in Northern Region communities discourage interactions with strange males. Norms of engagement for women also dissuade them from speaking in the presence of a male. This explains why a woman would be silent in a mixed group especially if her husband is present. The rules assigning women the larger share of domestic work is another inhibiting factor. Men have time to participate in meetings because they have little or no responsibility for household chores like childcare and fetching water and fuel wood.

The fact that the most important information sources for women are human based raises issues of access since their interactions with others outside their households is carefully controlled by norms of appropriate gender behavior. Findings also revealed that the institutional settings tend to be male dominated. Customary rules of decision-making organs limit women's participation in leadership and where they happen to operate their jurisdictional remit extends to female affairs. Existing spaces like farmer groups operate within such customary rules. Membership of the R4Ds, for example, tends to be male dominated. But for the introduction of the Magagyia there would have been no female presence on this important community-based, decision-making arena of Africa RISING. Thus, having the Magagyia on the R4D is a useful starting point. Her primary responsibility to assist women acquire skills to process soy products in order to facilitate the acceptance of soybean, facilitates the acceptance of a gender order breaking crop in communities where this crop has been accepted. There is a need to explore how her role can stretch to other areas of resource constraints beyond serving as a conduit for reaching women. It is important also to explore how membership on the R4D platform can be expanded to include more women.

Working within established systems of state and market institutions has implications that should inform Africa RISING's decisions about how to make its strategies gender sensitive. First, is the ability of these institutions to address rules shaping gender orders that structure women and men's engagement in agriculture, and the orientation of, these institutions. We note, for example, the implications of the for-profit motive of market-based input providers for gender responsive interventions. We also point out state policy content for reaching women farmers and the implementation capacity of responsible ministries. Here we are making reference to the institutional setting of the Ministry of Food and Agriculture and its capacity to meet women farmers' gender needs. Such gender needs might hinder women's participation in Africa RISING's intensification practices. We note that a number of challenges need to be overcome to improve agricultural productivity for all farmers, which also have implications for women's productive capacity in the interventions' communities. A number of these issues fall beyond Africa RISING's capacity. These include the provision of irrigation facilities, ploughing technology, and transport infrastructure.

The question is how far interventions can move beyond access to grant women greater autonomy over productive resources. Our findings have provided leads to avenues for circumventing institutional rules around gendered crop divisions and agricultural task allocations. The findings suggest that the rules, far from being rigid, and like all customary practices, are amenable to change. This calls for a better understanding of how gendered rules engaging agricultural production can be circumvented. Additional questions needing attention are how interventions can be used to support women who are able to transgress existing gender orders. This calls for real attention to identifying existing institutional arrangements that allow men to maintain their stronghold on agricultural resource access and control.

Recommendations

Dealing with gender differences in observed criteria for evaluating innovation suitability

Our findings and subsequent analysis show that informal institutional rules are the most important factors shaping gender differences in observed criteria for evaluating the suitability or otherwise of new technologies or practices. These rules, generated at the community and household levels, are important for shaping female and male responses to agricultural innovations. It was clear, however, that for gender differences to be overcome it might be necessary for Africa RISING to explore crops like maize that transcend gender boundaries and therefore do not submit to the rules of gender provisioning. An additional consideration will be to explore markets for female crops, in particular cowpea and groundnut, to enable women to earn additional income to reduce their dependence on men. Another consideration is the introduction of technology for farming, tractors and bullock ploughs, and spraying machines that women can easily access. Women will have to be provided with the skills to manage such technology outside male control. This calls for research to understand how technology introduction can circumvent existing rules on female and male roles in agricultural production and how the introduction of technology can unmake gender orders in the community.

Tackling gender in productive resource access and control in innovation uptake

Land access, we noted, constituted a major constraint to female ability to adopt Africa RISING technology. This affected access to other community and externally based productive resources. We noted, in addition, the land criteria for qualifying farmers to be admitted to try Africa RISING technologies. Dealing with women's land access is therefore an important condition for promoting a gender-responsive policy. An important approach calls for a reexamination of women's groups and the role of the Magagyia as presently constituted. It might be important to push for group acquisition of land for women. This will call for the promotion of women's groups and specific capacity building to set them up to push for land from traditional leaders in the respective communities. There are suggestions that male traditional rulers might be amenable to granting women access to land if they approach them as a group and not as individuals. The role of the Magagyia in mobilizing women to push for, secure, and protect lands so acquired might be an important strategy to get women to benefit from Africa RISING technologies by overcoming an important resource constraint. Another approach will be to support the Ministry of Food and Agriculture's Women in Agricultural Development Directorate to institute a monitoring mechanism for its own policy goals. This could lead to greater pressure for delivering policy targets and provide an avenue for discussing even policy assumptions and their ability to address gendered constraints underlying women's differential resource access and control. To meet this aim it might be important for Africa RISING to outline clearly what its goals and targets are for meeting its own gender policy and set up facilities for monitoring adherence.

Overcoming differentials in female and male farmers' propensity to adapt agricultural practices

From the findings on adaptation, the most critical recommendation we can prudently offer is the need for special gender awareness training for technical officers fronting Africa RISING's technologies within the communities. They should be supported to identify and promote adaptation of the technologies they introduce into the communities for all and in particular for women.

But it is necessary that the various platforms are encouraged to discuss challenges in adoption and how they fit within existing practices. The tendency is for innovations to recognize indigenous knowledge systems for environmental sensitivity. Incorporating within the trial process the need for officers to address, and account for, any existing practices that can enhance the impact of Africa RISING interventions might encourage officers to support adaptation for all farmers and in particular women.

Dealing with the gender dynamics of information access and learning about agricultural practices

As discussed earlier, gendered access to information is located within formal institutions as well as the technology employed to support the dissemination of information to target communities. The Ministry of Food and Agriculture, its institutional capacity in terms of the dearth of its human resources deployed to support Africa RISING, and gender balance within it, have been discussed at length. In view of the findings on sources of and access to information as well as participation in learning about agricultural innovations and practices, we recommend that Africa RISING:

- Support the Ministry of Food and Agriculture to implement its affirmative action provisions on recruiting and training more female AEAs in their operational areas.
- Engage the Women in Agricultural Development Directorate in its activities and also provide their representative a position on the R4D platform.
- Explore the possibility of providing women with basic functional mobile phones at subsidized prices. This will aid free flow of communication between them and the designated agents.
- Endeavour to organize interactions with female farmers when they are done with their domestic chores. Asking women for a convenient time may be a useful step.
- Ensure that all meetings use the local languages of the farmers or at least are translated to ensure the inclusion of all, male or female, regardless of the level of education.
- Encourage the formation of more female groups, since groups have emerged as an important vehicle for information dissemination. Once female groups are formed, attempts should be made to target these groups and interact with the women alone.

The next phase must certainly look to including livestock rearing, since women state that owning small ruminants forms an important route to providing alternative income that can feed into crop production and reduce women's dependence on men. Again interventions replacing crop staples and helping women to access and control cereal staples, and the introduction of new

technologies for male agricultural tasks are critical openings for empowering women through agricultural interventions. We insist that agricultural interventions are not gender neutral and can make or unmake gender orders; a fact made by existing literature. An understanding of the gender orders and how they feed into the technology uptake is important for developing and delivering gender-responsive strategies. The rules of formal institutions are just as important as community and household-based customary norms and practices. It is apparent that in order for Africa RISING to be responsive to gendered constraints, the conception, planning, and execution of the second phase will have to respond to clearly set goals. As our findings reveal, women miss a good part of the positive impact of projects when gender responsive goals are not clear and monitoring indicators are absent.

References

1. Adolwine, W.M., and A. Dudima. 2010. Women's access to emerging urban land in the Sissala East District in Northern Ghana. *Journal of Science and Technology* 30(2): 94–104.
2. ADVANCE (Agricultural Development and Value Chain Enhancement). 2013. Gender impact assessment report. USAID and ACDI/VOCA.
3. Agarwal, B. 1994. Gender and command over property: a critical gap in economic analysis and policy in South Asia. *World Development* 22(10): 1455–1478.
4. Agarwal, B. 2011. Food crises and gender inequality. UN/DESA Working Paper No. 107, New York: UN.
5. Anaglol, J.N., S.D. Boateng, and C.A. Boateng. 2014. Gender and access to agricultural resources by smallholder farmers in the Upper West Region of Ghana. *Journal of Education and Practice* 5(5): 13–19.
6. Apusigah, A.A. 2009. The gendered politics of farm household production and the shaping of women's livelihoods in Northern Ghana. *Feminist Africa* (12): 51–68.
7. Aryeetey, E., J.R. Aryee, K. Ninsin, and D. Tsikata. 2007. The politics of land tenure reform in Ghana: From the Crown Lands Bills to the Land Administration Project. Accra: ISSER.
8. Benneh, G., R.K. Kasanga, and D. Amoyaw. 1995. Women's access to agricultural land in the household: a case study of three selected districts in Ghana. Department of Geography and Resource Development, Family and Development Programme (FADEP). Accra: FADEP.
9. Bortei-Doku Aryeetey, E. 2002. Behind the norms: women's access to land in Ghana. In *The dynamics of resource tenure in West Africa* edited by C. Toulmin, P. Deville Lavigne, and S. Traore, IIED.
10. Boserup, E. 1970. *Women's role in economic development*. Allen and Unwin, London, UK.
11. Britwum, A.O., N.K. Ghartey, and P. Agbesinyale. 2006. *Organising labour in the informal sector: the case of rural agriculture in Ghana*. Ghana Universities Press, Accra, Ghana.
12. Britwum, A.O., D. Tsikata, A.D. Akorsu, and M.A. Aberese. 2014. *Gender and land tenure in Ghana: a synthesis of existing literature*. ISSER Technical Publications No 92, Legon, Ghana.
13. Bryceson, D.F. 1995. African women hoe cultivators: speculative origins and current enigmas. Pages 3–32 in *Women wielding the hoe: lessons from rural Africa for feminist theory and development practice* by D.F. Bryceson. Berg Publishers, Oxford, UK.
14. Bugri, J.T. 2004. Report on access to land and control over agricultural land resources in Northern Ghana (Land Policy Research). OXFAM, Accra, Ghana.
15. Dittoh, S. 2000. Agricultural land use arrangements and derived rights. IIED/GRET.
16. Doss, C.R. 2002. Men's crops? Women's crops? The gender patterns of cropping in Ghana. *World Development* 30(11): 1987–2000.
17. Doss, C.R. and M.L. Morris 2001. How does gender affect the adoption of agricultural innovations? The case of improved maize technology in Ghana. *Agricultural Economics* 25: 27–39.
18. Duncan, B.A. 2004. *Women in agriculture in Ghana*. Friedrich Ebert Foundation, Accra.
19. Duncan, B.A. and C. Brants. 2004. Access to and control over land from a gender perspective: a study conducted in the Volta Region of Ghana. FAO, Accra.

20. Ellis-Jones, J., C. Okali, and K. Agyeman. 2014. Africa RISING West Africa Project External Mid-Term Review Report. International Institute of Tropical Agriculture, Ibadan, Nigeria.
21. FAO (Food and Agriculture Organization). 2011. The state of food and agriculture: women in agriculture—closing the gender gap for development. FAO, Rome, Italy.
22. FAO (Food and Agriculture Organization). 2013. The gender and equity implications of land-related investments on land access, labour and income-generating opportunities in Northern Ghana: the case study of Integrated Tamale Fruit Company. FAO, Rome, Italy.
23. FAO. 2012. Gender inequalities in rural employment in Ghana: an overview. FAO, Rome, Italy.
24. GSS (Ghana Statistical Service). 2008. Ghana Living Standards Survey Report of the Fifth Round (GLSS5). Ghana Statistical Service, Accra, Ghana.
25. GSS (Ghana Statistical Service). 2013. 2010 Population and Housing Census. Ghana Statistical Service, Accra, Ghana.
26. Hampel-Milagrosa, A. and J. Frickenstein. 2008. Taking the women's perspective: gender risks of regulatory reforms. *Enterprise Development and Microfinance* 19(3): 1–13.
27. Kabeer, N. 1994. *Reversed realities: gender hierarchies in development thought*. Verso, London, UK.
28. Kelkar, G. 2013. *Women, work and gender regimes in Asia*. ILO, Geneva, Switzerland.
29. Koira, A.K. 2014. *Agribusiness in sub-Saharan Africa: pathways for developing innovative programs for youth and the rural poor*. Mastercard Foundation Working Paper.
30. Kotey, A., and D. Tsikata. 1998. Women and land rights in Ghana. Pages 203–229 *in* *Women and law in West Africa: situational analysis of some key issues affecting women* by A. Kuenyehia. WALWA, Accra, Ghana.
31. Kotey, N.A. and M. Owusu-Yeboah. 2003. *Peri-urbanism, land reforms and women in Ghana*. Accra: GTZ Legal Pluralism and Gender Project (Land Law Focal Area).
32. Kumase, W.N., H. Bisseleua, and S. Klasen. 2008. *Opportunities and constraints in agriculture: a gendered analysis of cocoa production in Southern Cameroon*. Courant Research Centre, University of Göttingen, Göttingen, Germany.
33. Larbi, W.O. 2006. *Land administration reform in a plural environment—the case of Ghana*. Fifth FIG Regional Conference. FIG, Accra, Ghana.
34. Manuh, T., J. Songsore, and F. Mackenzie. 1997. *Gender and land: the interface between legislative initiatives, customary tenure and land use management*, mimeo.
35. Millar, D., J. Abazaami, and S. Bonye. 2007. *Women, land and agricultural productivity: a study into community level constraints to land availability for women in Kalbeo and Gowrie Kunkwa*. Centre for Cosmvision and Indigenous Knowledge (CECIK).
36. Ministry of Food and Agriculture. 2007. *Food and Agriculture Sector Development Policy (FASDEP II)*. MoFA, Accra, Ghana.
37. Minkah-Premo, S. and C. Dwuona-Hammond. 2005. *Recommendations for integrating gender issues into land administration project: review of land and gender studies and identification of resources in Ghana*. Ghana Land Administration Project Ministry of Lands and Forestry, Accra, Ghana.
38. Morris, M.L., R. Tripp, and A.A. Dankyi. 1999. *Adoption and impacts of improved maize production technology: a case study of the Ghana Grains Development Project*. CIMMYT, Mexico.
39. Oduro, A., W. Baah-Boateng, and L. Boakye-Yiadom. 2011. *Measuring the gender asset gap in Ghana*. Woeli Publishing, Accra, Ghana.
40. Okali, C. 2012. *Gender analysis: engaging with rural development and agricultural policy processes*. Future Agricultures Consortium, Brighton, UK.

41. Padmanabhan, M.A. 2004. The making and unmaking of gendered crops in Northern Ghana. Conference on International Agricultural Research for Development. Deutscher Tropentag, Berlin, Germany.
42. Quisumbing, A. E. Payongayong, J. Aidoo, and K. Otsuka. 1999. Women's land rights in the transition to individual ownership: implications for the management of tree resources in Western Ghana. International Food Policy Research Institute, Washington, DC, USA.
43. Runger, M. 2006. Governance, land rights and access to land in Ghana—a development perspective on gender equity. Fifth FIG Regional Conference. FIG, Accra, Ghana.
44. Sarpong, G.A. 2006. Improving tenure security for the rural poor: Ghana case study. FAO/LEP Working Paper No. 2.
45. Tsikata, D. 2008. Women's land interests in Ghana: continuities, changes and persistent inequalities. *Afriche e Orienti X*: 3–4.
46. Tsikata, D. 2009. Gender, land and labour relations and livelihoods in sub-Saharan Africa in the era of economic liberalisation: towards a research agenda. *Feminist Africa* 12 (2): 11-30
47. Veeman, T. S. and J. Politylo. 2003. The role of institutions and policy in enhancing sustainable development and conserving natural capital. *Journal of Environment, Development and Sustainability* 5: 317–332.
48. Whitehead, A. 1984. Men and women; kinship and property some general issues. Pages 176–192 in *Women and property: women as property* by R. Hirschon. Croom Helm, London, UK.
49. Whitehead, A. and D. Tsikata. 2003. Policy discourses on women's land rights in sub-Saharan Africa: the implications of the re-turn to the customary. *Journal of Agrarian Change* 3(1 & 2): 67–112.
50. Woodman, G.R. 1996. Customary land law in the Ghanaian Courts. Ghana Universities Press, Accra, Ghana.
51. Yaro, J.A. 2009. Customary tenure system under siege: contemporary access to land in Northern Ghana. *GeoJournal* 75(2): 199–214).
52. Young, K. 1993. *Planning development with women: making a world of difference*. Macmillan, London, UK.
53. Zakaria, H., A.M. Abujaja, H. Adam, and W.Y. Salifu. 2015. Does gender make any difference in livelihoods diversification? Evidence from Northern Ghana. *International Journal of Agricultural Extension and Rural Development Studies* 1(1): 36–51.