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Overview

This assessment sought to establish the benchmark baseline conditions for all the indicators required to track the progress of the 4R Solution project. The baseline conditions are established by analyzing primary data obtained from focus group discussions conducted in 56 communities and 1,008 individual households enumerated in the East Gonja, Kpandai, Nanumba North and Nanumba South districts of northern Ghana. In addition to these community level data, 8 institutions and 4 zonal co-operatives were also interviewed as part of the baseline survey. An analysis of the household data using the poverty probability index and the FGT measure of poverty suggests that about 14.1% and 49.6% of the sample are “likely to be poor” and “are poor”, respectively. The data suggests that female headed households, on average, are poorer. An average female and male-headed household struggles to find adequate food in about 2.7 months of the year. About 58% and 67% of female and male-headed households are food secured. Crop yields are generally low with the average yields of maize, rice, soybean and groundnuts being 0.52, 0.74, 0.35 and 0.41 Mt/Ha, respectively. The household data also shows that females, on the average, earn lower incomes from three of the four key crops studied, groundnut being the notable exception. The low levels of income generated by female headed households suggests the presence of a gender-based inequality gap that could be resulting from inability to access or apply productivity enhancing agricultural technologies and best management practices.

The baseline shows that the concept of 4R (i.e. obtaining the right source of fertilizer and applying it at the right rate, at the right time and at the right place) as an integrated idea is new in the study area. The consultants did not find an institution that has integrated 4R principles into their policies and guidelines. Similarly, the study did not encounter a new standard and/or policy of an organization that include gender sensitive 4R principles. Agricultural extension agents and some farmers are generally aware of the environmental and economic importance of the different components of 4R but not as an integrated concept. There does not appear to be any evidence of a gender sensitive tool or guideline developed to generate, collect and validate data for 4R. Similarly, there does not seem to be any evidence of the establishment of an on-farm demonstration or a farmer field day or an exchange visit organized to promote 4R in the study area. Similarly, the consultants did not find a champion who has been recruited to help advance the course of 4R in the study area. Even though earlier projects have been instrumental in establishing Community Volunteer Agricultural Extension agents (but not specifically on 4R), the consultants find that only few of them are actively or deliberately sharing information with other farmers after the exit of the projects that established them.

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There is some level of gender awareness and inclusiveness in the project area given the earlier interventions of the FOSTERING and related projects. About 12% of elected community leaders and 40% of zonal co-operatives are women. Women influence about 36% and 40% of decisions undertaken by their co-operatives and communities, respectively. About 65% of the women and 64% of the men enumerated expressed their willingness to accept women as leaders. With regards to economic empowerment of women, the baseline data reveal that rural commercial women's groups were established in the communities that participated in the FOSTERING Project. The women were trained on leadership, financial literacy and business skills and were assisted to set up a commercial venture. Similarly, gender model families were established in the communities that benefitted from the FOSTERING Project. Gender equality and positive masculinities trainings targeted at men and boys were organized at each of the FOSTERING communities. The baseline data establish women's average ability to communicate and negotiate as 2.6, out of a 5-point scale with 5 being the highest. The consultants did not find documentary evidence of a gender equality dialogue, international workshop or gender summit organized in the study area.

The baseline survey shows that farmers have in the past been linked to value chain services by previous projects. However, such links have tended to wean or end after project exits. The baseline data show that no farmer was linked by a zonal co-operative to post-harvest storage and market in 2019 even though 7% of female farmers and 10% of male producers were linked to improved production resources.

The baseline shows that the zonal co-operatives are still have executives even though their level of activity declines considerably without project support. Services being provided by the zonal co-operatives is basically linking their members to seed and tractor services. The FOSTERING Project built the capacity of the co-operatives in the areas of gender sensitive good governance, management and business practices. The baseline data suggest that 169 female and 169 male co-operative members have been trained on their roles and responsibilities as well as on strategic business planning and markets.

Priorities for 4R-NSP

The following are recommended for action based on the findings of the baseline assessment. These are discussed under 8 thematic areas and are meant to help the 4R-NSP to achieve its objectives.

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Gender in agriculture

The 4R-NSP can improve gender inclusiveness by promoting the 4R principles for a couple of crops (including legumes often produced by women) rather than focusing on only a single commodity. The program can, for example, support farmers to produce maize, rice, groundnut or soybean instead of restricting the 4R intervention to just one crop. Even though yam and other crops appear to be currently less amenable to the 4R principles, the program can make a bigger impact by adopting a farming systems approach where such traditional crops are not totally neglected.

There also is the need to continue to implement measures that empower women. Women need to be encouraged to play more active roles in their communities. It is common practice for women to literally opt for back seats even when they are the first to arrive for a communal or co-operative meeting. Women should be encouraged to compete for elective leadership positions at all levels. In addition, positive affirmation could prove useful. Co-operative constitutions and local level by-laws can reserve some key leadership positions solely for women. Financial requirements (if any) associated with vying for such positions can be lowered for women. The baseline survey reveal that group leaders are usually selected based on consensus or open ballot and the tenure of leadership is often flexible. Therefore, there is the need to sensitize various farmer groups to adopt tenure for leadership and use secret ballot so that voting can be independent and sincere. Furthermore, Annual General Meetings (AGMs) should be held regularly to allow for new leaders to be elected (in one of the AGMs) when their tenure expires. This way, women stand a higher chance of being selected. In addition, capacity building in the area of positive masculinities ought to continue so that more men and boys will be empowered to support or encourage women to play more active roles in farmer groups and to effectively champion the course of the marginalized. Scaling up the concept of gender model family (GMF) and rural commercial women's groups (RCWG) is appropriate. One option to scale out is to organize a refresher training for existing GMF and recruit and train new GMF in communities where they do not exist. The retrained and newly trained GMFs can then be tasked and backstopped to organize peer trainings for a targeted number of families.

Value chain linkages

The importance of developing but more importantly strengthening value chain linkages cannot be downplayed. There is the need for the 4R-NSP to devote some resources to facilitating and strengthening value chain linkages in order for such linkages to be sustained after the project. Strengthening the existing District Value Chain Committees in terms of retraining and retooling them to become competitive and self-sustaining could be a starting point. The program should avoid the use of external actors where possible, e.g. linking farmers to a tractor service operator or input supplier based in a regional capital when there is local capacity or potential within the district should be avoided. There is also a need to

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build the capacity of various actors in the agricultural value chain to appreciate and honor contractual agreements. Farmers should be sensitized on the need to respect contractual terms as it relates to produce quantity, quality and other specifications whilst other service providers need to be sensitized to promptly honor contractual payments and timely deliver high quality products and services.

Agricultural credit

To minimize disagreements about in-kind loans and repayments and to promote economically profitable production, there is the need to build the capacity of farmers and co-operatives to prepare crop budgets by costing all inputs including in-kind loans obtained from projects as well as services rendered by women and the youth. The capacity of credit unions needs to be enhanced so that they can avoid or minimize providing risky loans regardless of the external pressures mounted by projects or farmers. One option is train credit providers on ways to identify risky loans, minimize their advancement and how to amicably recover such loans.

Post-harvest storage and market

There is the need to expose farmers or create awareness on simple post-harvest technologies and structures that can be owned privately or communally. An example of a post-harvest technology is the triple-layered hermetic storage bags that have been proven to be effective for the storage of grains (Kharel et al., 2018). Simple improved storage structures can also be adopted to minimize post-harvest losses. Moreover, farmers ought to be sustainably linked to structured markets in order to guarantee sustainable adoption of 4R. One option is to link farmers to a platform (e.g. mobile-phone or web-based) where they can obtain market prices or buyer information. It is also important to build the capacity of farmers to consider the market first in making production decisions and to be able to directly negotiate and communicate with other actors in the agricultural value chain instead of relying on project-led negotiations and communications.

Agricultural extension and reach

There are a number of options that the 4R-NSP can use to reach the 30,000 smallholder farmers targeted by the program. One option is to target 30,000 individual farmers by working with an average of 7,500 individual farmers per district which can translate into an average of 50 communities per district and 150 individual farmers per community. Another option would be to target households or farm families. With an average adult household size of six in the intervention area, the program could work directly with two individuals per household who would then be expected influence the other four members of their household (2 each). In that regard, the project could target 32 communities per district and then work with 60 households (or 120 individuals) in each community (i.e. 2 direct beneficiaries multiplied by 2 indirect beneficiaries (who are being influenced

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by each direct beneficiary) multiplied by 60 households per community multiplied by 32 communities per district multiplied by 4 districts equals 30,720). Note that the “indirect beneficiaries” in the second option can also benefit directly from some activities undertaken at the communal level including farmer field days, community interactions, community trainings among others.

There is the need for the 4R-NSP to adopt mix methods to scale up the concept of 4R given that it is relatively new. The use of group and mass communication methods such as farmer field fora, community demonstrations, radio, video shows among others, can greatly enhance the awareness and adoption of 4R principles and concepts and consequently aid in closing the yield gap.

The concept of Community Volunteer Agricultural Extension Agents (CVAEAs), though a very good initiative to bridge farmer to extension gap, also appear to be project-dependent such that the activities of CVAEAs tend to wean or curtail after project exit. Therefore, as is common with formal extension delivery, farmers can be encouraged to appreciate the efforts of CVAEAs by, for example, gifting CVAEAs with some of the produce that result from implementing their ideas or recommendations. Social recognition could also be an additional source of motivation for CVAEAs.

4R concepts and principles

The 4R-NSP should endeavor to partner and support many institutions to develop simple and easy to understand 4R principles and concepts as well as gender-sensitive tools and guidelines (i.e. protocols developed for the establishment of on-farm demonstrations should explicitly consider issues of gender right from site selection to post-harvest processes) that can be published as leaflets, flyers, posters, booklets among others.

General capacity of farmers and co-operatives

There is the need to build the capacities of co-operatives for them to become less dependent on SEND GHANA or any project that facilitates their establishment such that they can provide services to their members with little or no project support. In addition, co-operatives and other actors in the agricultural value chain can be assisted to prepare demand-driven bankable and implementable business plans and strategies. Beyond project support and the credit unions, zonal co-operatives should be assisted to prepare business plans as a primary document to be used to source external loans to finance activities of their members.

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Crop productivity and welfare

The 4R-NSP can improve crop productivity and food security and consequently reduce poverty if the program can take steps to link farmers to sustainable finance, technology, agro-inputs, extension services, post-harvest facilities and structured markets.

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Tables and Figures

Table 1: Results of baseline survey in Ghana

Expected Results	Indicators	Measure		Baseline Value	Comments	
Ultimate Outcome						
1000. Improved socio-economic well-being and resilience of smallholder farmers, particularly women, in Ethiopia, Ghana and Senegal	1000.1 Percentage change in poverty level (w/m headed households).	Incidence of poverty	W	54.3	Consistent with other national surveys, the baseline data shows that the levels of poverty in rural northern Ghana is still high.	
			M	44.9		
		Poverty probability index (%)	W	13.93		
			M	14.34		
	1000.2 Number and percentage of smallholder farmers (w/m) reporting improvements in their livelihood and food security	Average number of months that households have adequate food	W	9.26	An average household struggles to find adequate food close to 3 months in a year. The period of scarcity tend to coincide with the rainy season (i.e. after planting but before harvesting).	
			M	9.29		
		Percent of food secured households	W	58.4		
			M	66.8		
		Total value of household assets	W	2817	As can be anticipated and given that the study area is a patriarchal society, the total value of assets of male headed households is higher than that of female headed households.	
			M	3152		

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Intermediate Outcomes						
I100 Enhanced sustainable production using climate smart, best management practices in agriculture and increased value chain access and integration by women and men farmers in the targeted regions in Ethiopia, Ghana and Senegal	I100.1 %/ total targeted smallholder farmers (w/m) implementing 4R	Percent of farmers implementing 4R	W	0	The baseline survey shows that the principles of 4R, as a single or integrated concept, is seemingly new to farmers.	
			M	0		
	I100.2 % change in yield per unit area (hectares) of project supported key crops	Maize (Mt/Ha)		0.72		Yields obtained by farmers are below average. The yield gap can be attributed to both biotic and abiotic factors such as declining soil fertility, suboptimal farm management practices, erratic rainfall among others.
		Rice (Mt/Ha)		0.96		
		Soybean (Mt/Ha)		0.54		
		Groundnut (Mt/Ha)		0.52		
	I100.3 %/total targeted smallholder farmers(w/m) who have reported additional income resulting from project supported key crops	Maize income (GHs ¹)	W	715.35		Males earn higher income for all the crops studied except for groundnut, which is often processed locally, an activity usually done by women to add value to the crop.
			M	1131.62		
		Rice income (GHs)	W	431.63		
			M	1076.21		
Soybean income (GHs)		W	278.11			
		M	297.61			
Groundnut income (GHs)	W	2838.29				
	M	2333.97				
I200 Enhanced representation and influence of women in leadership positions & decision-making bodies, especially in co-	I200.1 % of trained women elected to leadership positions within the community, disaggregated by position and organization	Percent of women elected to leadership positions at	Unit comm	12.1	Unit committee and assembly membership are the two political leadership positions that can be contested at the local level. Women tend to vie for unit committee membership which is lower than the assembly membership rank.	

¹ The foreign currency exchange rate for the Canadian Dollar is 1.00CAD=GHs4.01.

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operatives within targeted communities of Ethiopia, Ghana and Senegal		the community level	Coop	40	Women are often elected either as financial secretaries/treasurers or as deputies of other substantive positions. The dominance of males in the leadership of the co-operatives may be linked to men's traditional role as leaders of their household and communities.
	I200.2 Proportion of decisions (by co-operative/community) driven by women	Percent of decisions driven by women	Comm	36	Decisions that are driven by women include negotiations for more productive lands, tractor services, time and day for group meetings, adoption of good agricultural techniques practiced in their maiden communities among others.
			Coop	40	
I300 Increased integration of gender sensitive 4R principles in relevant standards and policies globally and nationally, particularly in Ethiopia, Ghana and Senegal	I300.1 Number of institutions that have integrated 4R principles in their policies and guidelines	Number of institutions that have integrated 4R principles in their policies and guidelines		0	There is no evidence of an institution in the study area that is either implementing or have integrated 4R into their policy or guideline.
	I300.2 Number of new standards and/or policies within organizations that include gender sensitive 4R principles	Number of new standards and/or policies within organizations that include gender sensitive 4R principles		0	
Immediate Outcomes					
I110 Improved agricultural knowledge and skills of women and men smallholder farmers and extension agents,	I110.1 %/total targeted smallholder famers (w/m) reporting improved agricultural knowledge and skills on the 4R approach	Percent of farmers with knowledge on 4R	W	0	The baseline survey shows that farmers are not aware of 4R.
			M	0	
	I110.2 %/total targeted extension agents (w/m)	Percent of extension agents	W	66.7	

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particularly in applying 4R for targeted crops	reporting improved agricultural knowledge and skills on the 4R approach	with knowledge on 4R	M	50.8	Unlike farmers, a large share of extension agents reported been taught 4R as part of their agricultural college education.
I 120 Enhanced access of women and men smallholder farmers to value chains, including access to inputs, loans, pre- and post-production facilities and markets through co-operatives	I 120.1 %/total targeted smallholder famers (w/m) with access to improved production resources <i>(Note: This includes but is not limited to seed, fertilizers, credit, agric mechanisation)</i>	Percent of farmers with access to improved production resources	W	7.4	This refers to the proportion of farmers who have been linked by zonal co-operatives to production resources such as improved seed and tractor services.
			M	10.2	
	I 120.2 %/ total targeted smallholder famers (w/m) linked by co-ops to post-harvest storage and markets	Percent of farmers linked by coops to storage	W	0	The last time that farmers were linked by the zonal co-operatives to either storage or market was during the FOSTERING ² Project.
			M	0	
		Percent of farmers linked by	W	0	
			M	0	

² The 4R-NSP is a follow-up to an earlier project dubbed Food Security through Co-operatives in Northern Ghana (FOSTERING) which in turn was built on the Food Security and Livelihood Development Programme implemented in 2001. FOSTERING was a 5-year project implemented by the Canadian Co-operative Association in collaboration with SEND GHANA and the Ghana Credit Unions Association. The project, which costed CAD8,032,151 was funded principally by the Department of Foreign Affairs, Trade and Development Canada (DFATD). The ultimate aim of the project was to increase sustainable, gender equitable food security for women and men in targeted communities in northern Ghana. The project had three outcomes which were to increase economic stability for women and men and a higher level of gender equitable economic productivity; increase levels of services and support provided to women and men members of credit unions and co-operatives and to increase the awareness and responsiveness of government to food security issues raised by smallholder women and men farmers. FOSTERING was implemented in three districts that benefitted from the earlier Food Security and Livelihood Development Programme (i.e. East Gonja, Nanumba North and Kpandai) and in five additional districts (i.e. Tatale-Sangule, Nanumba South, Chereponi, Zabzugu and Krachi-Nchumuru). A total of 42,000 women and men in 130 communities were targeted.

FOSTERING and 4R-NSP have some similarities. The focus of both project is to improving food security and sustainable economic growth for smallholder farmers; improve production and productivity as well as facilitate access to produce markets and finance. The direct beneficiaries of both projects are women and men smallholder farmers that are members of zonal co-operatives. Gender and general resilience are important cross cutting themes in both projects. Note, however, that the 4R-NSP is being implemented with at least two new partners (i.e. Fertilizer Canada and IPNI) and therefore places additional emphasis on soil fertility and plant nutrition management. 4R-NSP has a limited geographical scope (i.e. East Gonja, Kpandai, Nanumba North and Nanumba South), less budget and 6 additional months of implementation when compared to the FOSTERING Project.

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		coops to market in 2018				
1210 Increased capacity of women smallholder farmers to participate as extension agents and leaders in co-ops and communities	1210.1 % /total women trained who report improved capacity, especially confidence in their own negotiation & communication skills (4 or 5 on a 5-point scale)	Average capacity of women to negotiate (5-point scale, 5 is highest)		2.6	The baseline data reveals that women's capacity to negotiate and communicate is average.	
		Average capacity of women to communicate (5-point scale, 5 is highest)		2.6		
	1210.2 Number of Women Community Volunteer Agricultural Extension Agents (CVAEAs) sharing knowledge with other farmers	Number of Women Community Volunteer Agricultural Extension Agents (CVAEAs) sharing knowledge with other farmers		19	The baseline that data shows 19 of the CVAEAs that were established in the sampled communities under the FOSTERING Project are still active.	
1220 Improved acceptance of women and men in targeted communities towards women's participation in leadership roles	1220.1 % of respondents (w/m) in project communities who are willing to accept women as leaders, disaggregated by respondent category (community leaders, government officials, and beneficiaries)	Percent respondents (w/m) in project communities who are willing to accept women as leaders	Com mem	W	77	The result suggests that an average female coop leader appears to have better working relationships with men than other women.
				M	79	
			Com lead	W	84	
				M	83	
			Coop mem	W	80	
				M	53	
			Coop lead	W	18	
				M	40	

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<p>I310</p> <p>Improved awareness by international policy makers, universities and agribusinesses of the environmental and economic benefits of 4R</p>	<p>I310.1 Percentage of institutions reporting 'substantial' or 'comprehensive' understanding of the environmental and economic benefits of 4R, disaggregated by type of organization (4 or 5 on a 5-point scale)</p>	<p>Percentage of institutions reporting 'substantial' or 'comprehensive' understanding of the environmental benefits of 4R</p>	0	<p>The institutions here refer to the four zonal co-operatives that were enumerated. Other 'institutions' are captured in the next indicator, I320.1.</p>
		<p>Average rating (5-point scale)</p>	2.67	<p>The average rating is a summation of all the institutional self-ratings divided by the number of institutions. A rating of 4 or 5 is judged as 'substantial' or 'comprehensive'.</p>
		<p>Percentage of institutions reporting 'substantial' or 'comprehensive' understanding of the economic benefits of 4R</p>	0	<p>The institutions here refer to the four zonal co-operatives that were enumerated. Other 'institutions' are captured in the next indicator, I320.1.</p>
		<p>Average rating (5-point scale)</p>	3	
<p>I320</p> <p>Increased awareness of the importance of 4R within government ministries, farm groups and key rural development actors in the target countries</p>	<p>I320.1 Number of local government departments, institutions and key rural development actors reporting 'substantial' or 'comprehensive' understanding of the importance of 4R (4 or 5 on a 5-point scale)</p>	<p>Number of local government departments, institutions and key rural development actors reporting 'substantial' or 'comprehensive' understanding of the importance of 4R</p>	5	<p>The institutions are the Agronomy Department of the University for Development Studies and the 4 departments of agriculture in Nanumba North, Nanumba South, East Gonja and Kpandai districts.</p>

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		Average rating (5-point scale)	4	Staff of the 5 institutions mentioned above all have advanced degrees in agriculture and therefore report a high understanding of the importance of 4R.
Outputs				
IIII Gender sensitive assessments conducted on barriers to efficient production of key crops, including selection of most appropriate crops	IIII.1 Number of gender-sensitive assessments conducted on barriers to efficient production of key crops	Number of gender-sensitive assessments conducted on barriers to efficient production of key crops	0	The Department of Agriculture in Nanumba South reports that constraints that limit women's participation in the production of crops such as maize and rice include difficulty in accessing fertile lands, tractor services and agro inputs.
II12 Gender sensitive tools, guidelines, scientific field trials and instrumentation developed to generate, collect and validate data for 4R	II12.1 Number of gender sensitive tools and guidelines developed to generate, collect and validate data for 4R, disaggregated by category	Number of gender sensitive tools and guidelines developed to generate, collect and validate data for 4R	0	Given that the concept of 4R as a single or integrated concept is new in the study area, all baseline values are zero except those related to the levels of knowledge of extension and academic staff.
II13 4R demonstration plots established for training and outreach activities for women and men smallholder farmers	II13.1 Number of demonstration plots established	Number of demonstration plots established	0	
	II13.2 Number of field days held for training and outreach activities	Number of field days held for training and outreach activities	0	

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1114 Gender-sensitive training on agronomic best management practices (BMP), specifically 4R, provided to women and men extension agents and smallholder farmers	1114.1 Number of individuals (w/m) trained on agronomic best management practices, specifically 4R, disaggregated by type of individuals (smallholder farmer/extension agents /other)	Number of farmers trained on 4R	W	0	
			M	0	
		Number of extension agents trained on 4R	W	0	
			M	0	
1121 Gender-sensitive assessments conducted on the business, strategic and governance capacity of co-operatives	1121.1 Number of assessments conducted on the business, strategic, governance and gender equitable capacity of co-operatives	Number of assessments conducted on the business, strategic, governance and gender equitable capacity of co-operatives		0	This indicator refers to specific 4R-NSP interventions. Nonetheless, the Kpandai and Salaga zonal co-operatives reported that the FOSTERING Project assessed their business, strategic, governance and gender equitable capacities.
	1121.2 Number of co-ops that are functional with active members	Number of co-ops that are functional with active members		1	The Salaga Zonal Co-operative reported that their executives and members meet regularly and also receive dues regularly. This notwithstanding, elections are not regular, the last time being 2015.
1122 Gender sensitive training program on good governance, management and business practices delivered to co-op leaders and managers	1122.1 #/ total targeted co-ops trained on gender-sensitive good governance, management and business practices	Number of co-ops trained on gender-sensitive good governance, management and business practices		4	All the zonal co-operative reported receiving the referenced trainings in 2015 from the FOSTERING Project
	1122.2 Number of participants (w/m) trained on good governance,	Number of coop leaders trained on good	W	9	The entire leadership of the zonal co-operatives were trained under the FOSTERING Project.

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	management and business practices, disaggregated by training category and participant type (board members/staff/other)	governance, management and business practices	M	19	
1123 Women and men co-op members trained on roles and responsibilities as coop members, and on strategic business planning and markets	1123.1 #/total targeted co-ops with a strategic business plan developed that reflect co-op priorities and needs of w/m members	Number of co-ops with a strategic business plan developed that reflect co-op priorities and needs of w/m members		2	The co-operative data suggest that the Chamba and Salaga Zonal Co-operatives both have a business plan.
	1123.2 a) #/total co-op members (w/m) trained on roles and responsibilities as co-op members	Number of co-op members trained on roles and responsibilities as co-op members	W	169	These trainings were organized during the FOSTERING Project
			M	169	
	b) #/ total co-op members(w/m) trained on strategic business planning and markets	Number of co-op members trained on strategic business planning and markets	W	169	
M			169		
1124 Revolving/guarantee fund for women and men smallholders established to facilitate purchase of inputs,	1124.1 Number of unique women and men smallholder farmers to whom loans are disbursed through the selected	Number of unique women and men smallholder farmers to whom	W	0	During the FOSTERING Project, the co-operative credit unions were very active in disbursing loans to smallholder farmers.

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including equipment and machinery	financial institution(s), disaggregated by loan category/purpose	loans are disbursed through the selected financial institution(s)	M	0	
1125 Women and men co-op members linked to input suppliers and high-value markets	1125.1 Number of agreements signed per co-op with a) input suppliers and b) produce buyers	Number of agreements signed per co-op	With input suppliers	2	Agreements between input suppliers and co-operatives are often verbal and one off. There is no guarantee that a relationship started in a particular year will extend to the next. Any service provider can be contacted if there is sufficient farmer demand.
			With produce buyers	0	
	1125.2 %/total co-op members (w/m) linked to input suppliers and produce buyers	Percent of co-op members linked to input suppliers	W	7.4	This refers to the proportion of farmers who have been linked by zonal co-operatives to production resources such as improved seed and tractor service.
			M	10.2	
		Percent of co-op members linked to produce buyers	W	0	The last time that farmers were linked by the zonal co-operatives to either storage or market was during the FOSTERIN Project.
			M	0	
1126 Value chain inputs, technologies and facilities procured by co-ops	1126.1 Type of services provided by co-ops, disaggregated by category Note: -crop inputs (seed, fertilizer, pesticide);	Type of services provided by co-ops	Seed Ploughing services		The zonal co-operatives are currently linking their members to inputs such as seed and tractor services. Fertilizer, planting equipment and harvesting equipment are other important inputs that are scarce and could be addressed by the 4R-NSP.

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	-Farm equipment (machinery/tools) -other facilities			
1211 Rural Commercial Women's Groups (RCWG) established	1211.1 Number of Rural Commercial Women's Groups established	Number of Rural Commercial Women's Groups established	19	Several RCWGs were established under the FOSTERING Project. The community survey shows that 19 RCWGs are still active in the enumerated area.
	1211.2 Number of women trained on financial literacy and business skills	Number of women trained on financial literacy and business skills	210	These trainings were organized by the FOSTERING Project.
1212 Leadership training provided to members of RCWG	1212.1 Number of RCWG members who have completed the leadership training course	Number of RCWG members who have completed the leadership training course	234	
1221 Gender Equality Strategy (GES) developed based on gender analyses to inform implementation of gender- sensitive and gender-specific interventions	1221.1 Number of gender equality strategies developed	Number of gender equality strategies developed	0	This indicator refers to gender equality strategies developed by the 4R-NSP so the baseline value is zero.
1222 Gender equality dialogue sessions related to women's	1222.1 Number of gender equality dialogue sessions held, disaggregated by topic	Number of gender equality dialogue sessions held	0	The consultants did not find evidence of a gender equality dialogue session held in the study area.

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economic empowerment and leadership roles held with community leaders, public sector officials as well as women and men small holder farmers	I222. Number of participants(w/m) attending the sessions, disaggregated by category	Number of participants attending the sessions	W	0	
			M	0	
I223 Gender Model Families (GMF) established showcasing positive gender roles	I223.1 Number of GMF established	Number of GMF established		40	The GMFs were established under the FOSTERING Project.
I224 Peer-to-peer gender equality and positive masculinities training provided to men and boys	I224.1 Number of unique individuals (men and boys) trained on gender equality and positive masculinities	Number of unique individuals (men and boys) trained on gender equality and positive masculinities	Men	518	The FOSTERING Project facilitated these trainings at the community level.
			Boys	376	
I225 Gender summit held in each of the 3 participating countries	I225.1 Number of gender summits held	Number of gender summits held		0	During the baseline survey, the consultants did not find evidence of a gender summit held even though such a summit was hosted in the past (https://www.newsghana.com.gh/18-best-families-participate-in-two-day-gender-model-family-summit/).
	I225.2 Number of key gender institutions and other organizations that have made commitments	Number of key gender institutions and other organizations that have made commitments		0	
I311 Global 4R champions recruited	I311.1 Number of global 4R champions (w/m) recruited	Number of global 4R champions recruited	W	0	Given that 4R is new in the study area, the baseline values for outputs I311-I321 are all zero.
			M	0	

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1312 International workshops and events held to showcase 4R results	1312.1 Number of international workshops and events held	Number of international workshops and events held	0	
1313 Agreement on global 4R Standards Declaration signed	1313.1 Number of agreements signed	Number of agreements signed	0	
	1313.2 Number of organizations that have signed an MoU	Number of organizations that have signed an MoU	0	
1321 Standardized gender-sensitive 4R training materials developed for relevant government departments and stakeholders.	1321.1 Number of gender-sensitive 4R toolkits developed, disaggregated by target audience group	Number of gender-sensitive 4R toolkits developed	0	
	1321.2 Number of public and private sector stakeholders trained on 4R	Number of public and private sector stakeholders trained on 4R	0	
National events including exchange visits held to highlight the importance of 4R	1322.1 # of events and exchange visits held	Number of events and exchange visits held	0	

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Table 2: Sampling procedure used to identify households

		Northern Region	Savannah Region	Sampling method
A	Number of districts per region	3	1	Purposive
B	Number of communities per district	14	14	Simple random
C	Number of households per community	18	18	Simple random
	Total sample per region = A x B x C	756	252	

Table 3: Membership of association based on sex

	Male	Female	Pooled
Main occupation (1=farming)	91.70	92.51	91.85
Residence (1=ative)	94.75	64.71	89.17
Member of FBO (1=yes)	42.74	62.03	46.32
Member of youth (1=yes)	11.72	5.88	10.64
Member of VSLA (1=yes)	21.05	45.99	25.70

Table 4: Access to facilities based on sex

Variables	Distance (km)	Walking distance to facility (minutes)	
		Adult Males	Adult Females
Access to road	1.60	10.51	12.84
Access to input shop	5.83	75.49	83.48
Access to market	6.92	85.76	94.01
Access to credit facility	5.36	75.84	86.75
Access to health facility	7.75	87.47	94.82

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Access to storage facility	3.24	20.33	24.43
Access to irrigation	1.95	21.53	26.18
Access to district capital	8.46	113.92	122.95
Access to extension services	9.56	116.47	128.06
Access to district assembly	8.45	119.27	126.54

Table 5: Cropped area by sex

Variable	Gender of household head				Difference
	Male		Female		
	Mean	Std. Dev.	Mean	Std. Dev.	
<u>Crop area (acres)</u>					
Maize area (acre)	4.37	3.75	2.85	2.39	1.51***
Rice area (acre)	4.05	4.29	2.63	2.99	1.41
Soybean area (acre)	2.54	2.45	2.32	2.91	0.22
Groundnut area (acre)	3.62	2.70	2.97	2.37	0.65***

*** represents statistical significance at the 1% confidence level.

Table 6: Household cost profile by sex

Variables	Mean cost (GHS)		
	Male	Female	Pooled
Total annual cost ⁺ (GHS)	1434.59	850.84	1325.87
<u>Distribution of cost by sources</u>			
Total input cost (GHS)	1095.23	581.84	999.10
Seed cost (GHS)	105.80	132.28	111.68
NPK cost (GHS)	954.10	546.50	908.09
Sulphate of ammonia cost (GHS)	631.68	310.85	591.99

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Herbicide cost (GHS)	166.04	101.42	155.50
Insecticide cost (GHS)	93.79	85.10	91.95
Tarpaulin cost (GHS)	30.28	25.89	29.52
Transport cost (GHS)	117.64	95.44	113.77
Tools and equipment cost (GHS)	285.72	212.58	272.14
Amount of loan (GHS)	2266.76	1094.44	1985.40
Other cost (GHS)	72.39	32.82	66.18

Notes: +The total household cost exclude amount of loan accessed by the household.

Table 7: Timing & Rate of fertilizer application by sex

Variable	Gender of household head				Difference
	Male		Female		
	Mean	Std. Dev.	Mean	Std. Dev.	
<u>NPK application after planting (week)</u>					
Maize	3.44	1.33	3.52	1.36	-0.05
Rice	4.75	0.78	4.81	0.77	-0.01
Soybean	4.96	0.34	4.95	0.32	0.01
Groundnut	5.00	0.00	4.87	0.67	0.08***
<u>SoA application after planting</u>					
Maize	4.63	0.72	4.67	0.60	-0.06
Rice	4.93	0.36	4.92	0.37	0.01
Soybean	4.98	0.24	4.98	0.25	0.00
Groundnut	5.00	0.04	4.95	0.30	0.05**
<u>Rate of NPK application (bag/acre)</u>					
Maize	1.67	0.50	1.64	0.49	0.03
Rice	1.34	0.46	1.43	0.60	-0.09
Soybean	1.13	0.36	1.23	0.41	-0.09
<u>Rate of SoA application (bag/acre)</u>					
Maize	1.57	0.52	1.58	0.51	-0.01
Rice	1.34	0.46	1.41	0.59	-0.07

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Soybean 1.08 0.27 1.13 0.35 -0.06

** and *** represent statistical significance at the 5 and 1% confidence level, respectively.

Table 8: Awareness of recommended rate of fertilizer and application method by sex

Variable	Male	Female	Pooled
	Yes	Yes	Yes
Aware of recommended rate (%)	33	24	31
Method of NPK application (maize)			
Broadcasting	1.25	1.92	1.37
Banding	12.64	7.69	11.76
Spot/hill application	68.06	66.03	67.69
Deep placement	18.06	24.36	19.18
Method of NPK application (rice)			
Broadcasting	83.13	54.55	79.79
Banding	7.23	27.27	9.57
Spot/hill application	4.82	18.18	6.38
Deep placement	4.82	0.00	4.26
Method of NPK application (soybean)			
Broadcasting	0.00	0.00	0.00
Banding	38.46	16.67	31.58
Spot/hill application	61.54	83.33	68.42
Deep placement	0.00	0.00	0.00
Method of NPK application (groundnut)			
Broadcasting	0.00	50.00	50.00
Banding	0.00	0.00	0.00
Spot/hill application	0.00	50.00	50.00
Deep placement	0.00	0.00	0.00
Method of SoA application (maize)			
Broadcasting	1.43	4.96	2.00
Banding	12.08	4.96	10.93
Spot/hill application	80.60	87.60	81.73
Deep placement	5.88	2.48	5.33
Method of SoA application (rice)			
Broadcasting	77.78	76.92	77.65

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Banding	6.94	0.00	5.88
Spot/hill application	9.72	23.08	11.76
Deep placement	5.56	0.00	4.71
Method of SoA application (soybean)			
Broadcasting	16.67	0.00	11.11
Banding	25.00	16.67	22.22
Spot/hill application	41.67	83.33	55.56
Deep placement	16.67	0.00	11.11
Method of SoA application (groundnut)			
Broadcasting	0.00	50.00	42.86
Banding	100.00	0.00	14.29
Spot/hill application	0.00	50.00	42.86
Deep placement	0.00	0.00	0.00

Table 9: Source of fertilizer for the focal crops by sex

Variable	Male	Female	Pooled
	Yes	Yes	Yes
Source of NPK (maize)			
Registered input dealer (%)	37.48	31.06	36.31
Open market (%)	62.24	67.08	63.12
Other farmers (%)	0.28	1.86	0.57
Source of NPK (rice)			
Registered input dealer (%)	39.74	35.71	39.13
Open market (%)	60.26	64.29	60.87
Other farmers (%)	0.00	0.00	0.00
Source of NPK (soybean)			
Registered input dealer (%)	55.85	50.00	52.63
Open market (%)	46.15	50.00	47.37
Other farmers (%)	0.00	0.00	0.00
Source of NPK (groundnut)			
Registered input dealer (%)	0.00	0.00	0.00
Open market (%)	0.00	100.00	100.00
Other farmers (%)	0.00	0.00	0.00

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<u>Source of SoA (maize)</u>			
Registered input dealer (%)	36.22	27.73	34.88
Open market (%)	63.46	72.27	64.85
Other farmers (%)	0.31	0.00	0.27
<u>Source of SoA (rice)</u>			
Registered input dealer (%)	40.85	33.33	39.76
Open market (%)	59.15	66.67	60.24
Other farmers (%)	0.00	0.00	0.00
<u>Source of SoA (soybean)</u>			
Registered input dealer (%)	53.85	50.00	52.63
Open market (%)	46.15	50.00	47.37
Other farmers (%)	0.00	0.00	0.00
<u>Source of SoA (groundnut)</u>			
Registered input dealer (%)	100.00	0.00	14.29
Open market (%)	0.00	100.00	85.71
Other farmers (%)	0.00	0.00	0.00

Table 10: Household income profile by sex

Variables	Mean Income (GHS)		
	Male	Female	Pooled
Total household Income (GHS)	4349.70	2173.17	3960.95
<u>Distribution of Income by sources</u>			
<u>Agricultural income</u>	3917.47	1937.08	3575.95
Crop income	3539.51	1728.57	3229.46
Livestock income	835.60	708.54	820.04
Fish income	963.33	1300	1011.43
<u>Non-agricultural income</u>	2020.35	1120.92	1822.72
Off farm income	1667.48	999	1526.25
Rent income	1240	0	1240
Remittance income	2331.33	1167.50	1978.65
NGO	295.56	143.33	257.50

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Government support	449	200	421.33
Dowry	933	243.75	736.07

Table II: Mean comparison for welfare outcomes based on sex

Variable	Gender of household head				Difference
	Male		Female		
	Mean	Std. Dev.	Mean	Std. Dev.	
Total income	4344.05	4245.07	2173.17	2729.98	2170.87
Agricultural income	3912.35	3508.33	1937.08	2691.46	1975.27
Non-agricultural income	2020.35	3607.83	1120.92	1000.90	899.43
Total cost	1434.59	1982.27	850.84	1344.33	583.75
Input cost	1095.23	1949.97	581.84	1323.05	513.39
Transport cost	117.64	142.28	95.44	138.32	22.20
Tools and equipment	285.72	222.87	212.58	174.88	73.14
Other cost	72.39	112.15	50.35	32.82	22.04
Food expenditure	10048.65	7687.24	8963.91	7793.04	1084.74
Per capita food expenditure	1169.48	1081.92	1058.42	988.35	111.07
Household asset	3060.60	4955.68	2923.82	5100.65	136.78
Agricultural asset	182.00	311.95	146.43	214.45	35.57
Total asset value	3152.18	4954.79	2816.88	5016.05	335.30

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Figure 1: Proportion of food secured households disaggregated by sex

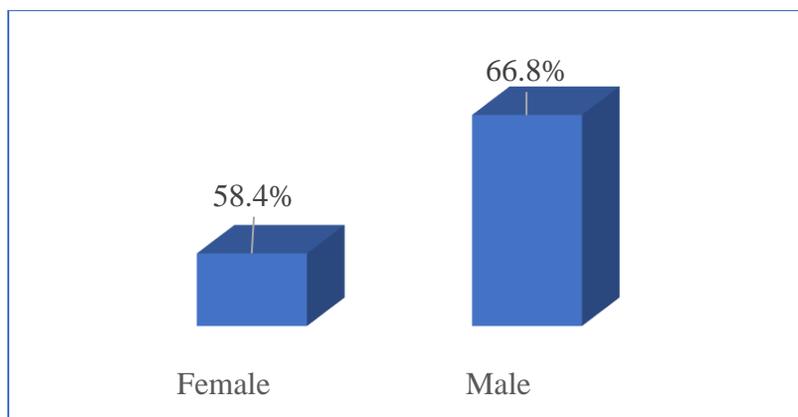
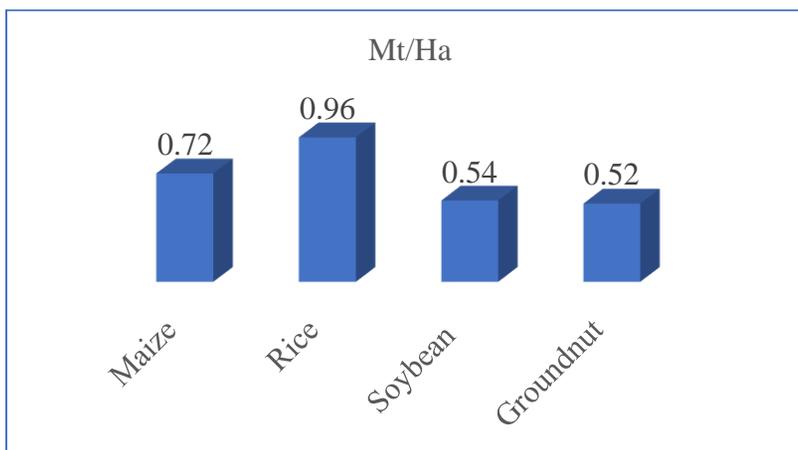


Figure 2: Average productivity of major crops



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Figure 3: Crop income disaggregated by sex

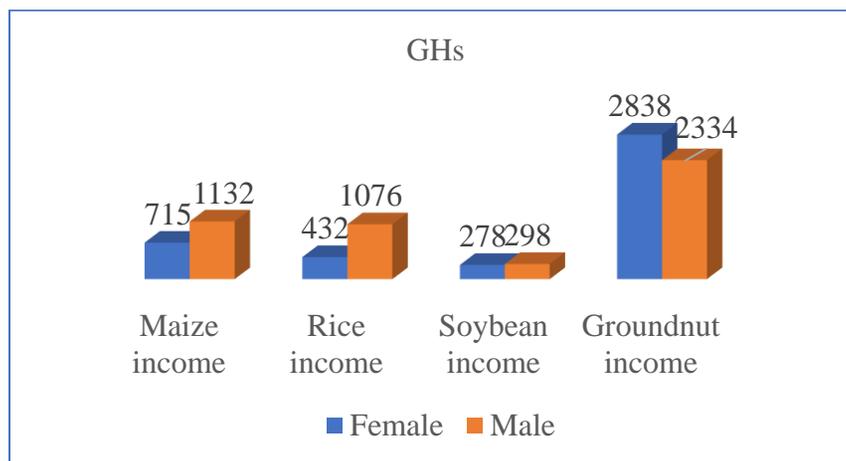
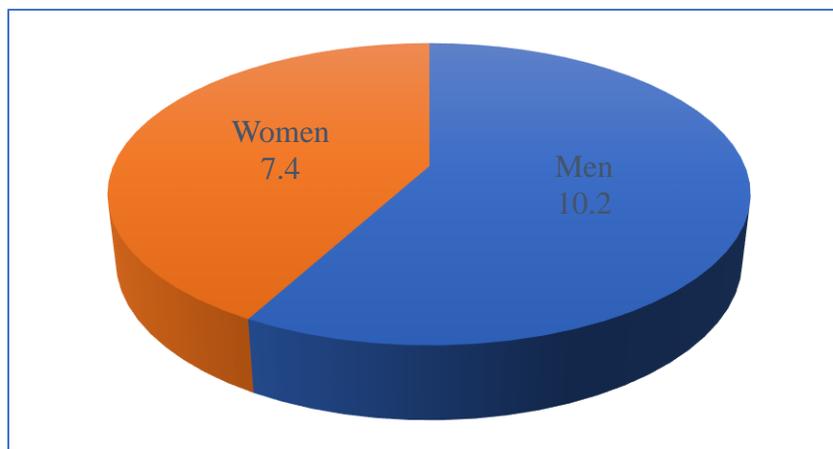


Figure 4: Access to improved production resources disaggregated by sex



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Figure 5: Willingness to accept women as leaders disaggregated by sex

