Rwanda Climate Services for Agriculture: Qualitative Evaluation through a Gender Lens

Working Paper No. 315

CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

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Abstract

This report presents results from a qualitative evaluation of the Rwanda Climate Services for Agriculture project, carried out in October of 2019. The project focused on enhancing smallholder farmer resilience and ability to cope with climate variability through interventions such as Participatory Integrated Climate Services for Agriculture (PICSA) and Radio Listeners' Clubs (RLC). Recognizing that gender-related factors influence farmers' capacities to access, use, and benefit from climate information, the evaluation critically analyzed differences and trends in women's and men's access to weather and climate information, use of the information in their farm and non-farm livelihood decision-making, and benefit from their climate-informed decisions made. The project also sought to reach increasing numbers of farmers over the course of its duration, starting with pilot districts and extending interventions into additional areas over its four years. Consequently, the evaluation took into account a farmer's length of exposure to one or multiple project interventions, sampling farmers representing "treatment categories" of participation in: i) PICSA in 2016, ii) PICSA in 2018, iii) PICSA and participating in a RLC, and iv) not having participated in either intervention.

Data collection was carried out via qualitative methods, including focus group discussions and key informant interviews. A men's focus group discussion and a women's focus group discussion was carried out per treatment category and per each of Rwanda's four provinces, resulting in a total of thirty-two. A male and female key informant interview was carried out per treatment category in three provinces, for a total of twenty-four. Discussions and interviews were recorded, transcribed, and then coded and analyzed using Excel.

Results show that both women and men, with little variation among treatment categories, report using similar channels for accessing weather and climate information. For example, women and men report using radios and Farmer Promoters as primary channels for accessing weather and climate information, although they may report use of radio slightly more for weather information. Differences arise between those women who have not participated in project interventions and those who have, concerning climate-informed decisions made; in contrast, among men, control treatment categories tend to report making climate-informed

decisions to the same extent as PICSA and RLC treatment categories. This suggests that direct participation in interventions has contributed to women's climate-informed decision-making. Additional research to explain the differing gender trends is warranted; however, it is possible that men receive capacity building on climate via other means not accessible to women, or also that peer-to-peer climate knowledge sharing might be more effective for men than for women.

Similarly, the project may have contributed to gender-specific benefits favoring women, in some instances. Women who had participated in PICSA and RLCs reported benefits including increased ability to cope and increased confidence in planning more substantially in comparison to women who had not; in contrast, men across all treatment categories reported the same set of perceived benefits to the same extent. Nonetheless, both women and men who participated in one or both interventions reported increased income and food security impacts much more than control sample women and men, suggesting that project interventions have contributed to male and female participants' increased income and food security. Project activities' emphasis on climate-sensitive livelihood management and budgeting may have contributed to the results. The study also shows evidence that the interventions have contributed to women's enhanced participation in household agricultural decision-making.

Recommendations include promoting more opportunities for women to participate directly in the interventions. Carrying out a critical assessment of livelihood decision-making in order to understand when and what types of decisions are gender-specific will also be important to ensure that the project addresses women's and men's decisions, without disregarding women's livelihood needs. Although Rwanda might have had a particularly enabling environment for promoting women's enhanced decision-making through the project, it would also be key to intentionally plan for an outcome related to women's enhanced role in household decision-making.

Keywords

Gender; climate services; evaluation; Rwanda.

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Contents

Acronyms

PICSA	Participatory Integrated Climate Services for Agriculture
RLC	Radio Listeners' Clubs

Introduction

Carried out over 2016-2020, the Rwanda Climate Services for Agriculture project has sought to build capacity of the country's national institutions to provide climate information tailored to the needs of the agriculture sector, deliver climate services to farmers across Rwanda's 30 districts, and help farmers and other agricultural decision makers to effectively use the information to manage climate risk. To this end, the project has carried out several interventions targeting smallholder farmers, including: training Farmer Promoters, who are part of Rwanda's national agricultural extension service, to guide farmers in the Participatory Integrated Climate Services for Agriculture (PICSA) process (Dorward et al., 2015); and organizing farmers into Radio Listeners' Clubs (RLC) that meet weekly to participate in climate services radio programs and discuss management responses.

A qualitative evaluation was carried out in October 2019 to complement the project's quantitative endline survey and assess project goals of ensuring gender equitable participation in and benefit from interventions. Consequently, the qualitative evaluation assessed how the project has promoted access to weather and climate information, and how it has contributed to farmers' use of weather and climate information in their livelihoods decision-making, with a focus on gender trends and differences. Furthermore, the evaluation analyzed benefits experienced by women and men from project interventions, such as enhanced ability to cope in bad years caused by extreme weather events, increased income, and food security. The evaluation also sought to assess cases where project interventions may have contributed to women's enhanced participation in agricultural decision-making and shifts in household gender roles.

The project sought to reach increasing numbers of farmers over the course of its duration, starting with pilot districts and extending interventions into additional areas over the four years. Consequently, the study takes into account length of exposure to project interventions, particularly PICSA, as well as participation in a combination of interventions, such as PICSA and Radio Listeners' Clubs, as a factor of farmers' access, use and benefit from climate services.

The qualitative evaluation had the following objectives:

1. Assess gender differences in access to weather and climate information and channels used for access, including preferences for channels and barriers to access channels.
2. Assess gender differences in use of climate information in farm and non-farm livelihood decision-making, with a focus on types of decisions made.
3. Analyze gender differences in benefits from improved management decisions.
4. Assess effects of accessing and using climate information, on women's participation in household decision-making processes.
5. Analyze differences in access, use and benefits, according to women and men farmers' exposure to project interventions.

After discussing the study's conceptual background and methodology, the report presents the qualitative evaluation's results, organized by the study's objectives. To conclude, the paper presents insights and recommendations for how rural climate services projects can address gender disparities in access, use, and benefit from climate services and where possible, promote women's enhanced voice in agricultural decision-making, based on the evaluation's findings.

Conceptual Background and Methodology

The gender-differentiated roles, responsibilities, and daily activities that women and men carry out shape how they perceive socio-environmental change and risk and how they respond and adapt to it. Correspondingly, important gender-based factors influence smallholders' capacities to access climate information, use it to improve management, and benefit from those improved management decisions. From the existing knowledge base, it is possible to identify key gender-based challenges to access and use weather and climate information (Gumucio et al., 2019; Gumucio et al., 2018).

First, social groups, networks, and group-based approaches can enable the dissemination of critical climate knowledge. Nonetheless, farmers' associations and cooperatives may underserve women due to membership criteria based on land ownership and other capital requirements that effectively exclude them (Venkatasubramanian et al., 2014). As a result,

women may face challenges to access climate information, agro-advisories, and related technical trainings shared via these groups. Sociocultural norms that limit women's extra-communal mobility and public interactions between women and men can also restrict women's access to agro-climatic trainings and extension services (CICERO, 2017).

Second, Information and Communication Technologies (ICTs) are useful for communicating climate and agricultural information directly to farmers, particularly information concerning shorter timescales associated with weather; however, women and men can differ in their access to and control of ICTs due to the fact that women are less likely to own ICTs, often because of a lack of financial resources (GSMA, 2012; Hampson et al., 2014). Even with access, gaps in schooling and literacy (both technical and otherwise) can result in less proficient use. While radio programming is used with increasing regularity in climate services to address these constraints, multiple studies have found that childcare and household duties can potentially hinder women's ability to listen to radio programs (Archer, 2003; CICERO, 2017; Tall et al., 2015; Venkatasubramanian et al., 2014). Notwithstanding these challenges to access, in some situations women report that cell phones are a highly useful tool for receiving information (Caine et al., 2015). Furthermore, women may be more likely to share phones with others and/or rely on friends and family to provide access to such communication tools (GSMA, 2012; Hampson et al., 2014).

Third, socio-cultural norms that define gendered labor roles can also influence the resources and decisions under women's and men's control, thereby conditioning the types of climate information that are useful to women and men (Gumucio et al., 2019). Furthermore, factors related to the gender division of labour, resource control and decision-making power can also influence women's and men's differing capacities to use weather and climate information to manage risks and make changes in livelihood planning (Carr, 2014; Carr et al., 2016; Carr & Onzere, 2017; Roncoli et al., 2009). Men, more often than women, tend to own necessary farming equipment, livestock, and land. Entrenched sociocultural norms regarding both agricultural and household roles and responsibilities can prevent women from participating in decision-making processes relevant to addressing climate risks.

Finally, while it may be challenging for climate services alone to address women's lack of control of productive resources and decision-making, there is some evidence that climate services may help local actors challenge limiting gender roles (Mittal, 2016; Rengalakshmi et

al., 2018). For example, access to weather forecasts has helped women to make informed agricultural decisions in cases in India – and their increased role in decision-making has influenced a shift in gender roles, wherein men are no longer the sole decision-makers and women are seen as more than farm laborers (Rengalakshmi et al., 2018).

The study used focus group discussions and key informant interviews to collect information on farmers' perspectives about access to and use of weather and climate information. In order to analyze the influence of project interventions, the study sampled farmers representing the following "treatment" categories: i) participation in PICSA in year 1 (2016); ii) participation in PICSA in year 3 (2018). Considering that Radio Listeners' Clubs began in year 3 of the project, a third sample pertained to iii) farmers who participated in PICSA in years 3 and participated in a Listeners' Club. A fourth "control" sample iv) consisted of farmers who were not trained in PICSA and do not participate in Listeners' Clubs, although they live in sectors where the trainings or clubs have been available. Table 1 defines each treatment category. For ease of reference, the report refers to the treatment categories in subsequent sections. Focus groups were conducted in four provinces representing the country's four major agro-ecologies. One men's group and one women's group were sampled per treatment category, resulting in eight focus groups per each of four agro-ecological zones, and thirty-two total for the study. Due to timing constraints of the study, key informant interviews were only carried out in three of the four provinces, resulting in twenty-four interviews for the study.

Table 1. Treatment categories

Treatment category	**Definition**
1. PICSA 2016	Participation in PICSA in year 1
2. PICSA 2018	Participation in PICSA in year 3
3. PICSA+RLC	Participation in PICSA in years 1-3 and participation in RLC
4. Control	Without participation in PICSA or RLC

Participants in the focus group discussions and key informant interviews were selected through random sampling, and the size of focus group discussions was limited to eight to ten participants. We also sought to ensure that single female household heads represented no

more than 30% of a women's focus group and of the pool of women key informants, making sure that female spouses of male household heads were included in the sample, in accordance with standards for sex disaggregated data collection (Doss and Kieran, 2014). Enumerators of the same gender facilitated focus groups discussions and key informant interviews with women and men, in order to foster opportunity for women to share their opinions more freely and honestly, outside of the presence of men (Anderson et al., 2017; Behrman et al., 2014). Enumerators took notes and audio-recorded the focus group discussions and interviews.[1]

Data from interviews and focus group discussions were coded and analyzed using Excel, disaggregating per gender, treatment category, and province.

Results and Discussion

Access to weather and climate information

Channels for weather and climate information

Both women and men, across treatment categories and provinces, discussed using radio as a primary channel for accessing *weather* information (i.e., current observations and forecasts at lead times up to 10 days). Subsequently, Farmer Promoters and mobile phones were discussed. Men in the control sample highlighted Farmer Promoters the least. Women in the control sample did not note phones at all. Women and men respondents mentioned the station Radio Rwanda primarily, followed by Radio Huguka, the station used for RLC interventions; however, men who participated in RLCs highlighted Radio Huguka as much as Radio Rwanda. Men in the control sample did not mention Radio Huguka. This is consistent with results from the project's quantitative evaluation concerning channels used for accessing weather information, although it did not disaggregate the results according to gender (Birachi et al., 2020).

Gender differences in accessing channels for weather information arose concerning peer to peer networks and television. While men across treatment categories mentioned peer networks insubstantially, women PICSA 2016 participants, participating in RLCs and those

[1] Focus group discussions were not recorded in Southern Province.

from the control sample highlighted accessing weather information from their neighbors. In particular, some female respondents mentioned that they were able to access weather information when neighbors who had a radio shared the information with them. Additionally, while television was mentioned by some men's focus groups and key informants across treatment categories, women seldom identified television as a channel for weather information. Similarly, the quantitative evaluation also found that men accessed both weather and climate information via television more than women, 48% of the male respondents and 38% of female respondents (Birachi et al., 2020). This illustrates differences in channels that might be more easily accessible to women versus men. For example, women can have less tendency to own television or tend to not have the free time to watch television programs as men do; women can have greater tendency to depend on their peer networks for information, in the absence of access to more diverse types of communication assets, in comparison to men.

Concerning frequency, women and men noted accessing information from the radio daily, while information from farmer promoters was weekly. This differs from results from the quantitative evaluation slightly, in that women and men farmers had reported most frequently that they accessed information via the radio weekly (Birachi et al., 2020).

"We only listen it in the evening hours when we are in the kitchen preparing the meal." (Women's focus group, Control, Eastern Province)

Concerning channels for accessing *climate* information (i.e., seasonal forecasts and historical data analyses), women and men highlighted radio and Farmer Promoters as primary channels; concurrent with results from the quantitative evaluation, however, radio was less prominent as a channel for climate information than it had been for weather. Women and men also mentioned meetings, television, peers, and agronomists as channels for climate information. One female key informant and one women's focus group mentioned indigenous knowledge and their common experience as means of perceiving climate-related information. One men's group (PICSA+RLC) in Northern Province mentioned internet. While the number of channels used for climate information was similar among women per treatment category and per province, among men, those PICSA-trained in 2018 tended to note the greatest number of different channels used for accessing climate information. Additional research on the context of PICSA trainings in 2018 might be necessary in order to explain this trend, and assess

whether or not the PICSA trainings had contributed to men's actively seeking out sources of climate information.

Concerning frequency of accessing climate information, women's groups varyingly reported that they accessed climate information weekly or once per season. Men highlighted that they accessed climate information at the beginning of every season; furthermore, several men's focus groups explained that they accessed it up to three times per season, via the farmer promoter.

"Generally it's like three times per season for big information about the season: when we are starting to grow crops, during weeding and towards the harvesting period." (Men's focus group, PICSA 2018, Eastern Province)

Barriers to accessing weather and climate information

When asked why they or other farmers in their community might not be able to access channels for weather or climate information, women discussed that they might not own a radio. Less frequently, women noted lack of mobile phone ownership as a barrier. One women's focus group explained that, although older people might actually own a radio, they might not use the weather or climate information received through it due to lack of familiarity or understanding of the information. People's lack of awareness about the significance of weather and climate information also arose as a barrier to accessing the information. Moreover, women highlighted that people might not be members of a *twigire muhinzi* team, referring to the farmers' groups facilitated by Farmer Promoters as part of Rwanda's extension service; one women's group specified that people might not care to attend the *twigire muhinzi* meetings. Concerning these and other meetings where climate or weather information might be shared, one women's focus group (PICSA 2016) in Northern Province indicated that farmers might not have enough time to attend the meetings due to the number of activities for which they are responsible. Participants of RLCs in the Southern Province noted that existing community institutions that could transmit information to all community members, like community meetings and village communicators, did not concern themselves with weather and climate information. Female key informants who participated in RLCs mentioned that their own busy schedules, and conflict between neighbors, could prevent them from sharing information with their peers. One focus group from the control sample mentioned that they might not have access to ideal channels because farmers do not have the

opportunity to voice their demands to providers. Despite the indications of barriers from focus groups and key informants from other sites, one female key informant (PICSA 2018) from Western Province noted that most farmers in the community knew about climate and weather information and used it.

In contrast to women's responses, men's discussions of barriers to accessing weather and climate information did not extend much beyond naming lack of ownership of radios or mobile phones. One focus group mentioned expenses associated with interactive voice response (IVR) as a barrier. A men's focus group (PICSA 2016) from Eastern Province and both the female and male focus groups, PICSA 2018 treatment category, from Southern Province noted the importance of accessing precise information on the seasonal forecast, specific to their locality.

"Sometimes they say the seasonal forecast for the whole district or sector, and it only falls in some areas not the whole district or sector." (Men's focus group, PICSA 2016, Eastern Province)

Additionally, a control sample male focus group in the Western Province noted that they had not been engaged in discussions on climate by outside organizations before, and had not thought about their access to channels before.

"You are the first people who come to us talking about climate." (Men's focus group, Control, Western Province)

Ideal channels for weather and climate information

When women and men were asked what would be their ideal channels for accessing weather and climate information, women particularly highlighted how to reach more people than currently. Correspondingly, women highlighted the importance of having more Farmer Promoters and trainings to stimulate information sharing, with the exception of PICSA 2018 women. Men also mentioned Farmer Promoters as an ideal channel, although less notably than female respondents. In particular, men noted that because of the Promoters' regular contact with farmers, Promoters were able to transmit the information broadly among farmers. Men also noted the importance of trainings for helping farmers to understand and use climate information. One male key informant from the control sample, when asked why he did not

access trainings on climate currently, responded that he had not cared very much for it, and he also had not been asked about it.

In men's discussions of ideal channels, the most highly mentioned channel for short-term weather information was mobile phones. Reasons given by men were that most farmers owned mobile phones (thus the information could be made available to almost everyone), and that they always had their phones with them. The preference was associated with an interest in having the information made available to them as soon as it was possible. Women similarly discussed mobile phones as an ideal channel for reaching more people with information because almost everyone in their communities had a phone. Although many women and men own or have access to mobile phones and there is a demand for mobile phone-based channels, less numbers of women and men use mobile phones as a channel (i.e., IVR, text message) for weather information, as noted previously. It is possible that women and men are not aware of the IVR and text messaging options available to them for accessing weather information. There may also be other factors inhibiting their use of mobile phone channels, like those associated with costs, as highlighted by one men's focus group.

Less substantially, village meetings and print materials were noted as ideal channels for climate information. Both women and men, the women's control especially, mentioned village meetings. Other female key informants also mentioned that designating an individual responsible for sharing information from meetings with those unable to attend would be helpful. While women did not mention print materials as an ideal channel, some male respondents noted it. In particular, one men's focus group noted that print materials would make the information available to those who did not own radios.

Importance of climate information and PICSA

When asked whether or not they found climate information to be important, women and men affirmed its importance, most frequently explaining that the information was critical for timing of planting. Women and men also discussed its importance for crop selection, particularly PICSA 2018 men. Women and men also mentioned its general importance for planning farming activities, citing specific activities like erosion control and harvesting. Less frequently, women noted that weather information was important for planning one's daily activities, not limited to agriculture. A few men's and women's focus groups also mentioned weather and climate information's importance for budgeting of farm activities. Less

frequently, men noted that the information was important to prepare for harsh weather and extreme events, to minimize losses. In particular, a few male key informants who participated in PICSA noted that they regarded the weather and climate information as important because it was provided by "professionals," thus it was trustworthy. One women's focus group who participated in RLC from Western Province also noted that having weather and climate information was important for being able to work confidently; furthermore, it had positive effects on their neighbors, who learned from their example of climate-informed hard work.

"When you have information, you work courageously and your neighbors may learn from you." (Women's focus group, PICSA+RLC, Western Province)

When women (from the first three treatment categories) were asked what their reasoning had been for participating in PICSA, several from PICSA 2018 and PICSA+RLC samples reported not having participated in all training sessions or that they had not participated in PICSA specifically. Of those who reported not participating in some or all of PICSA, some clarified that they had participated in other trainings or events on climate, or that their Farmer Promoters had trained them on how to use climate information, in general. The discrepancy could be due to time constraints and labor burdens that make it difficult for women to attend a series of training sessions, and to a possible lack of consistency in how the PICSA trainings were implemented by Farmer Promoters as the project progressed over the four years. It is important to note that it is also possible that women had not been aware of the training series' formal name, "PICSA," when asked about it in the focus group discussions. Notwithstanding the discrepancies, reasons given by women for participating in PICSA were that the new skills they learned in agricultural planning were valuable to them (related to timing of planting, crop selection, and applying other practices that would improve their yields).

Among men farmers, reasons given for participating in PICSA trainings most frequently had to do with learning how to better plan their agricultural activities through timing of planting and crop and variety selection based on climate information. Additionally, farmers often mentioned an interest in learning new skills and knowledge, particularly information about climate. Farmers also discussed that they had seen the good production results of peers who had been trained in PICSA, and they wanted to acquire that knowledge that had benefited their peers, although less frequently than the previously noted reasons. They also mentioned that they participated out of their trust in their Farmer Promoters' advice. A few focus groups

also highlighted the value of the budgeting skills they learned, and lessons on involving all family members in livelihood activities.

When asked why others may not have participated in the trainings, reasons women and men gave were that it might have been due to people's mindset and not caring about or knowing the importance of the information. On this note, a few focus groups mentioned that others might believe that their indigenous knowledge works better than scientific climate information. Women's focus groups (PICSA 2016 and PICSA 2018) in Southern Province and a male key informant (PICSA 2016) in Eastern Province also mentioned that those who did not participate in the trainings may not have known about them, or were prevented from attending due to other responsibilities occupying their time. Particular to male respondents, a focus group in Southern Province and a key informant in Northern Province also noted that those who do not own land or have very little land might not have thought that the training would be worth their participation. Among female respondents, there was some disagreement between responses from Western and Southern Provinces concerning whether or not a farmer had to be selected or invited to participate. Despite the discussion of people who may not have been able to participate in the trainings, women and men (treatment groups 1-3) often mentioned that they shared the information learned with those who had not participated, and that those who hadn't participated could learn from their example of applying the climate-informed practices.

"But we who attended, we had the responsibility to share with them what we learned."
(Men's focus group, PICSA 2016, Eastern Province)

Use of weather and climate information in decision-making

In general, results suggest that participation in interventions promoted women's use of weather and climate information in decision-making, more than men; moreover, interventions addressed a major gender inequity in use. Women from treatment categories 1-3 reported using weather and climate information for farm decision-making substantially more than those from the female control group. However, men often reported using the information to a similar degree regardless of participation in project interventions. Although PICSA participants are expected to share the information learned with their peers, it is possible that direct participation in the PICSA (and RLCs) make more of a difference for women than for men. This could be related to a general gender trend wherein men receive trainings and other

capacity-building on climate and agricultural management via more sources and other projects than women (Ngigi et al, 2017).

Crop management

Table 2 shows gender trends per types of decisions discussed in the focus groups and interviews. Women from treatment groups 1-2 and from groups 1-3 substantially discussed using climate information on decisions related to crop and variety selection, respectively, while women from the control group did not. In contrast, men regardless of exposure to interventions discussed using climate information for these types of decisions. The finding illustrated in Table 2 suggests that men play a more primary role in crop and variety selection than women; however, it also suggests that project interventions helped enable women to make these types of climate-informed decisions.

Table 2. Contribution of interventions to decision-making per gender

Crop management decisions	**Women's treatment groups**				**Men's treatment groups**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Crop selection	√	√			√	√	√	√
Variety selection	√	√	√		√	√	√	√
Planting on time	√	√	√	√	√	√	√	√
Other crop management								
Erosion control	√	√	√	√	√	√	√	√
Fertilizer and pesticide use	√	√	√		√	√	√	√
Livestock management								
Fodder preparation	√	√	√		√	√	√	
Build/repair livestock shelter	√	√	√	√	√	√	√	√
Reduce livestock					√	√	√	

	Interventions promoted women's informed decision-making
	Interventions promoted women's and men's informed decision-making
	Interventions promoted men's informed decision-making
	No association between interventions and informed decision-making for women or men

Furthermore, when discussing crop and variety selection, women and men highlighted using information on total seasonal rainfall amount and on length of season for their decisions. For instance, they discussed cultivating cassava when a short season was forecasted and planting maize when a high rainfall season was forecasted.

"The last season, they told us that the rainfall will be low. We cultivated cassava because we were expecting that lower rainfall." (Women's focus group, PICSA 2016, Eastern Province)

Women and men also discussed using the information to decide whether or not to cultivate beans. In addition to the crops mentioned by women, men also noted using the information for deciding whether to cultivate peanuts. In comparison to men, women discussed variety selection less substantially. It is worth noting that women from Eastern Province discussed using climate information for crop and variety selection more, in comparison to women from other zones.

Less frequently, although across treatment categories, both women and men discussed using climate information in order to plant at the right time (Table 2). However, a greater proportion of the men's focus groups and key informants reported using the information to plan planting time than women. The types of information mentioned by women and men for making the decision were total seasonal rainfall amount, length of season, and onset of the season. That the control groups discussed using climate information to time planting suggests that participation in the interventions did not contribute critically to the informed decision-making reported. However, in comparison to crop and variety selection, it is possible that knowledge on timing of planting has been shared more extensively among women's peer networks, facilitating its transmission to women who have not participated in the project interventions, or that other sources of information on timing of planting exist and are available to women.

Other crop management decisions

Women and men across treatment categories also discussed using climate information for erosion control (Table 2); consequently, similarly to decisions on timing of planting, results suggest that participation in interventions did not contribute to the informed decision-making reported. Women mentioned using information on total rainfall amount; men mentioned using information on total rainfall amount, rain onset, and length of season to plan soil erosion control and water management. Women and men noted making tied ridges or digging water channels after hearing the information, and discussed planting trees and grass to protect the soil.

Additionally, women and men discussed using weather and climate information for planning use of fertilizers and pesticides. Women from the control sample did not mention decisions on

inputs; in contrast, there was no substantial difference across treatment groups for men (Table 2). In this case, the findings suggest that participation in interventions contributed to women's informed decision-making. For example, women noted using information on rain onset, length of season, and total rainfall amount for questions of when to apply fertilizers and pesticides, and how much. In general, men discussed using information on onset, total rainfall amount, length of season, and also daily weather to prepare seeds and fertilizer and pesticide application. Both women and men discussed using the information for timing pesticides application on Irish potatoes, for a forecasted high rainfall season.

A few men's groups and key informants discussed using climate information to plan budgeting and investment in livelihood activities, including preparing laborers. Among men, this was even mentioned by male respondents in the control sample. Women discussed using climate information for planning investment also, but to a lesser degree than men (2 women key informants).

Livestock production and non-farm management

Concerning decisions related to livestock production, the results suggest that women and men may both be involved in fodder preparation, and that project interventions may promote greater use of climate information for this type of decision for women and men (Table 2). Although it was discussed substantially across treatment categories, the use of climate information for fodder management was mentioned minimally by those women and men in the control groups. For their part, women from treatment groups 1-3 discussed using information on total rainfall amount and dry season prediction to plan fodder preparation. For example, women explained that they would use the information to plan on planting grass during the rainy season and storing it to be used for fodder for livestock ahead of the dry season.

"When they say that it will be drier, we start growing pasture for our livestock so that we will have pasture for them in the dry season. . . We store dry grass and when the fresh grass is finished, we put some water on the dry grass and add some salt and feed the animals."
(Women's focus group, PICSA 2016, Northern Province)

Some women's focus groups and key informants also reported using information on the weather and total rainfall amount to plan when to find pasture, ahead of the rainy season. In

comparison, men tended to discuss using information on total rainfall amount, length of season and onset to plan fodder preparation. In addition to planting and storing grass as women did, men also mentioned preparation of crop residues ahead of the dry season.

To a lesser degree, female and male respondents across treatment categories also discussed using seasonal climate information on total rainfall amount, and weather forecasts for decisions to repair and strengthen the roof of the shelter for livestock. The finding suggests that participation in interventions did not contribute to the informed decision-making reported (Table 2).

Other decisions related to livestock production were more gender-specific, suggestive of gender-specific roles in livestock production. For example, some men's focus groups and key informants in treatment groups 1-3 mentioned dry season forecasts to decide to reduce their numbers of livestock, via sale or shared ownership with a neighbor, so they would be able to provide enough food for the livestock under their care. However, this planning activity was not mentioned by men in the control sample, and only one women's focus group (PICSA+RLC) in Eastern Province noted using the information to reduce their number of livestock. Table 2 summarizes the finding. This could suggest that men play more of a primary role in decisions to reduce livestock in comparison to women; it also suggests that project interventions contributed to use of climate information for this decision.

Other uses of climate information strictly discussed by men across treatment categories, although infrequently, tended to concern non-farming activities. This is aligned with women's affirmation during the focus group discussions and interviews that they did not participate in any other livelihood activities besides farming. For their part, men discussed using climate information to decide whether or not take out a loan, or build a house; to determine how much boutique items to stock up on for sales during expected hard times; and to plan to stock up on charcoal and firewood to sell during forecasted periods of rain. Men also discussed using information on length of season and total rainfall amount to decide how much land to allocate to crop production, whereas women discussed this only minimally.

Constraints to using climate services

When asked if there had been instances when they would have liked to make a climate-informed decision but were not able to, women gave far fewer examples in comparison to

men. (However, the question might not have been administered as consistently to women as it had been to men). The difference could suggest that men are more responsible for agricultural planning than women, or that they have the opportunity to lead agricultural management more than women. Of those women who did respond affirmatively, focus groups of female PICSA participants in Southern Province and a female key informant (PICSA+ RLC) in Western Province mentioned a problem of lack of means either to store fodder or purchase pesticides. A women's focus group who participated in PICSA in Western Province noted that due to poor quality of land available to them (swamp land), practices that they apply to prevent an epidemic based on forecasts of high rainfall are not as successful as they could be. A women's focus group (PICSA+RLC) in Southern Province noted that in general people might not make decisions due to lack of resources and lack of trust in the climate information. A women's control group in Southern Province noted that they were not able to harvest water using tanks and tubes due to a lack of resources.

Men also frequently mentioned lack of finances and sometimes lack of knowledge as reasons for not being able to make climate-informed decisions they would have liked to make. Across treatment categories, men noted not being able to implement irrigation technologies due to lack of resources. One key informant mentioned his home's long distance from water as a reason, and a focus group discussed the problem of lack of resources to make a dam. In general, not being able to carry out plans for irrigation often impeded male respondents' plans to cultivate vegetables.

Male respondents also highlighted lack of knowledge and financial resources as reasons for not making plans to mulch, make water catchments, or store fodder. In other instances, because of lack of financial means, men were unable to purchase a particular seed variety to match the season. Lack of means also prevented men from purchasing fertilizers and pesticides. One male key informant highlighted the distance to the village as a barrier to purchasing fertilizers as he would have liked to. Pesticides were mentioned particularly for their use in cultivating vegetables. Although they recognized financial problems to purchase fertilizers and also seeds in the past, one male focus group participating in a RLC in Western Province mentioned that this stress was alleviated when the nonprofit agricultural organization, Tubura, provided seeds and fertilizers in the prior season. Men also mentioned

lack of resources, particularly for paying for hired labor, as a reason for not cultivating as large an area as they would have liked.

Perceived impacts of climate-informed decision-making

When farmers were asked to discuss the benefits they perceived on their farms and households as a result of their climate-informed decision-making, it appeared that women were slightly more challenged than men to respond to the questions. This could be due to inadequacy of the methodology to engage women in discussion concerning this topic. In future similar evaluations, it would be important to develop a more appropriate methodology for engaging both women and men to speak freely about benefits perceived on their farms.

Despite the possible shortcomings of the methodology, when asked to discuss benefits related to their agricultural production, women and men both reported positive benefits as a result of their climate-informed decision-making. Similar to the findings on use of information, control group women tended to report benefits the least, in comparison to the other men's and women's treatment categories. As mentioned, men may have additional means of accessing climate knowledge, even if they did not participate in PICSA trainings and RLCs; moreover, they may have more resources and capacities to act on information than women.

Yields and crop loss

Table 3 shows gender trends per types of perceived benefits. Both women and men, across treatment groups, reported that they had perceived increased yields as a result of their climate-informed decision-making. This can suggest that participation in interventions did not contribute to increased yields perceived for women and men. Despite the reporting of increased yields by control groups, it is important to note that in a few instances there was disagreement within a focus group and in another the group was reporting on results of indigenous knowledge used.

Table 3. Perceived benefits from climate-informed decision-making per gender

Perceived benefits	Women's treatment groups				Men's treatment groups			
	1	2	3	4	1	2	3	4
Increased yield	√	√	√	√	√	√	√	√
Crop loss/damage	√	√	√	√	√	√	√	√
Income	√	√	√			√	√	

Perceived benefits	Women's treatment groups				Men's treatment groups			
Food security	√	√	√		√	√	√	
Ability to cope	√	√	√		√	√	√	√
Increased investment	√	√	√		√	√	√	√
Confidence in planning		√	√		√	√	√	√
Increased livestock production					√	√	√	

	Interventions promoted women's informed decision-making
	Interventions promoted women's and men's informed decision-making
	Interventions promoted men's informed decision-making
	No association between interventions and informed decision-making for women or men

In particular, men gave examples of positive changes in yield since they had started making climate-informed decisions.

"I used to harvest 2 sacks of Irish potatoes, but now I harvest 4 sacks on the same plot." (Men's focus group, PICSA 2016, Northern Province)

Another male informant noted that on an area of land, "*I can get at least 500kg but before, I used to have 200kg from that land."* (Male key informant, PICSA+RLC, Eastern Province)

Both women and men highlighted that timing of planting helped to achieve increased yields. One women's group highlighted that it was a combination of climate information and advisories that helped them achieve increased production.

To a lesser extent than increased yields, women and men discussed benefits related to crop loss and damage. Reduced crop loss and damage was noted in all treatment groups, suggesting that participation in interventions did not contribute to this perceived benefit (Table 3). For example, women and men often explained that their crops were healthier than those who did not act on climate information. Participants in one men's focus group noted that their maize had bigger grains and greater weight than those who did not follow the information. Some men's and women's groups also noted that climate information allowed them to prepare and plan cultivation activities beforehand, to prevent crop loss and damage.

Despite the positive responses, there was some divergence across farmers. For example, a female key informant PICSA-trained in 2016 from Western Province noted that faulty

information on rainfall caused her to experience some crop damage ("the rain lasted only a few days"); however, she still valued climate services.

"Our crops are nice because we follow the information." (Female key informant, PICSA 2016, Western Province)

Some male respondents from the non-treatment category also reported inconsistencies in experiences of crop loss after following climate information. One participant of a control sample men's focus group from Western Province noted that it can depend on the season.

"Sometimes the period changes and crops fail, other times they grow." (Men's focus group, Control, Western Province)

A control sample male key informant from Northern Province also noted that sometimes the information fails, explaining that information on onset led him to plant too early and he experienced crop damage.

Income and food security

When asked if they perceived changes in their household income due to their climate-informed decision-making, women and men discussed that they experienced increased household income, with some variation across treatment categories. Women from the control sample mentioned changes in income minimally; men from the PICSA 2016 and control samples mentioned changes in income less substantially than the other two treatment categories (Table 3). Correspondingly, the finding suggests that participation in interventions contributed to perceived increases in income for both women and men. When explaining the causes for their increased income, women and men noted their improved management of money, their ability to avoid farming losses, and their increased yields. Some male and female respondents specified that because of their increased harvests, they could keep some of their production for their households and sell the rest. Women in particular mentioned that increased income was a result of improved production from timing of planting.

While male and female respondents did not specify whether they were referring to gross or net income, they often highlighted key purchases they were now able to make for their households as a result of their income gained from climate-informed decision-making. For example, one benefit from the increased income, that both men and women cited, was the

ability to pay for school fees and health insurance. Men noted their households' enhanced capacity to pay health insurance and school fees more frequently than women.

"Our kids cannot miss school, life has changed in general." (Men's focus group, PICSA 2016, Eastern Province)

There were gender differences in other benefits of increased income reported. For example, some male respondents noted that they were able to renovate their houses with the increased income. Other male key informants mentioned the ability to purchase electricity, a television, and a cow. Some female respondents also mentioned their ability to purchase livestock due to their increased incomes; however, they did not purchase cattle, but rather a pig and sheep. Two female key informants who did not have husbands and one who had a husband also highlighted their ability to provide for their families, with their improved income.

"I can take care of my kid because of higher production from the knowledge I obtain from the weather forecast." (Female key informant, PICSA 2016, Eastern Province)

"I can buy soap and improve my family." (Female key informant, PICSA 2018, Western Province)

When asked if they had experienced any changes related to their food security due to their climate-informed decision-making, women and men often discussed that their households' food security had increased. For both women and men, the treatment category that noted positive changes in food security the least were those women and men from the control samples (Table 3); the result suggests that participation in interventions helped contribute to enhanced food security, for women and men. For example, women and men explained that due to their increased productivity, they have more food for their households. They also knew better how to manage their crop yields and store them for harsh times, as a result of the information and capacity-building they had received on climate-informed decision-making.

There were some responses that showed that sometimes challenging conditions can inhibit food security, despite farmers' training. For example, a women's focus group (PICSA 2018) from Southern Province highlighted that food had not been available in a recent season due to prolonged dry spells; nonetheless, they perceived a significant improvement in their ability to cope, in comparison to before their PICSA participation. A male key informant

(PICSA+RLC) in Western Province highlighted that while his household was not 100% food secure, they had enough food.

While women in the control sample tended to not discuss changes related to food security at all, control sample men discussed reasons why their food security might not have changed. For example, a control sample men's focus group from Eastern Province highlighted that their particular area was detrimentally affected by climate impacts, and consequently, it was consistently difficult for them to be food secure; however, it was even more difficult for those not trained on use of climate information. A control sample male key informant from Northern Province noted that he had always been food secure and climate-informed decision-making had not made much of a difference on his state of food security. During a bad season, his household still had enough food; however, they did not have enough to sell. In control sample male focus group discussions from Western and Southern Provinces, some but not all participants in the group noted an increase in food security.

In comparison to benefits related to increased yields and reduced crop damage, benefits related to increased income and food security can require additional farm management, concerning budgeting and strategies for saving money and food storage. Considering that PICSA includes capacity building on climate-sensitive budgeting and planning, it is possible that project interventions helped contribute to women and men farmers' increased income and food security (although to a lesser extent for those men who participated in PICSA in 2016). That the interventions may have helped contribute to female single household heads being able to provide for their families is noteworthy, considering that they are often particularly asset-poor.

Ability to cope, increased investment, confidence in planning

Concerning other benefits, project interventions may have made more of a difference for women than men. For example, although men regardless of exposure to interventions mentioned an increased ability to cope due to their climate-informed decision-making, among women all treatment categories except the control sample substantially discussed an increased ability to cope (Table 3). Women varyingly remarked that because of their climate-informed planning, such as timing of planting, erosion control and pesticide application, maintaining waterways to prevent damage to the home, and repairing animal shelters, they were better prepared. They were also able to prepare for forecasted hard times by storing food and saving

money. Some men's groups noted that the benefit of their increased yields helped them to cope. One women's focus group (PICSA 2018) from Southern Province remarked that although they perceived an improvement in their ability to cope since before the trainings, there had been a period when the food available to them was not enough, due to the extreme number of dry days.

When asked if they had experienced changes in expenses and labor as a result of their climate-informed decision-making, both women and men discussed that their agricultural and livestock-related expenses and hired labor increased; however, they often highlighted that their production also increased. While there was no substantial difference across treatment groups among men, focus groups of control sample women were the only groups to not discuss a change in expenses, although female key informants from the control sample did note it (Table 3). The finding suggests that participation in interventions contributed to women's increased farm investment.

Some men and women informants explained that they invested more in inputs and labor in order to implement improved practices. Several women's focus groups, particularly those participating in RLCs, and a female key informant (PICSA 2016) explained that they often hired more labor and spent more in response to forecasts of low rainfall, in order to complete the work necessary within the short period of time forecasted. Other female respondents (1 focus group PICSA 2016; 2 focus groups PICSA 2018) noted that because of the climate information, they had more confidence in their farm planning and invested more in their agricultural and livestock activities. In contrast, farmers who did not have climate training could lose money invested in agriculture due to poor planning. Through the training, they learned how to budget and spend money wisely, according to the female respondents.

To a lesser extent, women and men noted increased confidence in planning, as a result of their climate-informed decision-making. Male focus groups and key informants, across treatment categories, mentioned increased confidence in planning; among women, all treatment groups except the control noted it (Table 2), suggesting that participation in interventions contributed to women's increased confidence in planning for women. For example, a few focus groups of women PICSA-trained in 2018 and a few groups PICSA-trained and participating in RLCs explained that they had increased confidence and felt courageous in their work, due to the climate information that they had received and their understanding of it. They were sure about

the seasons and were not afraid to hire many people, according to their planning needs. A few male respondents also highlighted increased trust in climate information, as a result of their climate-informed decision-making.

Benefits specific to men

There were some behavior changes and benefits reported more substantially by men, to women's exclusion. In these cases, gender differences in benefits may be related to gender-specific responsibilities that women and men carry out. Women and men discussed changes in livestock production to a lesser degree than changes in crop production. However, men tended to note them more frequently than women. This could be due to gender inequalities in large livestock ownership. Men discussed changes in livestock production across treatment categories, except men from the control sample (Table 3). In particular, men explained that they had increased manure and milk from their livestock, because they had been prepared to provide their livestock food from their household's agricultural production and from their timely fodder management. One men's focus group (PICSA 2016) from Northern Province noted that they were able to take better care of their pigs, through their climate-informed decision-making. Another men's focus group (PICSA+RLC) in the Southern Province mentioned that they produced enough manure and milk to be able to sell some of it.

There may have been a discrepancy in how questions on changes in social standing were posed to female vs. male respondents. Consequently, fewer women than men gave responses related to changes in social standing as a result of their climate-informed decision-making. However, those women who did noted that they were good examples for neighbors in the community and were able to share information with their neighbors. Men across all treatment categories and provinces responded that they experienced an increase in social status due to their climate-informed decision-making. They felt that they were more respected in the community, and they served as role models.

"Some people start planting only when they see us starting to plant. We are the examples to them and they consider us as advisors." (Men's focus group, PICSA 2016, Western Province)

Household decision-making

Women's and men's participation in decision-making

The following discussion assesses women's and men's responses to questions related to women's and men's participation in household decision-making processes. This set of questions aimed to understand household gender relations across project sites, critical for the last component of the evaluation methodology, which probes changes in women's participation in household decision-making over the course of project interventions. This section reports results by province, recognizing that gender relations are often specific to the local context. The influence of project interventions on participation in decision-making is addressed later.

In general, women's responses tended to present household decision-making processes as more complex than men's responses did. Men often reported that spouses participated jointly in decision-making processes. In contrast, women noted that while both might participate, one spouse might play a larger role in the process, consulting the other, but having the final say in the end.

On land use, women tended to note that both spouses advised each other to make the decisions. However, several women's focus groups noted that men play a lead role in the process. In particular, groups from Western Province tended to highlight men's leading role. Nonetheless, women's groups also noted that, in some cases, men might not be "around" or they might "not care"; then, it is women's responsibility to make the decisions on land use. Some women's groups also noted, in cases of single female household heads, the woman makes the decisions alone, or with her children. The case of single female household heads' prime decision-making role was noted for all the types of household decision-making processes for which we inquired. Female key informants' responses contrasted slightly with focus group trends, highlighting that, while both spouses and other family members participated in decision-making on land use, they themselves played leading roles in the process because they were most involved in agriculture in their households. However, a few female key informants were single household heads or their husbands were largely absent. Furthermore, several focus groups highlighted the importance of being informed or knowledgeable in order to play a lead role in the decision-making process, indicating that usually the spouse who was more informed led.

Men's groups also tended to mention that both spouses participated in decisions on land use. However, when they were prodded to give more details on the process, a few groups highlighted that they (men) led. In discussions of control group men from Northern and Western Provinces, a few respondents noted that they alone were primarily responsible for the decision-making. One male key informant (PICSA 2016) in Eastern Province explained that his mother advised him on all decision-making.

Concerning decisions on production inputs, women and men also noted that both spouses participated in the decision-making process. However, female respondents often added that women led the process. Women's leading role in input decisions was noted particularly by women in Western Province. In contrast, when asked to explain further, men's groups tended to note that men led the process. In contrast with women's focus groups, several female key informants, in Northern Province in particular, noted that men tended to play a lead role in the process. Furthermore, a few female key informants noted that the spouse who had more money could exercise more influence. A few focus groups in Southern Province highlighted that whomever was the household head tended to lead. As in discussions of land use, the influence of being informed on leadership in decision-making on inputs also arose. For example, a women's focus group in Eastern Province noted that being trained and being in a farmers' group helped them (women) to give ideas on seeds and fertilizers in household decision-making processes. Additionally, some men's focus groups in Southern Province mentioned that some women might not be informed on agricultural inputs, and are unable to lead decision-making processes on them, as a result.

Concerning decisions on how money is spent, women's focus groups noted that both women and men participate in the decision-making process. However, several groups, across provinces, highlighted that men lead the process. A few women's groups also explained that men consulted their wives on how to spend money, in those families where household dynamics allowed for spousal consultation and discussion. Men across provinces tended to emphasize that decision-making on how to spend money was based on a discussion between spouses.

When asked who participated in decision-making on credit, both women and men tended to note that husbands and wives make the decision together. Furthermore, it seems that Rwanda's national policy requiring that both spouses sign on bank loans was an important

influence on spousal joint decision-making on credit, per women's and men's responses. A few women's responses deviated from this trend, arguing that while both spouses participate in the decision, men lead the process. In particular, one women's focus group in Eastern Province noted sometimes men take loans without informing their wives. A control sample male key informant in Western Province explained that in a farmers saving group, either spouse can take out a loan, depending on what is needed; however, to take a loan out at a bank, both spouses have to participate and take it out together.

For decisions on selling assets, women and men also noted that both spouses participated in the decisions; however, several women's focus groups noted that men led. In Eastern Province in particular, in several female focus groups some participants noted spousal tensions around the decisions, highlighting that some men do "whatever they want" and sell an asset without consulting their wives. Among men, a few outliers from the trend of reporting joint decision-making arose in the Western Province. A male respondent in the focus group and a key informant, both from the control sample, emphasized that they alone made the decisions to sell assets. However, the key informant noted that if his wife was uneasy about his decision, he discussed it with her. Men's focus groups in Eastern and Northern Provinces explained that because women often have the role of caring for livestock, particularly those kept near the home, it was necessary to consult with them before selling animals.

In general, trends in men's and women's responses suggest that men and women might have different perceptions of household decision-making processes. While men reported that both spouses participate in decision-making equally, women's responses showed that one spouse might have more decision-making power than the other, and a common occurrence might be that women are consulted in decision-making processes but might not have the final say. Deviations from this trend are cases of single female household heads, who might consult with their children. Also, in cases where women manage the farm and male spouses are off-farm, women might have greater voice in decision-making processes. As an exception to this generalization, women noted they play a larger role in production input decisions in some cases; however, who has access to monetary income can influence who makes these decisions. Agricultural knowledge also influences who has a larger role in decisions related to agricultural planning. For taking out credit and selling assets, women's responses suggest that

there might be some spousal tensions and male betrayal, noted in Eastern Province in particular. A regional specific trend also arose in Western Province, where women and some control group men highlighted men's lead role in decision-making processes.

Changes in women's participation in household decision-making

Female respondents were asked in more detail if they had observed any changes in their participation in decision-making over the years, and since their participation in climate (PICSA) trainings. Women who had not participated in PICSA were not asked the latter part of the question. All treatment categories of women who had participated in PICSA and also those participating in RLCs discussed a positive change in their participation in decision-making.

When explaining how the change occurred, women highlighted that the trainings had helped them to express their ideas on farm and livelihood management confidently, and better participate in decision-making. This aligns with findings from discussions of decision-making processes, wherein it was highlighted that enhanced knowledge allowed a spouse to play a more substantial role in the process. Some women highlighted that it was not only the knowledge learned from trainings, but also the climatic information and learning received from neighbors. A female key informant (PICSA 2018) from Eastern Province, who did not live with her husband, emphasized that in addition to the climate trainings, having gone to school helped her to be capable to make decisions.

An additional aspect of the change process noted by women concerned how the capacity-building and knowledge they had received enhanced their capacity to advise their husbands and other family members. Women explained that the new knowledge helped them to make improved decisions, and they could advise their husbands and family members on farm planning such as when and what to plant. Despite positive changes perceived, as in the discussions of general household decision-making processes, a few focus groups (PICSA 2016) from Eastern and Southern Province noted that being able to advise one's husband on farm management depended on one's familial situation, and whether or not there already existed an environment wherein women and men household members could share and receive advice from one another (i.e., that a certain level of gender equality existed within the household already). Additionally, a female key informant (PICSA 2016) from Northern Province mentioned that, although she could now advise her husband better on farm planning,

throughout her relationship with her spouse they could advise and consult each other on various issues, without having conflicts. While acknowledging that a certain level of intra-household decision-making existed prior to project interventions, focus groups participating in RLCs in Northern and Southern Province highlighted that their husbands and family members trusted their advice more because of their new climate knowledge. Control sample women's focus group discussions contributed an additional consideration by highlighting cases wherein men might not be available on the farm to make decisions, and other cases wherein men had abandoned their families such that women are responsible for all decision-making.

Furthermore, a few women's groups and informants discussed that putting the new knowledge received into practice was important for achieving an enhanced role in household decision-making. Women's groups referred to this as "talking with actions." Acting upon the information and using the information to work diligently played a role in enhancing their influence in household decision-making processes. Women in a focus group (PICSA 2018) in Northern Province highlighted that they had to work hard and generate income in order to be able to participate in the implementation of household decisions. Speaking in more general terms, focus groups mentioned that interventions related to radio and rural development encouraged women to work and think for themselves, also contributing to their enhanced participation in decision-making. Emphasized particularly by focus groups participating in RLCs, it was important not only that they acted on the knowledge received, but also that their actions yielded good results on the farm. The trend can be attributed to the structure of the Clubs, wherein members are asked to discuss climate-informed decisions made and results of their decisions, at Club meetings. The good results mentioned were increased production and income. For example, a focus group highlighted the importance of successful plans and good results.

"If it [plan] fails, even a child will not trust you and refuse your ideas." (Women's focus group, PICSA 2016, Northern Province)

A few women's groups noted that when their actions yielded good results, they were able to serve as an example to their families. Furthermore, a female key informant (PICSA+RLC) in Northern Province highlighted that with the income she earned as a result of her climate-informed decision-making, she could take actions on her own, such as purchasing a book for

her child, without waiting for her husband. Other female focus groups and a key informant noted that being able to help provide for the family gave them "more value," contributing to their enhanced voice in decision-making processes.

Although not mentioned widely across female respondents, a few focus groups noted that having climate knowledge helped them to have increased self-confidence. Consequently, they felt self-assured in sharing ideas on household management with family members. Similarly, self-respect was mentioned by a key informant not PICSA-trained in Western Province as a factor in enhancing women's participation in decision-making.

Besides noting the effects of project interventions on themselves and on their relationships within their households, several focus groups and key informants also discussed factors affecting the enabling environment for women's enhanced participation in decision-making. These primarily had to do with male resistance and existing normative structures surrounding gender roles, and national policies on gender equality. For example, a few focus groups participating in RLCs noted that achieving greater participation in household decision-making often required challenging men's preconceptions of women. It entailed convincing their husbands or male family members that women were knowledgeable and capable of implementing good farm management practices, through their actions and achieving results like increased production. Although they may have achieved greater voice in household decision-making as a result, male resistance to their enhanced role could still exist.

"Sometimes if we take decisions our husbands tell us that we've become men." (Women's focus group, PICSA+RLC, Eastern Province)

Other focus groups and key informants highlighted existing normative structures surrounding gender roles and responsibilities and how social changes over the years had influenced that women participated more in decision-making. A few control sample focus groups highlighted that gender roles were such that women had to be responsible for the family more than men, emphasizing for example that "children look to the mother for food," and that while some men might abandon their families and other men might be irresponsible ("some men drink beer"), women could not do the same to their children and families. Several focus groups and key informants also mentioned that, in contrast to the situation in the past, women were now valued and allowed to study, husbands did not make all decisions alone, and women were not dependent on their husbands. Furthermore, a control sample informant in Western Province

highlighted that, while men might be seen as providers for the household, women "can't sit and wait for men to provide alone," emphasizing the necessity for women's decision-making and actions, as well, for the good of the family. In particular, a female key informant (PICSA 2018) in Northern Province who did not have a husband noted that in her region women were the ones responsible for agricultural activities.

Finally, several focus groups and key informants discussed that changes in the national policy and institutional environment had helped promote women's enhanced participation in household decision-making over the years. They noted in particular government policies on gender equality that now existed. A few women mentioned that, thanks to the government and policy-making, women could now study, and they also knew their rights as women. Other women highlighted that being able to participate in community-based groups, liker farmer cooperatives and women's savings groups, and national programs that fostered inclusive community building, had enhanced their capacity to participate in household decision-making.

Conclusions and Recommendations

Although women and men coincide in using the same primary communication channels, there is evidence that women and men favor different communication channels for weather and climate information, and that men use a greater range of channels for climate information. Both women and men highlight using radio and Farmer Promoters as primary channels for accessing weather and climate information. Use of channels for weather information can differ among women and men in that women report using peer networks more than men, and men note using television more than women.

Project interventions interact with gender in influencing farmers' use of climate information for decision-making. The evidence suggests that women farmers may use climate information less than men; however, participation in project interventions enabled women's increased incorporation of climate information into their management decisions, narrowing the gender equity gap in use. A discrepancy from this trend arose concerning planting date decisions, for which women and men used climate information, regardless of exposure to project

interventions. For livestock management, project interventions particularly enabled men to adjust stocking rates.

Project interventions increased the benefits of climate-informed decision making that farmers perceived, also diminishing gender inequities in some cases, such as overall investment in their farms, coping capacity and confidence in planning. Participation in interventions contributed to increased income and food security for both women and men.

Women's participation in farm and livelihood decisions within the household is influenced by characteristics of individual households and local context, and are perceived as improving as a function of individuals' knowledge relevant to agricultural management and broader social and policy change across the country. Although the trend is for men to play a more dominant role in household decision-making processes, there is evidence that project interventions have contributed to women's enhanced role in agricultural planning, as well as standing in their households, in some cases. Women's increased voice in household decision-making is attributed in part to their enhanced climate knowledge, and their improved production and income as they have used climate information.

There were no substantial differences in results according to length of exposure to interventions. However, male 2018 PICSA participants noted use of more communication channels for climate information than male 2016 participants; they also highlighted perceived benefits related to increased income, while male 2016 PICSA participants did not.

In light of the study findings, it is possible to make the following recommendations:

- Promote more opportunities for women to participate in trainings, to ensure that women are able to access the same content as men. Direct participation in the interventions may be particularly important for women to be able to use and benefit from the weather and climate information they access. Further research on men's and women's peer networks and effectiveness for sharing climate knowledge through them might also be necessary.
- Assess which decisions are under women's control and which ones are under men's to ensure that existing climate services are informing women's decisions just as much as they are men's, e.g., through detailed analysis of women's and men's livelihood strategies and decision-making processes from the project's onset. Findings show that certain decisions might be gender-specific. That women reported much less than men decisions

they would have liked to make but were unable to suggests that the project might have been biased towards men's decision-making processes.

- Incorporate women's enhanced voice in agricultural decision-making into the theory of change, to support more intentional planning of project interventions and more critical consideration of disabling factors. Participation in interventions contributed to women's increased ability to give inputs for various aspects of agricultural planning; in many instances, women reported being valued more by their household members, as a consequence.
- Carry out a follow-up evaluation after farmers have been participating in the Radio Listener's Clubs for a longer period of time to assess evolving benefits. It could take a longer period of time before differences in climate-sensitive decisions made and in benefits were to arise, between those women and men participating in RLCs in addition to having participated in PICSA (treatment category 3) and those who had participated in PICSA only (treatment categories 1 and 2).

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