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Gendered Analysis of ICT-Enabled Agricultural Extension and Advisory Services: The Case of Agro-Tech Smart Ex Model

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Abstract

This paper focuses on a gendered value chain analysis within the Agro-Tech Smart Extension Model implemented in Ghana and identifies gender gaps and opportunities for integrating gender in testing business Model with farmers and other value chain actors. A total sample size of 402 respondents within the maize and rice value chains were interviewed and 16 focus group discussions were held. Study findings show that male farmers have more access to extension and services delivery than their female counterparts. Adult females' access to extension and services delivery was generally low in the Northern Region as compared to the Brong Ahafo and Volta Regions of Ghana. Responses from the sample interviewed showed that barriers to women access to extension and services delivery include lack of resources (46.7%), socio-cultural norms (23.3%), gendered associations with crop type a situation where crops requiring more fertilizer inputs are the preserve of males and few financially endowed women (16.7%), limited female farmer's based Organisations (10.0%) and Heavy workloads relating to farm work, care giving, and time spent on household chores (3.3%). It is recommended that the services package of Agro-Tech Smart Extension should be tailored to gender roles and responsibilities along the commodity value chain. Other recommendations are the use of advocacy groups to educate community leaders on removal of socio-cultural barriers and use of male champions in sensitization programs on e-extension and advisory services.

Keywords – Gender Gaps, Gender Roles, Agro-Tech, SmartEx Model and Ghana

Introduction

Grameen Foundation (GFUSA) and Farm Radio international implemented a private-sector led ICT-enabled extension service project that sought to extend the reach of agriculture information, improve the efficiency of local extension by training agents in effective outreach, and promote the adoption of good agricultural practices. The GFUSA Project used 2-pronged approaches in its implementation to reach out to the targeted groups and beneficiaries, (i) Agent mediated approach, and (ii) Direct to farmer approach which was handled by Farm Radio International. The e-extension package covered actor needs along the selected commodity value-chains (maize and rice) including farm management support knowledge, linkages with credit providers and market outlets and Interactive platforms for information sharing among others. In an attempt to scale-up the Agro-Tech Smart Ex model, there was the need to conduct a gendered analysis and come up with strategies to reach-out to more women.

Worldwide, women play an important role in agriculture but they are still marginalized in terms of access to agricultural extension and rural advisory services. Studies have shown that extension agents tend to approach male farmers more often than female farmers because of cultural restrictions and also because of the general misconception that extension advice will eventually “trickle down” from male heads to other household members (Meinzen-Dick *et al.*, 2010). Agricultural sector analysis showed that less than 20% of the representative sample of 372 value chain actors interviewed in 12 districts in Ghana accessed extension services (Ministry of Food and Agricultural (MOFA) under West African Agricultural Productivity Improvement Project (WAAPP), 2014). Male farmers had more access to extension services than their female counterpart (28.2% men against 12.3% women accessing extension services in agricultural production) (ibid).

The socio-cultural barriers to extension services delivery limiting women access have been discussed extensively in a case study of the three Northern Regions in Ghana (Quaye *et al.*, 2017 unpublished). The study identified fundamental issues such as gendered associations with some crop types. For example, men are more economically endowed than the women, they are able to afford the relatively high cost of the technologies and inputs required in maize cultivation. Women and the youth are not having adequate access to land and therefore end up cultivating small farm sizes, inadequate recognition to the specific roles of women for proper targeting and empowering strategies among others.

Although the existing literature is not specific on what kinds of extension services are more preferred by women in the agricultural value chain, it is clear that there has been inadequate recognition to the specific roles of women for proper targeting with extension services in the agricultural value chain. This knowledge gap will be addressed in the current study. In scaling-up the Agro-Tech Smart Ex model project activities, some pertinent questions had to be answered in this gendered analysis. The question of why limited participation of women and the youth in both implementation approaches need answers in order to provide innovative solutions and strategies of reaching out to more female actors along the commodity value chains with e-extension and advisory services.

Objectives

The study objectives were to

- identify gender roles and responsibilities in the maize and rice value chains;
- investigate the level of access to agricultural extension and services by gender;
- identify the barriers to access agricultural extension services by gender; and
- establish how to reach out to more women with the AgroTech Smart-Ex Model

Methodology

Four survey instruments were developed for the field work as indicated below:

- Structured questionnaire for farmer interview
- Structured questionnaire for agents and Outgrower Businesses (OBs) interviews
- Structured questionnaire for Traders interviews; and
- Semi-Structured questionnaire for focused-group discussions

Each set of questionnaires was designed to collect data on the socio-economic profile of the respondents, level of access to agricultural extension services and e-extension in particular, barriers and how to reach out to more women and the youth. The questionnaires were reviewed together with the project team of Grameen Foundation and Farm Radio international before multiplication for field use.

In collaboration with GFUSA partners, three (3) out of the 6 project participating regions were purposively selected for the survey based on the concentration of beneficiaries. These include Northern, Brong Ahafo and Volta regions of Ghana. A purposive sampling strategy was employed among the following units:

- Field agents engaged in the mediated e-extension delivery;
- Listeners clubs/groups involved in Farm Radio direct to farmer intervention;
- Individual farmers/beneficiaries by gender;
- Market Queens and potential service providers;
- Other out-grower schemes; and
- Program (e-extension package) designers and implementers.

A total sample size of 402 respondents of the above-mentioned value chain actors were interviewed one-on-one. In addition to this sample, 5 non-beneficiary outgrower farmers and 16 focus group discussions were conducted. The Data collected from the field were cleaned, analysed in SPSS and exported into excel for the generation of graphs and cross-tabulations.

Literature Review

Overview of Agricultural Extension and Advisory Services Delivery and gender considerations

Gradually, the traditional extension methodologies are giving way for the new approaches, a paradigm shift is evolving with the introduction of ICT-Enabled agricultural extension delivery. Abdul-Raheem and Worth (2016) found that public sector extension in West Africa is undergoing a transformation including decentralization and outsourcing extension services in the context of adopting a pluralistic system of extension delivery.

Extension and advisory services delivery in Ghana has evolved from the traditional methods of Farmer Field Schools (FFSs) and on-farm demonstrations which are associated with high cost and limited scale of outreach to the use of

community based extension services delivery and e-extension systems. The community-based rural agricultural extension model is based on the idea of providing specialised and intensive technical training to agricultural extension services volunteers in a community who provide extension services with occasional support from a supporting organization. The still evolving e-extension approaches use Information and Communication Technology (ICT) to improve outreach and performance. Basically, the use of mobile software application for smallholder farmer management and delivery of agricultural extensions services. The debate on whether or not e-extension can be fully commercialised and meet the huge demand for extension services delivery particularly among smallholder farmers by gender is still relevant.

In Ghana, Manfre et al (2013) rapid scoping assessment found very positive aspects of extension and services delivery, as well as some significant weaknesses and deficiencies. Extension assets identified included some examples of good extension practice in a number of public sectors and NGO’s run extension programs that employ key approaches like market-oriented extension and use of innovative ICT approaches. Ghana is home to some promising private sector input marketing and market access approaches, which have the virtue of being financially sustainable. The assessment also identified some gaps including weak coordination at the national level, inefficient performance from the public-sector extension services and the over-focus on production increases, without sufficient concern for farm-level profitability, which was necessary to induce further agricultural innovations and thereby boost productivity. Nevertheless, there are gaps in the ability of some current extension programming efforts to reach out to women farmers, gaps in the training and capacity of MoFA Agricultural Extension Agents (AEAs) and other extension field agents, training in the area of ICT use and applications, as well as in extension process skills. Suggestions were made for extension program structures that are explicitly and consciously farmer-led and market-driven given the decentralized governmental extension structure.

Jones et al (2017) reported that gender inequality continues to constrain women's opportunities in the agricultural sector, both in terms of achieving food security and increasing agricultural productivity. They further explained that investment in gender-responsive programming which promotes women's empowerment can help to overcome these constraints. Farnworth et al (2017) also supports gender-equitable strategies for achieving more balanced use of agro-inputs such as fertilizers. Mudege et al (2015) explored the interaction between extension services and gender relations in order to suggest ways and strategies that can be useful in ensuring that extension services are gender-equitable and empowering for women. Findings from their study show that underlying gender norms and cultural norms mediate access to extension services and information. A situation where some men regard themselves as representatives of their households and therefore could receive first-hand information for further dissemination to their female counterparts. It was also realised that gender norms related to household decision-making had an impact on the ability of women to access training opportunities. Mudege et al (2015) suggests that agricultural extension should not be a purely technical programme focusing only on good agricultural practices but also embed modules aimed at addressing social practices that disadvantage some people, particularly women, as well as adopt gender sensitive recruitment methods that do not rely on male-biased recruitment channels for extension delivery services.

Study Findings

Demographic profile of respondents

Table 1 gives a summary of demographic profile of the respondents particularly farmers. About 73% of the interviewed farmers were household heads, about 70% of the farmers were males and mainly above 35 years of age (74%). The youths among the farmers constituted approximately 25%. About 43.8% of the farmers interviewed had no formal education, 34.5% had primary education, 18% had secondary education, and 3.2% had tertiary education. Only 18.8% of the farmers have smart phones although the use of mobile phones particularly among male farmers is common.

Table 1: Percentage distribution of respondents by demographic characteristics

| Categories | Response | | | |
|---------------------------|-----------------|----------------|--------------|-----------|
| | Farmers (n=351) | Traders (n=39) | Agents(n=11) | OBs(n= 6) |
| Position in the Household | | | | |

| | | | | |
|---------------------------------|------|-------|-------|-------|
| Head | 72.8 | | | |
| Member/Dependent | 27.2 | | | |
| Sex | | | | |
| Male | 69.9 | 33.3 | 90.0 | 83.3 |
| Female | 30.1 | 66.7 | 10.0 | 16.7 |
| Age (Years) | | | | |
| Below 18 | 0.9 | 0.0 | 0.0 | 0.0 |
| 18 – 35 (Youth) | 24.9 | 28.2 | 72.7 | 0.0 |
| 35-60 | 62.7 | 69.2 | 27.3 | 83.3 |
| Above 60 | 11.6 | 2.6 | 0.0 | 16.7 |
| Level of Education | | | | |
| None | 43.8 | 59.0 | 0.0 | 0.0 |
| Primary | 34.5 | 30.8 | 10.0 | 0.0 |
| Secondary | 18.0 | 10.3 | 10.0 | 66.7 |
| Tertiary | 3.2 | 0.0 | 70.0 | 33.3 |
| Others | 0.6 | 0.0 | 10.0% | 0.0 |
| Major Occupation | | | | |
| Farming | 96.5 | 5.1 | 18.2 | 66.7 |
| Agro-processing | 0.9 | 0.0 | 0.0 | 16.7 |
| Trading | 1.7 | 94.9 | 9.1 | 0.0 |
| Other Services | 0.3 | 0.0 | 18.2 | 0.0 |
| Formal Employment | 0.6 | 0.0 | 54.5 | 16.7 |
| Ownership of Smart Phone | | | | |
| Yes | 18.8 | 100.0 | 90.0 | 100.0 |
| No | 81.2 | 0.0 | 10.0 | 0.0 |

Source: Field Survey (2017)

Gender roles and responsibilities in the maize value chain

Figure 1 mapped the maize value chain from production, through marketing, processing, distribution and consumption. Actors including regulators and service providers were identified along the maize value chains with specific interest in identifying the gender roles in the various segments of the chain.

In the production segment, most of the maize smallholder farmers identified were males due to high inputs requirements and cost implication. For the specific activities the gender roles identified include:

- Land clearing and preparation were mainly done by males
- Planting was mostly done by females
- Weeding – Youth
- Application of fertilizer was mostly done by women and youth
- Application of weedicides and pesticides was done by males
- Harvesting – males and Females
- Primary processing (dehusking, shelling & sorting) done by both males and females

Women faced a lot of challenges at the production stage of the commodity value chain. Women usually cultivated small farm sizes due to lack of access to land. Other challenges included limited access to credit, input supply and other productive assets such as technology, machinery. For example, women interviewed complained about inadequate access to tractor services. In addition, there were socio-cultural issues limiting women access to extension and services delivery in the surveyed areas. At the production level the Ministry of Food and Agriculture (MoFA) was the primary regulator.

In the marketing segment of the maize value chain, farm level bulking is usually done by both men and women. Aggregators for on-ward transportation to markets could also be men or women but in most cases the outgrower businesses (OBs) and their agents in the Agro-Tech Smart Ex Model were largely men. Mostly men have access to large silos and warehouses for grain storage. The men constituted a little over 90%. The OBs had links with buyers with predictable and regular demand requirements, such as poultry farms and feed mills. At the market level, in addition to the District Assembly, Market Queens were seen as key regulators of the supply and demand of maize on the market.

In the processing segment in figure 1, primary processing of maize after harvesting was done by both males and females. However, processing maize into products for human consumption was dominated by females. Processing maize for animal feed, an industry also dominated by males. The regulatory bodies identified at the processing and consumption levels

included the Food and Drugs Authority (FDA), Ghana Standard Board (GSB), Environmental Protection Agency (EPA) and MoFA. At the export level Ghana Export Promotion Council (GEPC) was also identified as one of the regulators.

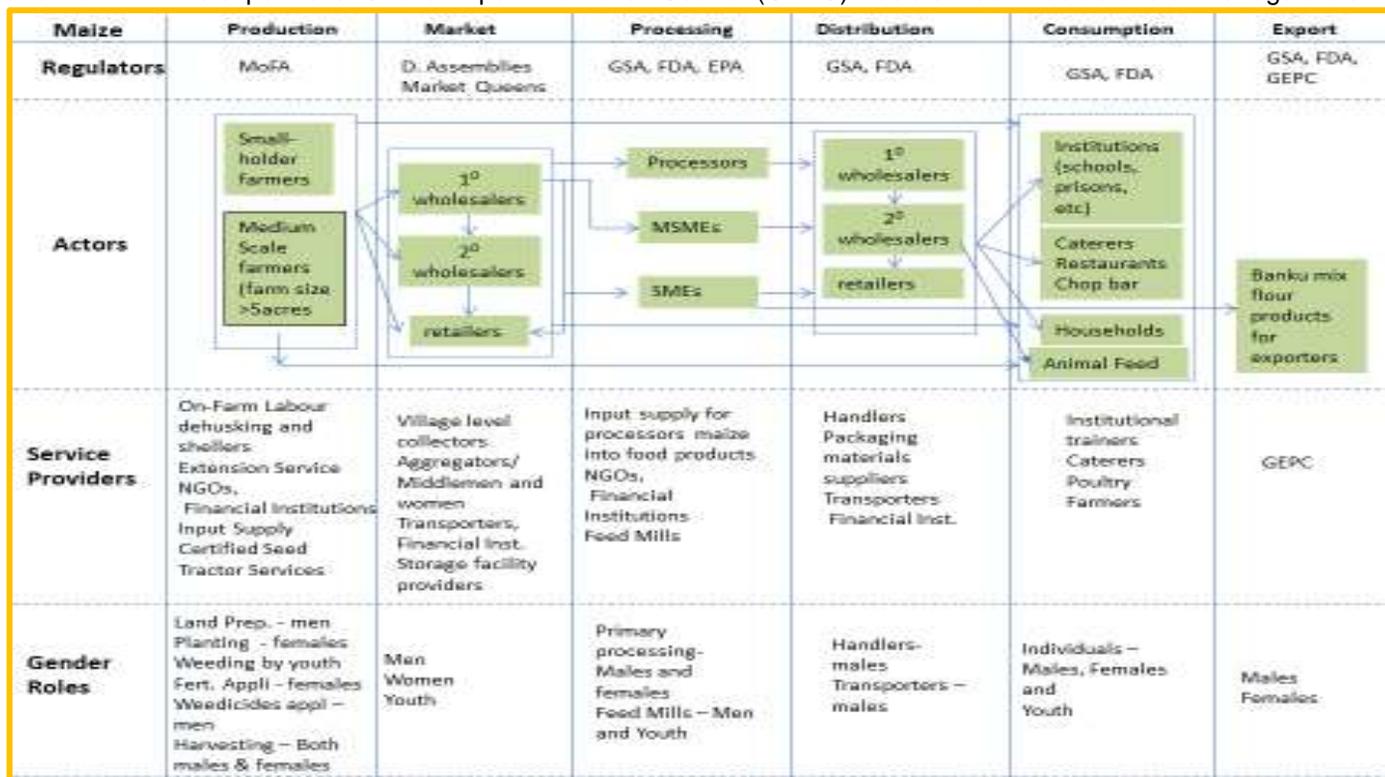


Figure 1: Maize value chain showing gender roles

Source: Author's Compilation; June 2017

Level of Access to extension and advisory services delivery

Farmers interviewed were asked to describe the level of access to e-Extension given the rating 1=High, 2=Moderate, 3 = Low, 4 = Difficult/No Access.

Comparatively, adult male farmers have more access to extension and services delivery than their adult female counterparts as shown in Figures 2 and 3 across all regions. In the case of adult female, 22.3% and 25.2% of the adult female farmers interviewed rated access to extension and services delivery high and moderate respectively (figure 2). However, 34.0% and 35.2% of the adult male farmers interviewed rated access to extension and services delivery high and moderate respectively (figure 3) while 33.6% and 29.3% of the youth farmers interviewed rated access to extension and services delivery as high and moderate respectively (figure 4). Adult female's access to extension and services delivery was generally low in the Northern Region as compared to the Brong Ahafo and Volta Regions of Ghana.

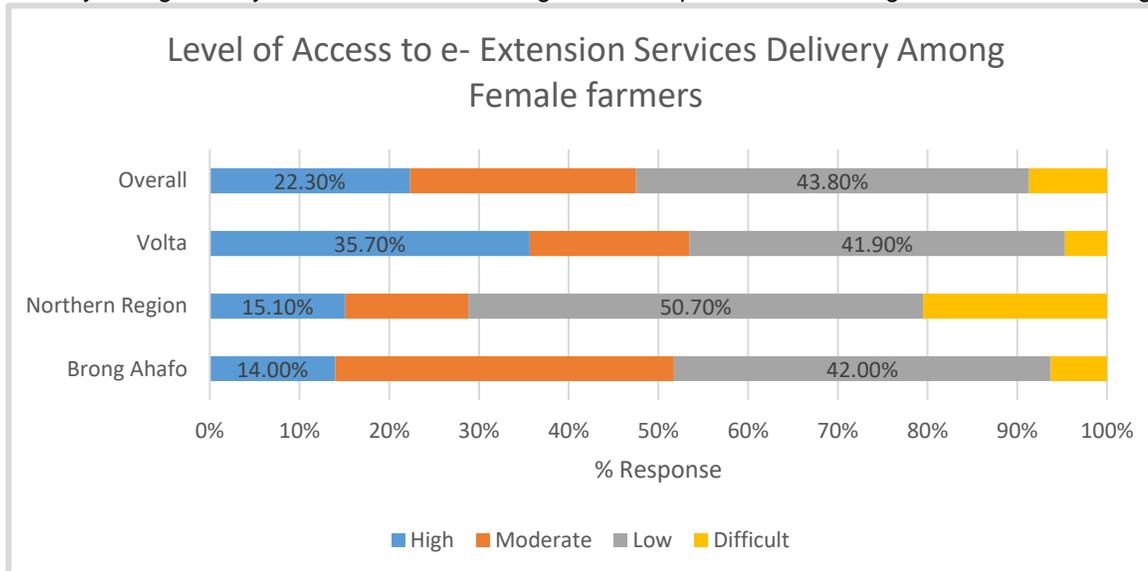


Figure 2: Level of Access to e-Extension and Advisory Services among Adult female farmers
Source: Field Survey (2017)

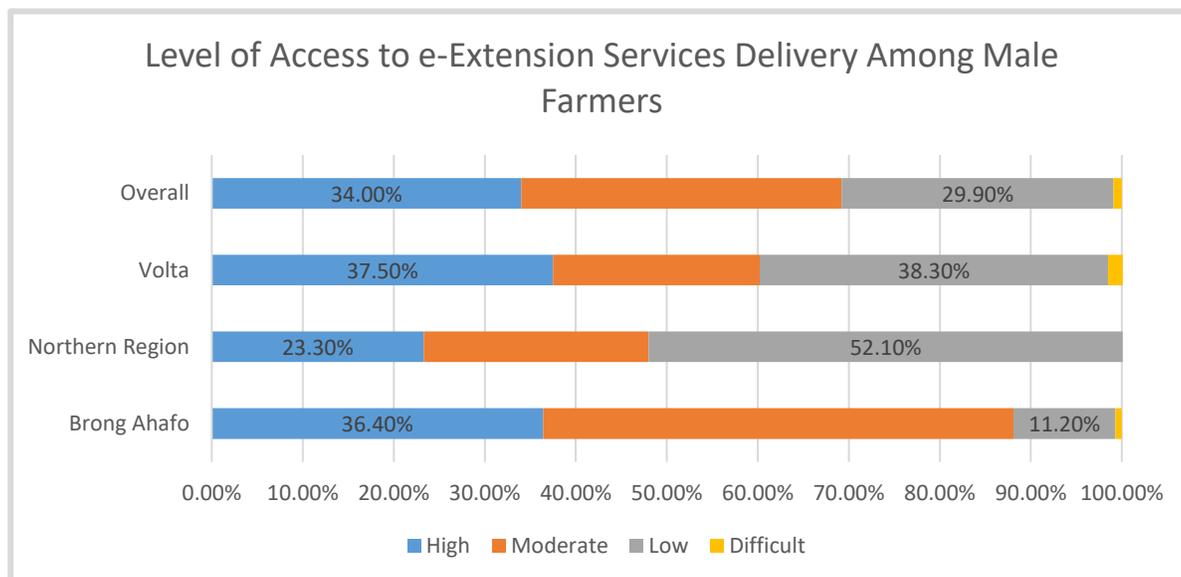


Figure 3: Level of Access to e-Extension and Advisory Services among Adult male farmers
Source: Field Survey (2017)

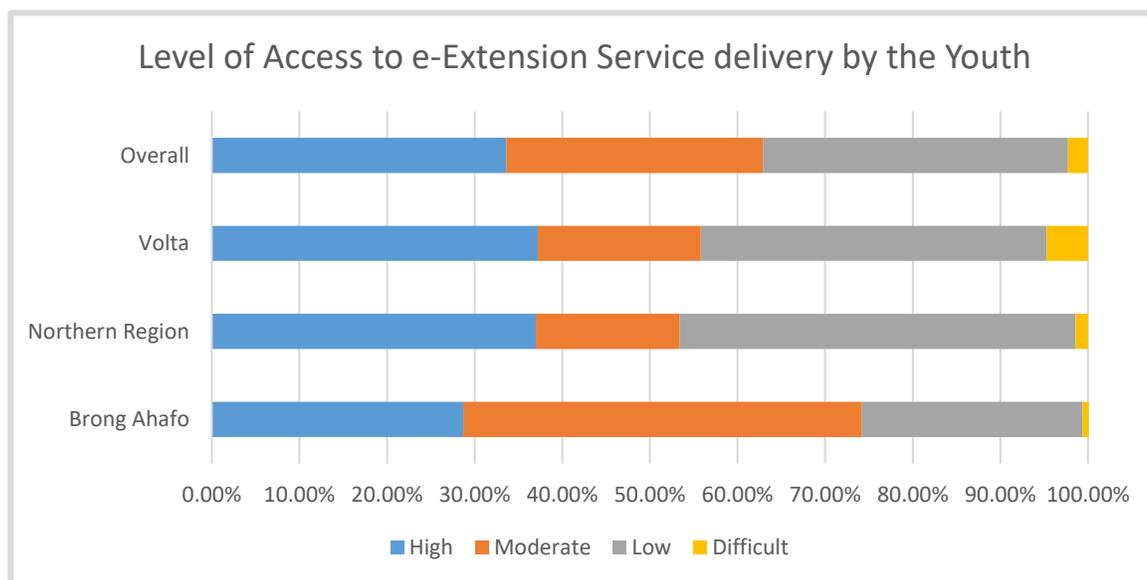


Figure 4: Level of Access to e-Extension and Advisory Services among youth farmers
Source: Field Survey (2017)

Focus group discussions were held among 61 farmer groups in the Volta, Northern and Brong Ahafo regions of Ghana. Themes discussed included factors limiting women’s access to extension and advisory services and strategies to overcome them. Summaries of focus group discussions have been presented in Table 2. From the focus group discussions barriers limiting women’s access to extension and advisory services may include socio-cultural norms, lack of resources to access productive assets such as land and so end up having smaller farm sizes and gendered associations with crop type, a situation where some crops are the preserved of males. Because women have relatively low access to agricultural

extension services in general they end up having low interest in e-extension and advisory services. Other barriers discussed are lack of access to radio sets, poor usage or under-utilization of smart phones among women, limited number of farmer organization for women and heavy workloads relating to farm work, care giving, and time spent on household chores.

Figure 5 presents percentage response among sample interviewed one-on-one on barriers limiting women's access to extension and advisory services. Findings showed that barriers limiting women's access to extension and advisory services in decreasing order of importance include lack of resources (46.7%), socio-cultural norms (23.3%), gendered associations with crop type a situation where crops requiring more fertilizer inputs are the preserve of males and few financially endowed women (16.7%), limited Farmer based Organisations for women (10.0%) and Heavy workloads and multitask relating to farm work, care giving, and time spent on household chores (3.3%).

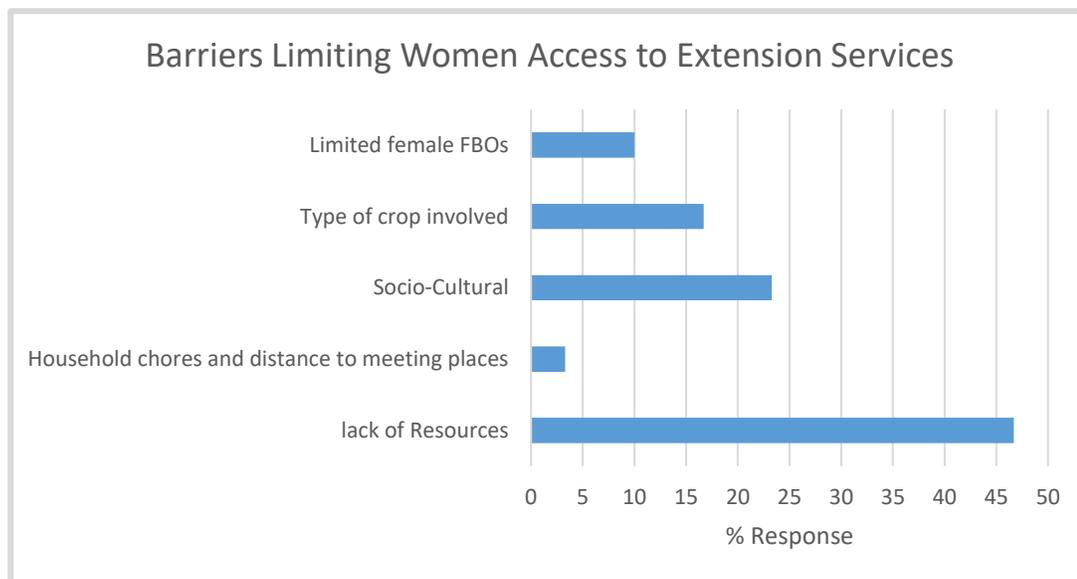


Figure 5: Barriers limiting Women access to e-Extension and Advisory Services
Source: Field Survey (2017)

Table 2 Analysis of Focus Group Discussion

| Region | Factors Limiting Women to access e-Extension and Advisory Services | Strategies to overcome barriers to access e-Extension and Advisory Services |
|---------------------------|---|--|
| <p>Brong Ahafo</p> | <p>Gender association of types of crops grown may limit their access to extension agents in general and may not have interest in e-extension in particular.</p> <p>Low level of education and poor network or communication among women</p> <p>Females do not own radio sets and in some cases may not have access to radio sets.</p> <p>Most females are busy with household activities when extension program is being aired.</p> <p>Inadequate input supply.</p> | <p>Reach out to women in groups such as Farmer Based Organizations (FBO's).</p> <p>Heighten awareness and sensitize women about e-extension.</p> <p>Women need extra support such as inputs (seeds and fertilizers) to be able to expand their farms and attract extension support.</p> <p>Establish a better communication network, provision of radio sets and phone number of radio stations to help farmers to call in.</p> <p>Radio programs on extension services should be aired in the evenings when the women have finished with their house chores and should be in local dialect.</p> |
| <p>Volta</p> | <p>Most women do not own radio sets and in some cases may not have access to radio sets.</p> <p>Lack of market access and inadequate agro-chemicals may limit their farm sizes and may not attract the attention of extension agents</p> <p>Women are not mostly interested in e-extension and need to be encouraged to form listeners' groups</p> <p>Poor usage or under-utilization of smart phones among women limit their access to e-extension services.</p> | <p>Women should be supported to own with radio sets.</p> <p>Extension programs should be aired at a time when women are done with their house chores.</p> <p>Women should be enrolled on an adult education program and be encouraged to form listeners group.</p> <p>Financial aid or access to credit facilities to support women.</p> <p>Awareness creation of e-extension and provision of credit facilities.</p> <p>Women should be trained on how to use smart phones to access e-extension services.</p> |
| <p>Northern</p> | <p>Lack of finance and lack of access to radio sets.</p> <p>Women are restricted by Socio-cultural factors.</p> <p>Women support their husbands on their farms and may not have time to engage with extension agents on their own.</p> | <p>Women should have access to radio, awareness creation and sensitization of e-extension services and provision of farm credit facilities.</p> <p>Use advocacy groups to educate community leaders.</p> <p>Women empowerment.</p> <p>Provision of resources to women.</p> |

Source: Field Survey (2017)

Exploring the possibility of reaching out to more women, the farmers interacted with indicated that majority of the female farmers in their outgrower schemes are not educated and hence explaining technical information to them requires more effort than reaching out to men. They also confirmed that generally, female farmers are less resourced than their male counterparts which affects farm sizes and production levels. In other words, females will be more interested in micro-finance and village level credit schemes that ride on social networks and operates at their doorsteps. From the farmers' view it is easier to engage women in groups. Contact person for extension and advisory services should be familiar with the targets communities and be well-resourced to visit female farmers on-site. Awareness creation and sensitization about the availability and how to access e-extension and advisory services are critical issues to consider when reaching out to

women. The use of advocacy groups to educate community leaders on removal of socio-cultural barriers and use of male champions in sensitization programs were also suggested.

Strategies to bridge the gender gaps in extension and advisory Services: Perspectives of Outgrower Business and Agents

The following were suggested by agents and OBs using Agro-Tech Smart Model:

- Awareness creation and sensitization of farmers;
- Initiate women empowerment programs, for example educating women on income generating activities in the agricultural value chain;
- Adult Education particularly for women farmers;
- Men should be able to give a lot of assistance to the women at home;
- Proper scheduling of meetings in terms of convenience of venue and time for women;
- Provision of adequate extension officers, provision of credit and education on credit access and financial management;
- Provision of mechanized equipment that are user friendly for women; and
- There should be a separate group for the women, their husbands should be sensitized to allow their women to participate more in extension programs.

Discussions

The current survey findings have been confirmed in other studies. From the literature, there are some stylized facts about gender and African Agriculture that have been elaborated in Lambrecht *et al.* (2017). These stylized facts that have been observed to be subject to changes over time (Doss 2001, Doss *et al.* 2015) due to socio-economic dynamics are as follows:

- women have limited access to land and lose out when land becomes more commercialized;
- crops can be classified as men's crops or women's crops, whereby the former are usually cash crops and the latter subsistence crops;
- men have more access to modern agricultural inputs compared to women; and
- Rural women's occupations are mainly limited to unpaid on-farm labor and household work, while men engage in remunerated on and off-farm activities.

Findings by Lambrecht *et al.*, (2017) also established that men are more likely to be plot holders than are women and that they hold larger acreages of land compared to women. Female plot holders hold an average of 3.47 acres of land, which is on average 3.78 acres less than that held by male plot holders. During the past 20 years, women have represented between 32 and 36 percent of all adults holding land in rural areas of Ghana. He observed that over time on average, land sizes of both women and men are not considerably changing. Small differences exist at the level of the agroecological zones, as the gender gap in land size seems to widen in the savannah but reduces in the forest. Female household heads are more likely to hold land and cultivate larger plots than female spouses in male-headed households. Women in matrilineal ethnic groups are more likely to hold land in the coast and savannah and hold larger plots of land in the forest. Lambrecht *et al.*, (2017) also concluded that gendered patterns are more outspoken in the northern savannah and forest in Ghana compared to the coast. Considering interaction between gender and time, the number of crops grown by women plot holders decreases less rapidly than for men. Again, cropping patterns of female heads are more similar to male cropping patterns than that of female spouses.

In Ghana and Mozambique, around 30 percent of all agricultural plots are under women's control as opposed to 70 percent men (De Brauw 2015; Doss 2002). In Kenya, women cultivate on smaller plots than men (Konstantinidis, and Barenberg 2014). Goldstein and Udry (2008) show that women farm lower-quality land in Ghana, but this result is not confirmed by evidence from De Brauw (2015) on Mozambique. Lambrecht and Asare (2016) confirmed that land tenure systems are dynamic and change in response to rural transformation processes such as changing rural infrastructure, population increase, and rural-urban migration.

Regarding gender association of crops, evidence from Mozambique and Kenya showed that women plot managers grow fewer cash crops (De Brauw 2015, Konstantinidis, and Barenberg 2014, Kilic, Palacios-Lopez, and Goldstein 2015). According to Carr (2008), cropping patterns mainly depend on the socioeconomic situation and livelihood strategy of the household rather than a mere distinction according to the gender of the farmer or household head.

With respect to the fact that men have more access to modern agricultural inputs compared to women, studies (Djurfeldt, Djurfeldt, and Bergman Lodin 2013) point to men's and women's unequal access to inputs as a cause of lower female productivity. Other factors that have been suggested to explain the differences in input use by gender include education and time constraints (Saito et al. 1994), access to land and family labor, and extension services (Doss and Morris, 2001).

Extension and advisory Services are embodied in various ICT-enabled services ranging from traditional radio programs using add-on features, to television shows using short message services to request information on agricultural varieties or farming practices, to the emerging mobile technology services and internet (Mbo'o-Tchouawou and Colverson, 2014). Lamontagne-Godwin et al (2017) studied 'Quality of extension advice: a gendered case study from Ghana and Sri Lanka'. In this study they highlighted the importance of appropriate advice, according to farmer gender and crop grown. They suggested greater focus on local knowledge about women's role in agriculture to help achieve more tailored advice. According to Mittal and Mehar (2016) farmers use multiple information sources that may be complementary or substitutes to each other and this also implies that any single source does not satisfy all information needs of the farmer.

Conclusion and Recommendations

Research findings conclude that comparatively, male farmers have more access to e-extension and advisory services than their female counterparts. Engagement with women on agricultural related information is not just socially important but an issue of all-inclusive development. It is recommended that gender gaps that have been identified can be bridged through the use of women groups, greater focus on local knowledge about women's role in agriculture and delivery of tailored information that will be of interest to women also taking into consideration the types of crops and activities that engage their attention. The use of advocacy groups to educate community leaders on removal of socio-cultural barriers and use of male champions in sensitization programs were also recommended by stakeholders interviewed.

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