

Integrating Gender and Nutrition within Agricultural Extension Services

Technology
Profile

Type of
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Physical

Rice Processing and the ABCs

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The Integrating Gender and Nutrition within Agricultural Extension Services (INGENAES)

project works to improve agricultural livelihoods focusing on strengthening extension and advisory services to empower and engage smallholder farmers, men and women. The technology profiles support INGENAES's goal of improving the dissemination of gender-appropriate and nutrition-enhancing technologies and inputs to improve women's agricultural productivity and enhance household nutrition. The technology profiles identify issues and opportunities to make technologies more attractive for men and women farmers, to increase men's and women's benefits from using technologies, and to design distribution models for extension agents, input suppliers, and mobile devices to get the technologies into men's and women's hands.

women and men are 38 percent and 59 percent, respectively (UNESCO 2016). Customary laws and social norms contribute to these and other disparities. Under customary law, women cannot access loans without the guarantee of a male relative (McFerson 2012). After the war, new laws promoting gender equality were passed, but they have seen little traction because of continued adherence to customary laws and weak implementation (ADFG 2011).

Sierra Leone is rich in natural resources, including arable fertile land, iron ore, diamonds, and titanium ore. Situated in West Africa, it borders the Atlantic Ocean and Guinea and Liberia. Agriculture fuels the country's economy, contributing approximately half of the gross domestic product (GDP) (Larbi 2012). The agricultural sector is primarily small-scale, with 59.2 percent of the working age population classified as self-employed in agriculture (AgCLIR 2016). Despite its abundant land and natural resources, Sierra Leone remains one of the poorest countries in the world with a Human Development Index rank of 181 of 188 countries (UNDP 2015), and a life expectancy of 46 years, the lowest in the world according to World Health Organization (2015). The country is still recovering from a 10-year civil war, from 1991 to 2002, that caused severe loss of life, internal displacement of populations and loss of government presence in rural areas. Furthermore, between 2014 and 2016 the country was unexpectedly hit by an outbreak of the Ebola virus disease. One of the most contagious and fatal viruses, the Ebola outbreak suspended government operations. Farmers and farmer groups were unable to access their production and harvest due to household and local quarantines.

Sierra Leone ranks 145 out of 188 countries in the Gender Inequality Index based on indicators including maternal mortality ratio, adolescent birth rate, share of seats in parliament, population with at least some secondary education, and labor force participation rate (UNDP 2015). There are significant disparities between men and women's literacy, education, land ownership, access to legal services, and differences in employment opportunities. For example, literacy rates for



Women farmers working in a rice field. © 2016 McNamara

Paramount chiefs who are mostly men are regarded as the “custodians of the land” and usually manage family-owned land (ADFG 2011; USAID 2016; McFerson 2012). Less than 10 percent of paramount chiefs are women (AgCLIR 2016). Agriculture accounts for 72 percent of female employment, and just over 23 percent of male employment (FAO 2010, ILO 2005). Nearly 62 percent of those economically active in agriculture are female (FAO 2010). Compared to men, women dominate in crop and poultry farming, and postharvest work including micro-fish retail and fish processing, as well as petty trading and marketing (ADBG 2011). Mining, a major industry in Sierra Leone, has led to environmental degradation of land since the war affecting women’s employment in agriculture (McFerson 2012).

Food security and nutrition are a nationwide concern in Sierra Leone. According to the UNICEF Smart Survey¹, 34.1% of children aged 6-59 months are stunted. This figure shows that, for Sierra Leone, chronic malnutrition is a serious problem that is linked to a poor quality diet. The Comprehensive Food Security and Vulnerability Analysis (CFSVA²) shows that food insecurity in Sierra Leone increases sharply in the lean season, when 45% of the population does not have sufficient access to food (WFP 2011). Sierra Leone has gone from being a net exporter of key staple crops to a net importer. While local rice is usually

¹ The 2010 SMART survey was conducted during the same period as the CFSVA and evaluated the nutritional status of children 6-59 months of age and women of reproductive age. (World Health Organization, 1997)

² CFSVA was undertaken by the World Food Program in close partnership with the Sierra Leone Government

cheaper than imported rice, the latter is more readily available and acts as a buffer supply during the lean season when access to food is limited (WFP 2011).

Technology Design and Dissemination

Rice is Sierra Leone's most important staple crop. During the rainy season, 85 percent of farmers cultivate rice (David 1992) and the annual per capita consumption of rice (104 kg) in Sierra Leone is amongst the highest in the sub Saharan African region (CARD 2009). However, rice yields in Sierra Leone are comparatively low. Fewer than five percent of households have access to fertilizers, insecticides, herbicides and basic machinery. Post-harvest losses due to poor crop management and inappropriate storage and marketing facilities often further limit the availability of locally produced rice. Sierra Leone has not been able to produce enough rice to meet local consumption demand. As a result, the country depends on imported rice, and food prices can be high, which adversely affects households with lower income. The promotion of domestic rice production is therefore a policy priority, the aim of which is to stimulate economic growth and increase rural income in Sierra Leone (Bah 2013).



Rice, legumes, and beans being sold at market.
© 2016 McNamara

One of the primary efforts taken up by the government of Sierra Leone (GoSL) in 2010 was the countrywide establishment of Agricultural Business Centers, also known as ABCs. Under the National Sustainable Agriculture Development Plan³, more than 450 ABCs were launched to provide local smallholder farmers with access to mechanized rice processing, equipment services and marketing linkages. These ABCs were to serve as umbrella organizations for their constituting Farmer Based Organizations (FBO). During the technology assessment, it was observed that each FBO consists of approximately 25 to 30 men and women farmer members. Most ABCs generate their financial resources from monthly subscriptions paid by the FBO members. Each FBO pays a subscription fee to the ABC with the amount varying somewhere between Le 110,000 to 120,000 (14 to 16 USD) per FBO. On average, each ABC has seven FBOs under its wing and consists of more than 200 members paying an individual membership of about Le 5,000 (0.6 USD). Usually 40-60% of these members are female and some FBOs provide subsidized rates for their membership.

The ABCs each have a small building with rooms for operating machinery, storing crops, and offering administrative office spaces. The management team receives training from the government on how to run these business centers and instructions for operating and servicing the machinery. Additionally, each ABC

³ The Food and Agriculture Organization of the United Nation supported the GoSL and the Global Agriculture and Food Security Program to implement these Agricultural Business Centers (ABC) under the Smallholder Commercialization Program.

receives a Chinese-manufactured (Win Gin company) rice mill that can process about 250 kg of rice per hour with a 16-horsepower engine. Some ABCs also receive other rice processing equipment such as destoners, harvesters, threshers, etc. Their aim is to utilize this space and equipment provided by the GoSL to serve local farmers and maximize their rice yield. Some of the services provided by the ABCs include:

- Rice processing– rice threshing, de-stoning, milling, rice cutting
- Floor space for drying rice
- Storage space for processed rice
- Transportation services
- Marketing services (e.g. connecting to nearby villages, arranging contracts with the World Food Program, etc.)



Agricultural Business Center in Moyamba District. © 2016 McNamara

The assets owned by ABCs vary from one ABC to another. This variation may occur due to the location of the ABC, discretion of the asset provider (MAFFS, iNGOs, FAO, etc.)⁴ and the activities that the ABC management and/or the FBO members choose to prioritize. ABCs collaborate with asset providers or donor agencies for inputs such as planting materials, pesticides, fertilizers, livestock, funds, and various forms of capacity building, including access to technical information and training. Some ABCs also have access to 2-30 acres of land (upland and inland valley swamps – IVS), ABC farms, mechanical hand pumps, and digital satellite receivers. Generally, all ABCs have a bank account. They generate financial resources from monthly subscriptions paid by members, business revenues, and through other side projects. In most cases, the level of financial transparency is not very clear, in part due to difficulties in communication with members who are not literate or numerate and other barriers in sharing financial information. The ABC Board serves as the governing body of the ABC and its membership. The board comprises of a Chairman,

⁴ MAFFS: Ministry of Agriculture, Forestry and Food Security

iNGOs: International Non-Governmental organizations

Vice-Chairman, Secretary General, Assistant Sec. General, Financial Secretary, Treasurer, and a Public Relations Officer. The board leadership structure (*for most ABCs that were visited*) has remained static since the launch of the ABC. It was observed that the Chairman, who is the executive leader of the board, was incidentally always a man for the ABCs we visited.

The primary advantage of the ABC has been to provide mechanized rice processing to farmers. Previously, rice was processed manually by women. This technology has reduced manual labor drudgery and increased the productivity of both men and women farmers. Other important resources such as social capital, organized marketing, and access to input networks have also been embodied within the ABCs and its constituent FBOs. These resources provide an incentive for rural populations to organize themselves as producer organizations and help link them with national markets.

In addition to ABCs, private sector providers of mechanized rice milling services exist in several other forms. Firstly, large-scale rice millers and local traders provide farmers with access to some milling services. Companies like Mountain Lion (just outside of Makeni) operate large mills and buy rice directly from farmers and village-based buyers. Mountain Lion's Satake rice mill has a capacity of processing 2 tons (1800 kgs) per hour and they sell their rice directly to the local market. This affords smallholder and



Rice milling machine at Songo Agricultural Business Center, Kpapie Village.
© 2017 Rastogi

commercial scale farmers with a market outlet for their un-milled rice. Companies also provide farmers with seed loans and tractor land preparation services in return for large quantities of un-milled rice. Another company, Lion Mountain, with a mill in Bo, employs out-growers, or contract farmers, with the goal to produce rice on a commercial scale using long-term land on a rental basis. Secondly, small-scale private mill operators offer milling services in some towns and cities. A small mill near the Makeni market (with a capacity of about 250 kg per hour) primarily serves market-women who go to small villages in Bombali District to buy un-milled rice. They then process it at the small mill and market it to nearby larger towns. Lastly, some local governments have invested in rice processing mills. A mill in Pelewahun (near Njala University), which was constructed and paid for by Moyamba District's development funds, provides one of the few rice-milling points between Taiama and Mano. Each of these models offers an alternative method to finance and provide smallholder farmers the access to mechanized milling services beyond the ABC approach.

BOX | DATA COLLECTION

Data collection took place in January 2017. The technology assessment team visited five different ABCs in Tonkolili District, Moyamba District, and Bombali District along with a District Council Grain store in Pelewahun. Focus group and key informant interviews were conducted with men and women rice farmers, FBO members, ABC administrators, rice mill operators, and other important actors in the rice value chain. A mix of farmers were interviewed: farmers who utilized the mill and processing machines along with those who did not.

The assessment team sought to investigate the impact that mechanized rice processing had on men and women's time, their household income and overall food security and nutrition. It also aimed to determine the decision-making capabilities that men and women farmers shared within a household. The underpinnings of different ABCs were studied along with the different roles that men and women played in the governance and decision-making within the FBOs and ABCs.

The team interviewed millers and traders at three privately owned mills, namely Lion Mountain in Senehun (the team visited an out-grower farm on a 100-hectare farmland along the Bo Freetown highway) and Mountain Lion in Makeni Bombali District along with the farmers who were working for them, and a small private mill near the Makeni market. The team also visited the MAFFS office in Tonkolili District, Magburaka, to interview the government officials, gain a better insight into the functioning of the ABCs and, to understand the societal differences that exist between men and women in Sierra Leone.

Gender Analysis

According to the Sierra Leone Labor Force Survey Report, the share of women in agricultural employment (53.5%) is slightly higher than the share of men (46.5 %) (ILO 2015). Women, who play a predominant role in Sierra Leonean agriculture, natural resource management, and food production are still marginalized; they receive little or no access to land, credit facilities, advanced technologies, and extension services. Due to customary laws and social norms, they do not have permanent land rights and can be dispossessed of their lands by male relatives through divorce or death of their spouse. Most of the land is managed by chieftom elders who are predominantly men (McFerson 2012; ADBG 2011). There exists a clear gender dimension in rice farming. Women perform activities such as planting, harvesting, weeding, winnowing, marketing, and selling. They are generally more involved in the post-harvest rice production process than men. They do not have access to their own land but they do have control over group farms owned by their FBOs. Women also work on farms owned by their husbands. Men perform the more physically laborious aspects such as land preparation, harvesting, and shipments.

The presence of ABCs has increased overall efficiency, created new opportunities for the farmers, and given them a space for storing their rice and marketing it. It has also provided their communities with a platform for knowledge sharing and acquiring information regarding their agricultural practice. A strong consensus exists between both men and women farmers about the important role that rice mechanization has played in reducing the sheer physical burden of milling the rice by hand. However, men and women farmers offer contrasting perspectives about the impact that the processing equipment and ABCs has had on their lives; men reported that it has led to a rise in their quality of life while women stated that they did not gain many economic benefits from it.

This gender analysis explores the direct and indirect effects of rice mechanization and ABCs on men and women, examining these effects around three key areas of inquiry: time and labor; food availability, quality,

and safety; and income and assets. It is based on interviews conducted for separate groups of men and women.

Time and Labor

Both men and women spoke very highly of the labor-saving potential of the rice mill and other technologies available at the ABCs. They say that it has speeded up the rice milling process, which was previously done by hand primarily by women, and has saved them a lot of time and energy. An ABC leader⁵ explained how agriculture in Sierra Leone is not heavily mechanized and access to these machines on a community level has had an exponential effect on making the process faster; A 50kg bag that previously took four or more hours to mill by hand can now be processed in a matter of minutes through machine milling, substantially increasing the process efficiency.



Female farmers at Magburaka ABC in Tonkolili District. © 2016 Rastogi

Women reported that they spend more time on the process of rice production than men do. They are responsible in pre-harvest activities such as clearing grass, transplanting along with post-harvest activities such as weeding, drying, parboiling winnowing, milling and, marketing the rice. Their time is distributed between rice farming, vegetable gardening and performing daily household activities. Men are responsible for land preparation (brushing and burning the land, clearing new farmland, tilling, plowing,

⁵ Reverend Toto from a local ABC at Gbotima, near Njala University

and building fences), operating the mill/other machines and helping women transport the rice. While women do the majority of the transporting in small quantities, men assist women with large loads which they transport by hand or motorcycles. Different technologies have had different effects on men and women because division of labor between them is heavily segregated.

The reduction in time spent on milling has allowed women farmers to dedicate more time to other income generating activities. With the use of the new rice milling technology at the ABCs, women no longer spend multiple hours manually milling the rice or trying to protect it from domestic animals while it dries, which allows them time that they can dedicate to their garden and home. Now women are involved in small scale gardening of cassava, groundnut, okra, pepper, maize, and other household vegetables which they sell to nearby markets. They are also engaged in petty trade of firewood and palm oil for generating extra income. In private milling companies, where rice is processed by the company which directly sells it to the market, women no longer need to travel to nearby villages to market the rice and can spend more time with their children and perform other household activities. Men also are able to dedicate more time in activities such as hunting, wood gathering, and carpentry instead of agricultural labor work.

Men farmers claimed that the economic benefits of rice mechanization have been so high that they have increased their average production of rice by dedicating more land to rice cultivation. **This has had some tradeoffs on men's and women's time and labor.** For men, it has meant more labor working hours to clear and maintain the land and for women it has meant an increase in time dedicated to post harvest activities. While men reported benefiting financially, women did not. This means men and women have different incentives for shifting their time and labor to increase rice production.

Despite the growing use of machinery in rice production, the perception that men are physically stronger still exists and therefore men perform the more laborious tasks such as land preparation and transportation of rice. In FBOs where women farmers are given access to their own land, they formally employ men for jobs that are considered 'too strong' for women to do themselves. Despite women dominating the income-based aspect of production, both men and women believe that men are 'more skilled to perform these laborious tasks' and are therefore merely 'helping out' the women farmers by providing them with labor services.

Milling rice has considered to be a woman's job. With the new technology, they are still responsible for taking the harvested rice to the ABCs. **During the ABC visits, it was observed that rice mill operators were only men.** In one instance at the Gbotima ABC, women had the opportunity to train for the position of a machine operator, but ultimately the machine broke down before they could train them. The women are currently still waiting. While employing women as machine operators could regain their active role in rice production, current male operators reported two major reasons why females were not being considered for this position:

1. Operators are required to be available to work at any given time. If they are unavailable, customers may take their crops to competing milling centers in surrounding towns. Availability is especially important during harvesting season when processing more grain results in larger income. Male operators expressed their belief that women who perform household activities require time for cooking, cleaning, and taking care of their children. Always being available is a large time commitment which might act as a barrier for them.
2. The cultural perception that women are physically weaker than men prevents them from being considered as viable candidates. The design of the mill engine excludes many men and women from being able to operate the machine. Starting the machine requires one hand to push a knob

and the other hand to quickly rotate a 50kg crank for 30 seconds. Male operators perceived that women would be physically unable to start the mill engine due to the enormous amount of strength that it required. The operators suggested that if the engine were to be redesigned to have a simpler method of use⁶, then perhaps more women would be able to operate them and be considered for the position.

While it is culturally more acceptable for women to work at home than to work outside, both men and women farmers suggested that if the ABCs started training women to operate the machines, (rice miller, harvesters and power tillers) they could potentially create more opportunities for women in tillage and soil management and increase the overall labor efficiency.

Income and Assets

Rice being the staple food in villages of Sierra Leone, it is produced mainly for household consumption before being sold on the market. Mechanized rice processing has enabled the milling of large quantities of high-quality rice with less waste. This has allowed for faster market turnover and, as a result, a growth in income for both men and women.

Women who are in charge of post-harvest activities believe that the mechanical rice mills have saved them manual drudgery and time but have not granted them any direct economic benefits. They reported that the money they make from selling rice is handed over to their husbands 'out of respect'. The husband then decides what to do with this money, whether it is buying new farming equipment or investing in capital. Alongside rice farming, women also engage in small-scale vegetable gardening. The money that they earn from this is available to them at their own discretion. They can decide whether to utilize it for paying their children's school fees, for buying household supplies or, keeping it for their personal use. This is perhaps why, despite spending most of their time on rice farming, women perceive that their main source of income comes from small-scale horticulture.

Women are indirectly benefiting from the rice mills by using its byproduct for generating income through horticulture. With the advent of the rice mills, farmers now have access to rice bran (a by-product of mechanized rice miller) which has multiple uses owing to its high nutrient gradient consisting of nitrogen, phosphorus, and potassium. A disparity between the way men and women utilize their assets can be seen in the way they handle this byproduct. Women use the rice bran as fertilizer for their garden and rice swamps as it reduces the acidity of the soil and gives them better quality yield. Men sell the rice bran as commercial fertilizer or as animal feed to nearby institutions. Men are able to utilize rice bran for direct economic gain.

In theory, all assets at the ABCs (processing equipment, storage space, external opportunities, etc.) are equally available to both men and women. **However, the ABC network gives men farmers access to external job opportunities that women do not have.** At the ABCs, only men are employed as operators for the rice milling equipment. This, being a key role within the functioning of an ABC, forces women to depend on the male operators for processing their rice. Additionally, large scale rice production companies such as Lion Mountain employ several manual laborers, equipment operators and transport vehicle drivers. These opportunities, considered as 'skill based work' are exclusively advertised to men. On the other hand, employment opportunities for women are limited to low-skill level jobs such as weeding, cooking and cleaning. The jobs are a direct translation of the kind of jobs women are 'supposed

⁶ Such as a key start or operation that requires lower physical effort

to perform' within a household in the Sierra Leonean society. Incidentally, these jobs do not pay as much as the jobs advertised to men. As a result, we can see women spending more working hours than men in agriculture while reaping less income benefits from the same.

Farmer Based Organizations (FBOs) have given women access to important assets they previously did not have. Women now have access to their own land through FBO groups which have played a crucial role in developing rice self-sufficiency for women. It was observed that FBOs that had equal participation of both genders displayed a more cordial behavior while making important decisions about their organization as compared to ones that did not. ABCs have also supported the formation of many women-only FBOs, which have acted as social support groups for women farmers. Profits raised by the FBOs are distributed equally among its members. They are also available to help its group members in times of hardship or need, fostering a strong sense of communal dependence and financial security. This sense of empowerment has translated directly to the decision-making power that women hold in their own households.



Farmers carrying harvest from a rice field. © 2016 Rastogi

On a larger scale, women are still underrepresented in the board of all ABCs, allowing them to have little say in its activities. In Sierra Leonean society, traditional leaders have predominantly been men with a few exceptions. While women are treated with respect and considered trustworthy, they are often not seen as fit for higher level leadership positions. In ABCs, women are appointed to positions that deal with monetary management, (Financial Secretary/Treasurer) however, decision making positions such as Chairman and Vice-Chairman are mostly reserved for men. Lack of access to education for women plays an important role behind this perception. Women reported “feeling shy” because they were “not educated

enough”. Additionally, external barriers such as time limitations and household responsibilities limit their participation in training programs conducted by the ABCs.

In instances where women are appointed as leaders, their positions are only nominal and men still overpower decision making. A female farmer in Lower Banta was appointed as the Chairlady of the ‘Dream FBO’. She was in charge of collecting money and depositing it to the bank. Crucial judgements such as how much money was being spent for membership, maintenance, fuel and repair were being made by the Chairlady’s counterpart, the Chairman. Despite holding the same position, the male member was considered ‘in-charge’ as he was ‘more educated’. This gave him more power over the female member and allowed him to make monetary decisions on behalf of the entire FBO.

Box 2 | Are the ABCs meeting their full potential?

Farmers continue to be concerned with the lack of proper maintenance and a resulting state of disrepair of the ABC equipment. They complained about the rice mills being broken without successful attempts made to repair them on time. In the past, farmers have had to halt their farming activities due to machine breakdowns, which has caused them additional distress and proved severely detrimental to their income. Access to different technologies varies from one ABC to another. All of the ABCs had a rice mill but there was varied access to power tillers, threshers, de-stoners, and power harvesters. These technologies were in various states of operability. Only the Gbangbatoke ABC had a functioning harvester which was operated only by men. It is important to note that equipment such as power tillers can only be used in fields with proper road access. Men at the Gbangbatoke ABC (Lower Banta) reported that because of this reason, fields with road access were reserved for FBOs and that individual farmers did not have access to this particular technology.

Farmers are also concerned about organizational flaws that exist within the ABCs and a lack of proper communication between the ABCs and its member FBOs. While the ABCs have succeeded in their goal to reach out to farmers and provide them with resources, improper functioning of the equipment and organizational corruption is creating barriers for the rice mechanization technology to be utilized to its full potential.

Food Availability, Quality and Safety

Food insecurity and adverse patterns of food consumption are usually caused by unavailability of sufficient quantities of food at all times and the relatively high costs of food that makes it largely unaffordable. The efficiency of rice mechanization has allowed farmers to produce more rice for consumption and increased their overall food availability. A storage space at the business center has given them better control and access to their rice when they need it. ABCs have distributed improved variety of seeds and educated farmers about rice farming which increased their overall yield.

Women farmers claimed that mechanically milled rice tasted better than hand-milled rice. Rural populations, especially women, are often particular about their local tastes and preferences. This can become an obstacle while trying to disseminate a new technology that changes the way a certain food tastes. Luckily, mechanization of rice processing has not only made the process faster, it has also improved the quality of rice⁷, making it taste far better.

⁷ Mechanically milled rice has standardized high quality. Most ABCs also have access to de-stoners which removes any additional impurities.

Normally while in the field, women and children eat starchy foods like as cassava, gari, potato, yam and rice. However, these starch-based foods do not provide enough nutritious content to the entire family. By using rice bran (a byproduct of the rice mill) as fertilizer, women are now being able to cultivate a variety of different vegetables in their garden. Women also reported that after selling their vegetables in the market, they were able to utilize the additional income to purchase other locally available foods. **Rice mechanization has thus indirectly increased food diversity and has provided the families with a broader range of nutrition.** Certain ABCs have allowed women to domesticate and farm livestock on their land. Women agree that these efforts have added protein and quality nutrition to their food. Women themselves are now able to eat much better compared to when they were manually processing rice for hours which took up a lot of their physical energy.

On a household scale however, food availability differs for different members of the family. In Sierra Leone, food is allocated in order of the status of individuals. Typically, men who hold highest status in the household are given the largest pieces or highest quality food (Pasqualino et al. 2016). While evidence suggests that there is potential to improve food availability and nutrition through rice processing mechanization, there may be differences in men's, women's, girl's, and boy's access to food at the household level.

Farmers discussed how water management of crops heavily affected the digestion and absorption of nutrients in the food. So far, the ABCs have provided equipment, marketing, and storage facilities. However, actions for better water operation and irrigation are yet to be taken. Both men and women farmers reported missing or broken water pumps from the ABCs as an important issue that required immediate attention. They reported not having access to water for proper irrigation. It is clear that machine breakdowns, fluctuating mill operation, and lack of proper irrigation methods have offered a promise of food security, but has not completely ensured it.

Issues and Opportunities

After studying systems of rice production, mechanized processing, and operations of the ABCs as well as the private rice sector, fieldwork suggests that the rice mill technology has reduced the difficulty of strenuous labor and increased efficiency in processing. The introduction of ABCs and rice mechanization has resulted in improved conditions for both men and women. That being said, it has potentially also increased workload for both men and women. While women are the major contributors in the rice value chain and put more hours into rice production, owing largely to discriminatory, customary and statutory laws which favor men over women, women are still not realizing their social and economic potential from rice farming. Women also lack fair and equal representation within the ABCs and have limited say in its operations. Men continue to overpower monetary decision making and access to income and assets throughout rice production. This negatively impacts women's roles in decision-making within their households where they are in charge of their family's food intake and nutrition.

The ABCs themselves lack proper infrastructure, financially sustainable business models and, in many cases, strategically managed direction. Machines constantly break down and the current operators lack the skills required to fix them. Spare parts for equipment are often hard to find and poor road infrastructure makes obtaining parts and getting repairs done much costlier. Poor infrastructure also limits access to markets which is a key component of the ABC business model.

Promoting local rice production is seen as a key strategy for the country's growth. In order to be able to fully utilize the potential of ABCs and the rice processing technology, it is imperative that the ABC

leadership is educated about strategic management and does not succumb to corruption. Providing technical training to machine operators, easier access to maintenance, and improving roads and information networks can also help to address these issues. On a smaller scale, farmers need to be provided with stronger incentives and adequate education in order to make them aware of the economic benefits of rice farming for their personal and commercial use.

Allowing more women to get training as machine operators or changing the design of the machine so that it can be operated easily by both men and women might allow women farmers to regain their active role in rice processing. Encouraging more women to take up leadership roles within the ABCs and FBOs through training and adult education programs in business management, ethics, marketing, etc. will help change societal perceptions and increase female participation on a higher level.



Assessment team attending an ABC meeting in Pelewahun near the Lion Mountain facility. © 2017 Rastogi

Unless gender relations are transformed, ABCs function more effectively, and infrastructure is improved, rice production may not be a profitable engagement for women. Instead of focusing on rice, improvements in activities where women are not constrained in access to land (such as homestead gardening) can be considered a viable alternative for their direct access to income. Household-level garden farming can be made more organized by creating fruit and vegetable production programs. Women can be engaged together on a community level and be supported to increase the scale of their horticulture production. Budgeting programs that can educate women on how to manage their income may help them realize their economic benefits from agriculture and increase their role in the economy.

In order to remove this gender disparity in access to income, it is also important that decisions made by men and women within a household are consensual. Educating men about household matters which are considered a woman's domain and engaging both men and women together in activities that inform them more about food and nutrition can help them communicate better and make informed decisions regarding their entire household. To conclude, more benefits can be delivered through rice mechanization by improving ABC management, assisting women in accessing land, strengthening their role in governance, supporting income generation through horticulture, and addressing the gender based constraints outlined above.

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