

# Participatory Integrated Climate Services for Agriculture (PICSA) as part of Rwanda Climate Services for Agriculture:

## Findings from quantitative evaluation of 2017/18 PICSA implementation

Working Paper No. 339

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

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Peter Dorward  
Gloriose Nsengiyumva  
Desire Kagabo



RESEARCH PROGRAM ON  
**Climate Change,  
Agriculture and  
Food Security**



Working Paper

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## Abstract

Participatory integrated Climate Services for Agriculture (PICSA) is being implemented in multiple districts across Rwanda as part of the Rwanda Climate Services for Agriculture project. This report presents findings from the evaluation of PICSA implementation across ten districts in the third year of the project. PICSA training of Farmer Promoters took place in late 2017 ahead of implementation with farmer groups.

This document reports on a quantitative survey of 502 randomly selected trained farmers. The quantitative evaluation took place in May 2018 after the season had finished and respondents had been able to harvest.

Results from the quantitative survey show that most of the farmers were trained on the PICSA elements that are implemented 'long before the season'. In addition, almost all respondents were trained in the seasonal forecast and two thirds received short term forecasts during the season.

98% of farmers had made changes in their farming or other livelihood activities as a result of PICSA training. More farmers made changes in crops (96% of respondents) than livestock (29%) and other livelihoods (6%). Men made an average of 2.4 changes per farmer and women 2.1.

The most popular types of changes made in crops were changing the management of land (50%), changing the amount and / or type of inputs used (35%); changing planting date (27%); growing a new variety of a crop they already grow (25%); and growing a new crop (20%). The most popular change in livestock enterprises were starting a new enterprise (15%), followed by changing the management of a livestock enterprise (11%) and increasing the scale of a livestock enterprise (6%). Regarding other livelihoods 4% of respondents had started a new enterprise, 1% had increased scale and 1% had changed management of livelihood enterprises.

Regarding the effects of the changes farmers had made as a result of the PICSA training, 92% of farmers reported that the decisions they had taken had improved their household food

security. 86% reported that they had improved household income, 81% that they had been better able to provide for family healthcare and 74% that they had found it easier to pay their children's school fees. Respondents reported that as a result of the PICSA training and the effects of the changes they had made that they are more confident in planning and decision making (93%), better able to cope with bad years caused by the weather (76%) and had improved their social standing within their households (92%) and within their wider community (91%).

PICSA is an integrated approach that enables individual farmers and households to study their own resources and farming systems, the climatology of their area, identify, evaluate and plan appropriate options to cope with and adapt to climate variability and change. The results of this study show that this integrated approach has continued to stimulate innovation and change in farming communities as it has been scaled across Rwanda.

## **Keywords**

Agriculture; livestock; land management; food systems; food security.

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# 1. Background and context

The Rwanda Climate Services for Agriculture Project (RCSA) is a four-year project which aims to build capacity in climate services for agriculture in Rwanda in order to increase the resilience of farmers to the changing and variable climate in Rwanda through improved climate risk management, leading to increased agricultural productivity for Rwandan farmers. The approach used to reach end-users with climate and weather information is Participatory Integrated Climate Services for Agriculture (PICSA). PICSA is a participatory extension approach.

## *PICSA as part of the Rwanda Climate Services for Agriculture project*

As part of RCSA, PICSA has been integrated with the national extension system and is being implemented by 'Farmer Promoters' (FPs). FPs are part of the Twigire Muhinzi system of extension that the Rwanda Government has developed alongside One Acre Fund. This integration has required a capacity building approach that cascaded PICSA through a series of training workshops. These began in 2016 with 'expert' training sessions at national level ahead of district training workshops for 'intermediaries' which included FPs, Socio-Economic Development Officers (SEDOs), Sector Agronomists (SAs) and Farmer Field School facilitators (FFSF). The initial pilot in 2016 covered 4 districts and the results are overview in Clarkson et al. (2017, 2020). In 2017, the approach began to scale to all districts of Rwanda after a further process of expert trainings on a regional level and over the course of the project (until March 2019) 1,231 FPs, 209 SEDOs, 119 SAs and 60 FFSF were trained. These trainings all included Meteo Rwanda staff to help contextualise and explain the climate and weather information for the intermediaries. These intermediaries have implemented the PICSA approach with more than 110,000 smallholder farmers across Rwanda.



## 2. Objective

This report will detail the results of a quantitative survey undertaken in May 2018 which sampled farmers trained in the lead up to the 2017 A season (September '17 to January '18). Previous work has provided evidence of the influence PICSA has on farmer decision making with thousands of farmers in the north of Ghana (Clarkson et al. 2019). This report will present results from the largest scaling of PICSA to date and will provide insight into the scalability of the approach. Evidence will include the understanding and use by farmers of the information and tools included in the approach; the response of farmers with regard to changes in practices that they attribute to the training; the associated effects on their households, their attitudes and their social status and whether or not they shared the information and tools with their peers.

### 3. Methodology

The quantitative survey covered 502 households in ten districts in Rwanda. It was carried out in May 2018 by a team of ten enumerators using tablets and [Open Data Kit](#) software. A pilot was undertaken to test the questionnaire and train the enumerators. On a district-by-district basis respondents were randomly selected from all trained PICSA households (ensuring that the respondent attended the training sessions). The questionnaire was carefully designed to provide understanding of how households responded to the concepts and tools introduced during PICSA trainings in the communities in which it had been rolled out (see Clarkson et al. 2019 for full explanation of the tool which was then adapted for use in this study). The questionnaire included sections on the training and the individual elements of PICSA (including use of images on the tablet to identify whether farmers recognised and had been trained in different elements of PICSA), the changes that participants have or haven't made as a result of the training and an indication as to the impact of those changes on the household. The questionnaire mostly consisted of multiple choice and Likert style questions to assess the training and consider the farmers' plans and decisions made as a result of the training. There were also opportunities for the farmer to go into more detail through open-ended questions. Analysis was completed using SPSS and we used a chi-square test of independence to test whether the proportion of responses was independent of gender and PPI group.

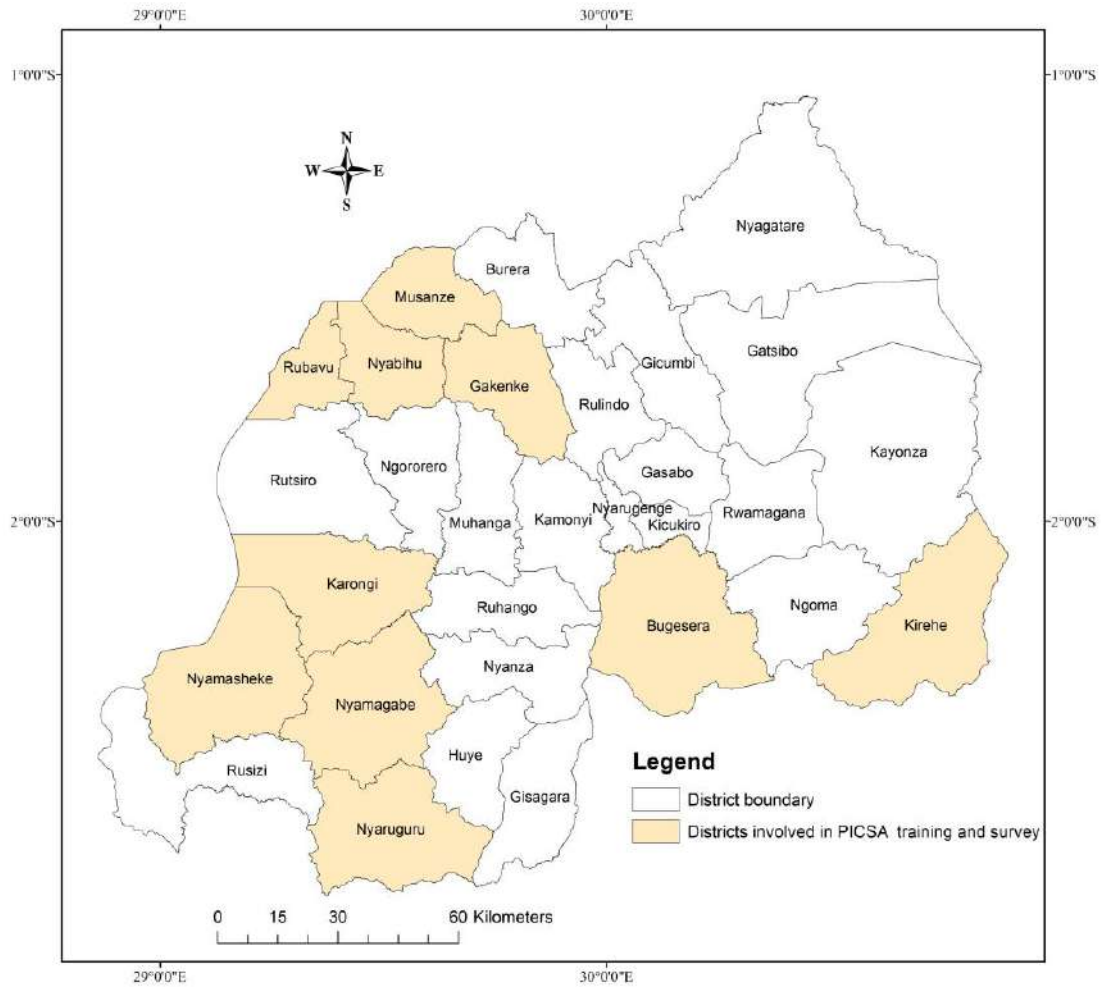


Figure 1: Map of Rwanda showing districts involved in PICS training and survey

## 4. Results

This results section will include results from the quantitative survey. Results will be split by gender of respondent and wealth of respondent (related to their PPI score).

### 4.1 Demographics of survey respondents

Almost half of the survey population was women (46%) and respondents ranged in age from 21 to 91 years old (figure 2). Respondents were evenly split across the 10 districts with a minimum of 49 respondents and maximum of 51. The quantitative survey also included standard questions from the Rwanda Progress out of Poverty Index (PPI). Each respondent was given a PPI score based upon these questions. Scores ranged between 13 and 93.

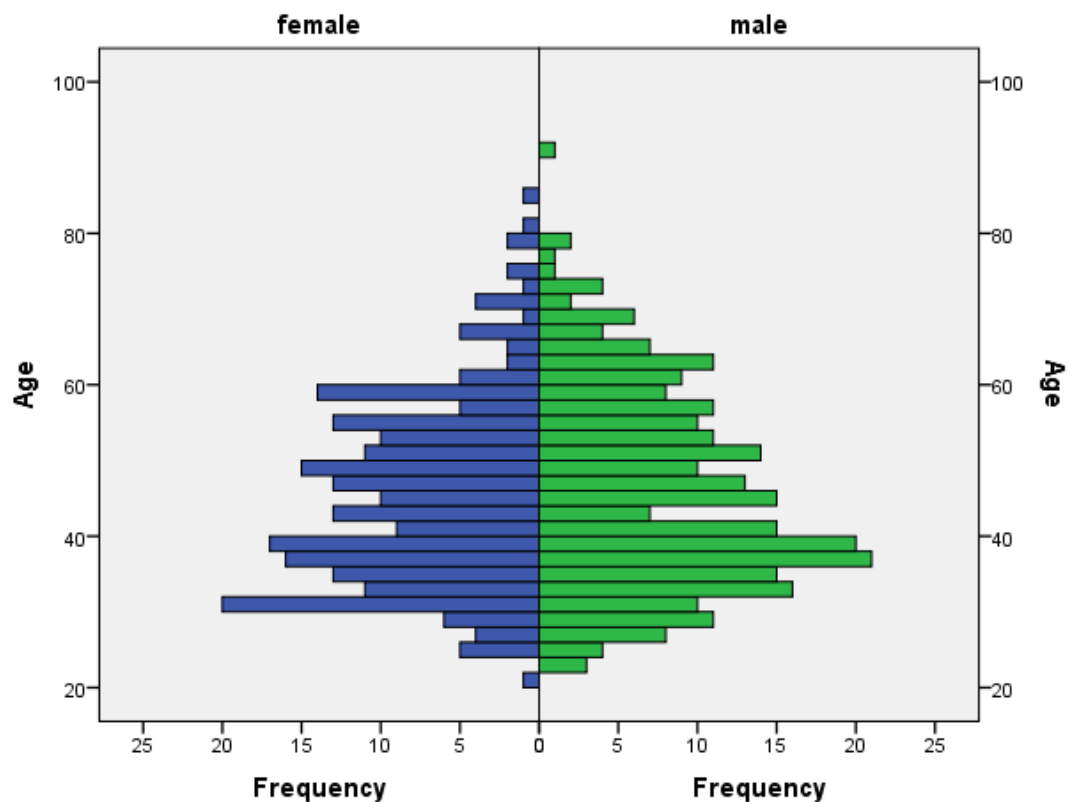


Figure 2: Age and gender of respondents

In order to split the sample by wealth the respondents were split into quartiles based on their PPI score (table 1). The large majority of respondents in the least wealthy group are likely to be living on less than \$1.25 per day and only a small proportion of those in the wealthiest group are likely to be in the same situation.

**Table 1: PPI ranges and wealth groups**

Wealth group	PPI score range	All % (n=502)	Men % (n=270)	Women % (n=232)	Poverty likelihoods
<b>Least wealthy</b>	13-37	25	23	28	60-97%
<b>Lower middle</b>	38-49	27	27	27	36-60%
<b>Upper middle</b>	50-59	25	25	24	17-21%
<b>Wealthiest</b>	60-93	24	25	22	0-8%

\* The poverty likelihood is the percentage chance that someone with a PPI score of x would be under a \$1.25 per day threshold

## 4.2 How did respondents react to the different elements of the PICSA approach?

For the purpose of the questionnaire the PICSA approach was split into eight different elements based around the different PICSA tools/steps that the respondents were expected to have been trained in (table 2). Respondents were asked whether or not they had received training on the specific tools/steps after being shown a familiar prompt (an image) from the training that identified each of them. They were then asked whether or not they felt the element had been useful in their planning and decision making for the coming season.

**Table 2: PICSA elements and their perceived usefulness**

PICSA tool / step	Respondents trained (n=502)	Trained respondents who found the tool / step useful in their planning and decision making		
		All	Women	Men
<b>Resource allocation maps</b>	480 (96%)	412 (86%)	198 (84%)	224 (88%)
<b>Historical climate information</b>	466 (93%)	377 (81%)	173 (80%)	204 (82%)
<b>Probabilities and risks</b>	411 (82%)	311 (76%)	145 (76%)	166 (75%)
<b>Crop and variety options</b>	495 (99%)	473 (96%)	217 (95%)	256 (96%)
<b>Livestock and livelihood options</b>	491 (98%)	466 (95%)	214 (94%)	252 (95%)
<b>Participatory budgets</b>	424 (84%)	371 (88%)	158 (84%)	213 (91%)
<b>Seasonal forecast</b>	493 (98%)	473 (96%)	212 (94%)	261 (97%)
<b>Short-term forecast</b>	342 (68%)	294 (86%)	129 (84%)	165 (87%)

The responses to the questionnaire provide evidence that almost all of the farmers were trained on most of the PICSA tools (table 2). This is notable as the different elements will have been split across several meetings (a range between one and nine meetings with a median of three and an average of 3.5). There were no statistically significant differences when respondents were split by gender but a higher proportion of PPI group 4 (75%)

received short term forecasts than those in PPI groups 1 (63%;  $p = 0.03$ ) and 3 (63%;  $p = 0.03$ ).

Overwhelmingly, those who were trained reacted positively to the different tools and found them useful in their planning and decision making. Men were more likely to find the participatory budgets useful (men 91% v women 84%;  $p = 0.03$ ). There were minor differences in proportions of PPI groups, but none were statistically significant.

Likert statements also provided evidence on respondents' perceptions on aspects of the training. Figure 3 shows that respondents overwhelmingly (94%) considered the training to be more useful than other training from their training providers (farmer promoters, SEDOs etc.); a small proportion (5%) felt that the training took too much of their time and 12% felt that elements of the training were too difficult to understand; women were more likely to report this than men (women 16%; men 9%;  $p = 0.01$ ). A considerable proportion of respondents (42%) reported that the training would have been better to be held earlier so that they had more time to integrate the information and tools into their planning and decision making. A larger proportion ( $p = 0.04$ ) of men (47%) reported this than women (38%). There were no statistically significant differences when PPI was considered.

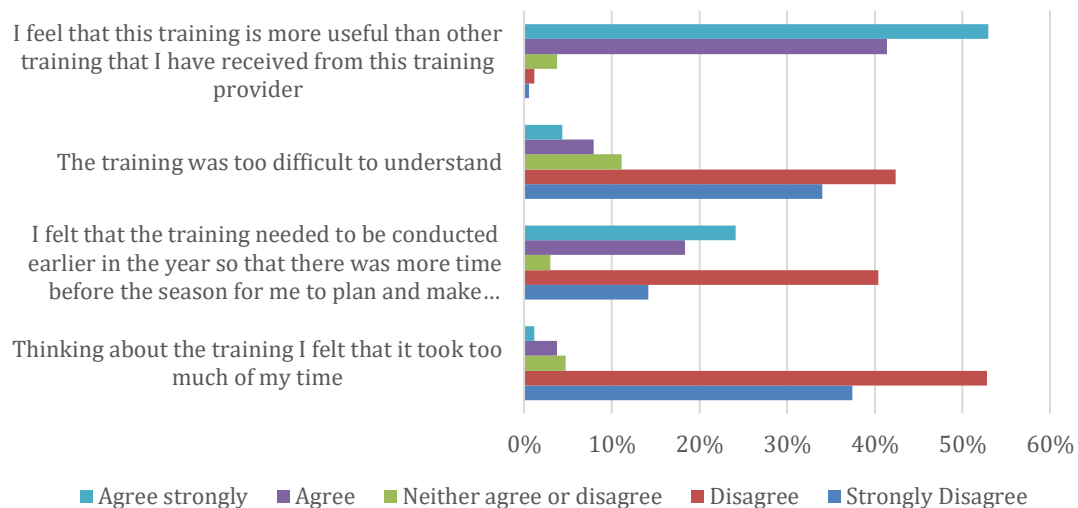


Figure 3: Likert statements r.e. respondents' attitudes to training

### 4.3 Is the approach influencing farmers decision making / are farmers making changes in their practices?

The overwhelming majority (total: 98%; women: 98%, men: 97%) of respondents had made changes in their crops, livestock or livelihood enterprises. The most popular type of enterprise for changes was crops (table 3), with 96% of respondents making changes in their crop enterprises. Almost a third (29%) of respondents had made at least one change in their livestock enterprises (men: 29%; women: 29%) and fewer than a tenth of respondents (6%) had made changes in their other livelihood enterprises (men: 6%; women 5%). There were no statistically significant differences when either gender or PPI grouping are considered.

**Table 3: Changes in different enterprises split by gender**

	All (n=502)	Women (n=232)	Men (n=270)
<b>Crops</b>	483 (96%)	225 (97%)	258 (96%)
<b>Livestock</b>	146 (29%)	67 (29%)	79 (29%)
<b>Livelihoods</b>	28 (6%)	11 (5%)	17 (6%)

With regards to the number of changes respondents reported making, the average for all respondents is 2.3 (men = 2.4 and women = 2.1). There was little difference in the average number of changes for respondents based on their PPI group.

#### 4.3.1 Changes in crops

The most popular change in crops (figure 4) was changing the management of land (50%), changing the amount and / or type of inputs used (35%); changing planting date (27%); growing a new variety of a crop they already grow (25%); and growing a new crop (20%). Very few respondents changed the scale of their crop enterprises as a result of the training. There were no statistically significant differences when gender or PPI were considered.

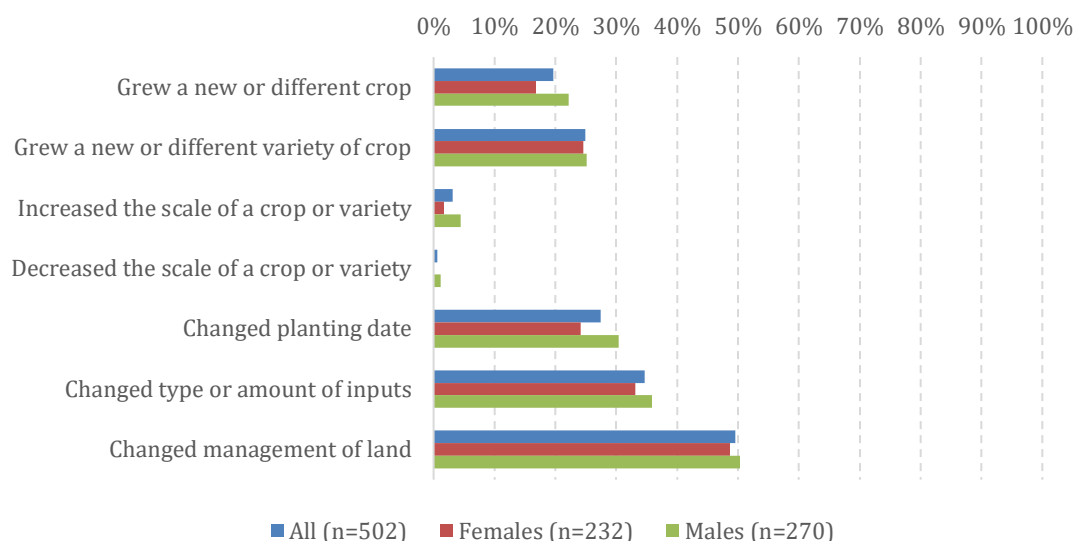


Figure 4: Type of changes respondents made in crop enterprises

Respondents reported growing a wide range of new crops (23 in total). The most popular new crops grown were maize (46% of those growing a new crop), climbing beans (14%) and Irish potato (8%). More women grew a new crop of climbing beans (women: 23%, men: 8%;  $p = 0.04$ ) than men. The same three crops were also the most popular crops in which respondents changed variety. More than half (52%) tried a new variety of maize whilst a quarter (26%) tried a different variety of climbing bean and 14% tried a new variety of Irish potato. There were 10 crops recorded in which respondents had tried a new variety.

#### 4.3.2 Changes in livestock

The most popular change in livestock enterprises (figure 5) was respondents reporting starting a new enterprise (15%), followed by changing the management of a livestock enterprise (11%) and increasing the scale of a livestock enterprise (6%). Only 1% of respondents decided to decrease the scale of a livestock enterprise following the training. A larger proportion ( $p = 0.04$ ) of Men (8%) reported increasing the scale of a livestock enterprise than women (3%). There were no statistically significant differences when PPI groupings were considered.



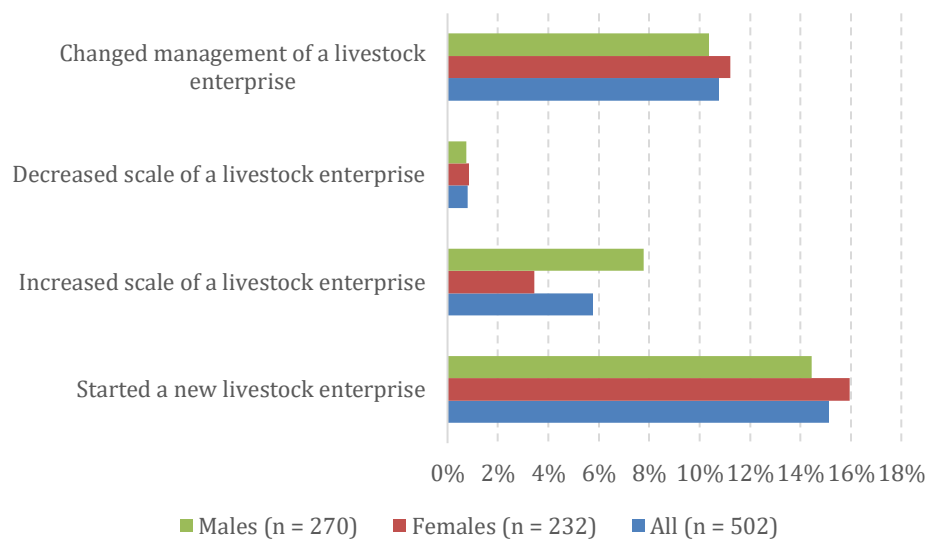


Figure 5: Type of changes respondents made in livestock enterprises

More than half (53%) of respondents that started a new livestock enterprise (n = 76) had started a new cattle enterprise. More women (43%) reported starting a new piggery enterprise than men (21%; p = 0.03). 21% of respondents who had started a new livestock enterprise had started raising goats and a smaller number had begun to keep sheep (5%), rabbits (5%) and chickens (5%). With regards to increasing scale, this was most popular in cattle enterprises (48% of those who increased scale), followed by goats (24%), chickens (20%) and pigs (17%). Cattle were also the most popular for changes in management (72% of those who changed management did so in cattle) followed by pigs (26%) and goats (20%).

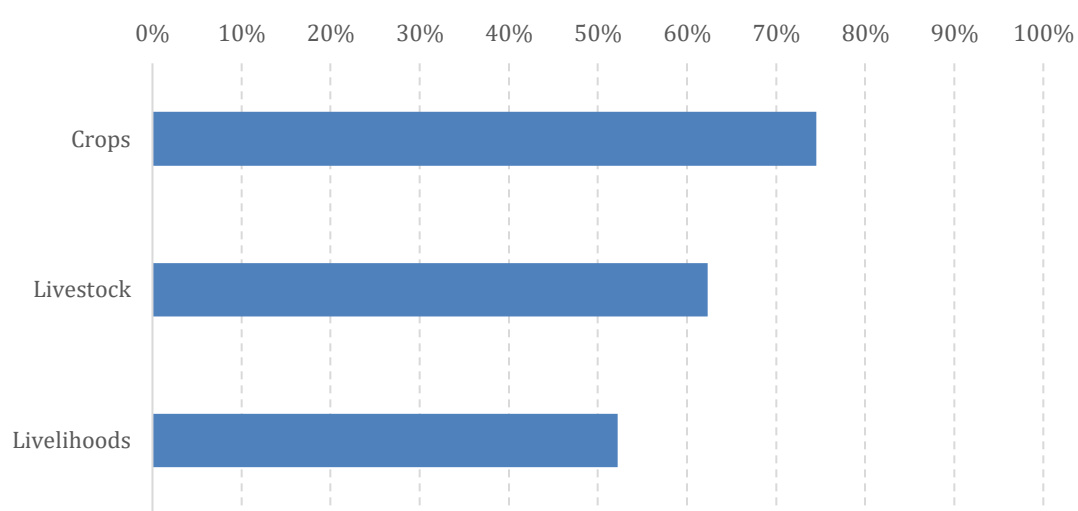
#### 4.3.3 Changes in livelihoods

There were a smaller proportion of respondents that reported making changes in 'livelihood' enterprises as a result of the PICSA training (6%). Most of those that did change a livelihood enterprise had started a new one (4%) and 1% had either increased the scale of an enterprise or changed the management of one.

#### 4.4 Would respondents have liked to make more changes in their practices?

Respondents were asked whether they would have liked to have made more changes as a result of the training they received. Three quarters (75%) of respondents reported that they

would have liked to have made more changes in their crop enterprises (figure 6) with no statistically significant differences when either gender or PPI are considered. The Main reasons respondents gave for not making more changes in crops were the lack of money (50%), lack of land (40%) and limited access to inputs and resources. Larger proportions of respondents from PPI group 2 (9%) reported that the risk of an unfavourable season stopped them from making more changes in crops than those in PPI group 1 (2%;  $p = 0.02$ ). Limited access to inputs and resources were more of an issue for those in PPI group 1 (21%) than those in PPI group 3 (11%;  $p = 0.03$ ).



*Figure 6: Proportion of respondents who would like to have made more changes in their enterprises as a result of the training*

Almost two thirds of all respondents would also have liked to make more changes in livestock enterprises (62%) with no statistically significant differences when gender or PPI are considered. Similarly, as for crops, respondents referred to a lack of money (54%) and land (15%) as the main reasons why they did not make more changes in livestock enterprises.

With regards to livelihoods, more than half (52%) of respondents wanted to make more changes in their livelihood enterprises; there were no statistically significant differences when gender was considered, however a larger proportion of the wealthiest group (PPI4: 60%) wanted to make more changes than those in the least wealthy group (44%;  $p = 0.01$ ). The main reason respondents reported that they did not make changes in livelihood enterprises was a lack of money (49%) followed by limited technical knowhow (9%). A larger

proportion of respondents in PPI group 4 (56%) reported that lack of money stopped them from making more livelihood changes than those in PPI group 1 (42%;  $p = 0.03$ )

#### 4.5 What are the effects of PICSA training and decisions made on farmers and their households?

Effects of the PICSA training and the subsequent changes made by farmers were assessed, in part, through a series of Likert style statements (figure 7). Respondents reported that their income (86%) and food security (92%) had improved as had their ability to pay for school fees (74%) and to provide for the healthcare of their household (81%). There were no statistically significant differences r.e. gender but larger proportions of the wealthier PPI groups reported that they had increased income. A larger proportion of PPI group 4 (93%) reported increased income than PPI groups 1 (79%;  $p = 0.01$ ) and 2 (85%;  $p = 0.04$ ). Similarly, a larger proportion of those in PPI group 4 (90%) reported that they were better able to provide for their family’s healthcare than those in PPI groups 1 (69%;  $p = 0.01$ ) and 2 (80%;  $p = 0.03$ ). Those least wealthy respondents in PPI group 1 (69%) also reported smaller proportions than those in PPI groups 3 (85%;  $p = 0.01$ ) and 2 (80%;  $p = 0.04$ ). The proportions of farmers benefiting in all PPI groups is therefore high and PICSA is stimulating beneficial change for all wealth levels. Perhaps not surprisingly, given their ability to invest available resources, a larger proportion of farmers in the wealthier groups are reporting benefits.

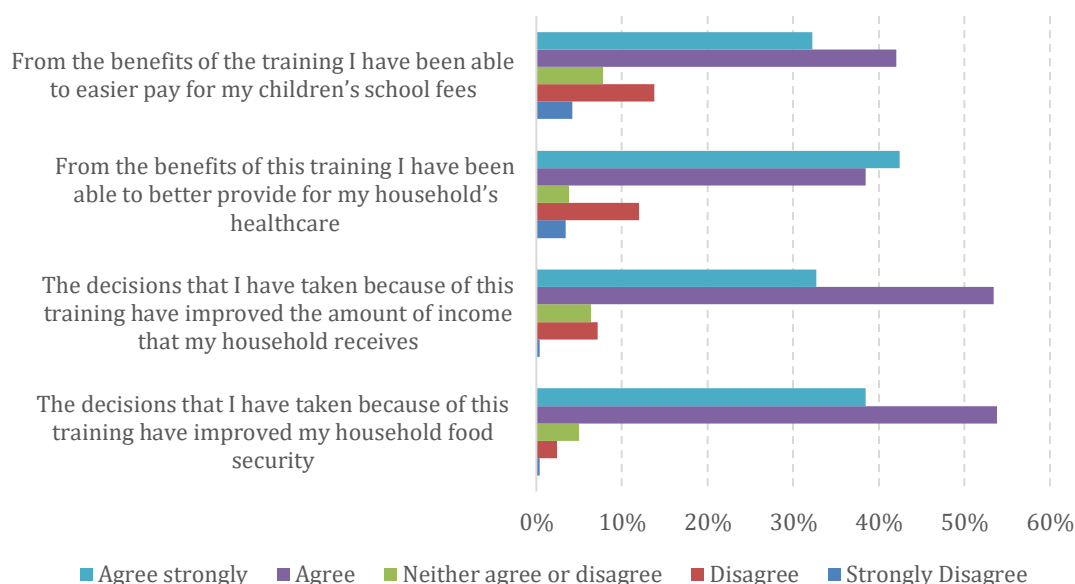


Figure 7: Likert statements considering effect on income and food security

## 4.6 Effects of PICSA training on respondents' attitudes to farming and their social standing

How respondent's attitudes to farming had changed as a result of the training was investigated using a series of Likert style statements. Respondents reported that they were more confident in their planning and decision making (93%), saw farming 'more as a business' (93%) following the training and were better able to cope with bad years caused by the weather (76%). There were no statistically significant differences when gender was considered. A larger proportion of wealthiest group (97%) reported that they were more confident in their planning and decision making than the least wealthy group (87%;  $p = 0.01$ ). A smaller proportion of those in the least wealthy group (87%) also reported that they 'saw farming as more of a business' than prior to the training than those in PPI groups 3 (95%;  $p = 0.03$ ) and 4 (97%;  $p = 0.01$ ).

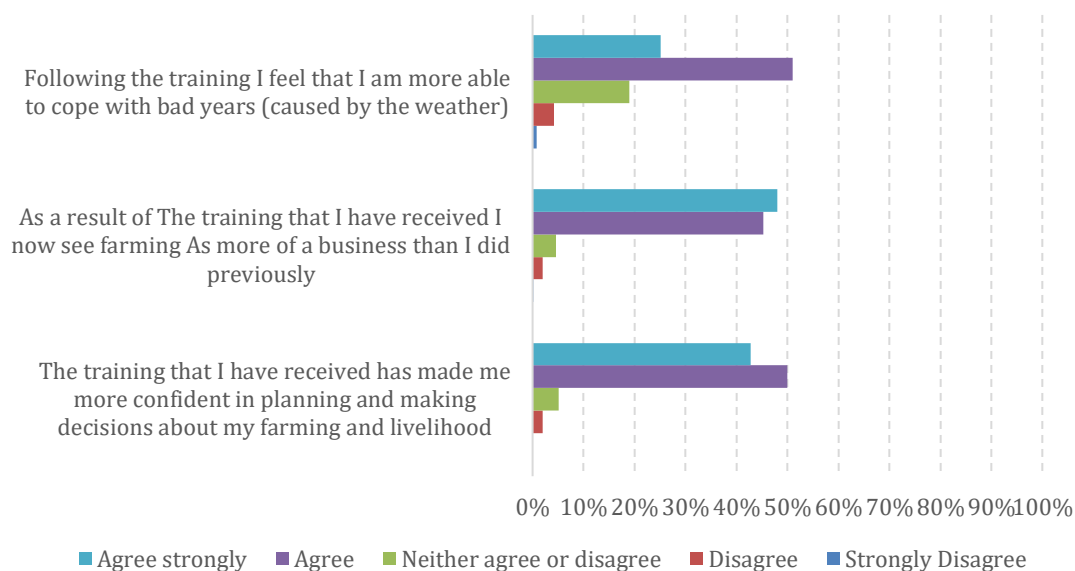


Figure 8: Likert statements r.e. farmers attitudes to farming

The survey also included statements considering respondents social status. Respondents overwhelmingly reported that following the training they were more confident to be talking to their peers about farming and associated livelihoods (88%); that their social standing in their local community had improved (91%) and that their social standing in their household had improved (92%). There were no statistically significant differences when gender was considered. A larger proportion of respondents in the wealthiest PPI group reported that they felt more confident to talk to their peers (92%) than those in PPI group 1 (83%;  $p =$

0.03). Similarly, a larger proportion from PPI group 4 had improved their standing in the community (97%) than those in PPI groups 1 (86%;  $p = 0.01$ ) and 2 (90%;  $p = 0.03$ ). A larger proportion of the wealthiest group also reported that they had improved their social standing in their household (97%) than those in PPI group 1 (89%;  $p = 0.02$ ).

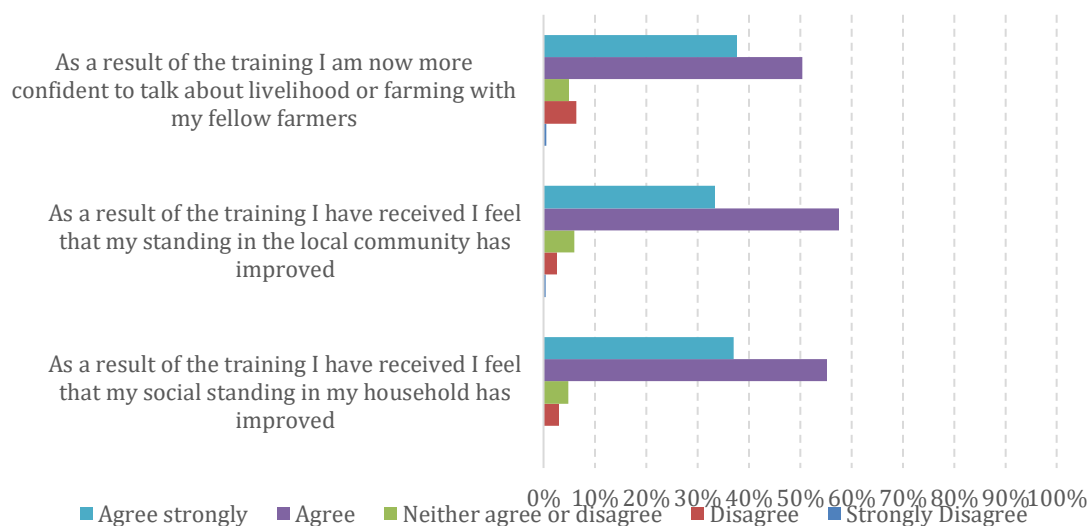


Figure 9: Likert statements r.e. respondents' social status

#### 4.7 Are respondents sharing PICSA information and tools with their peers?

Respondents were asked whether or not they shared information and tools from the PICSA training with their peers. 60% of trained farmers reported that they shared with their peers following the training. There was no statistically significant difference between men and women with regards to whether they shared information and tools. A larger proportion of the wealthiest PPI group 4 (66%) shared the information and tools following the training when compared with PPI group 1 (51%;  $p = 0.02$ ). A possible explanation for this is that farmers in the wealthiest PPI group may have more connections within communities and a higher social standing which provides more opportunities to share information.

Those who shared did so with a mean of 10 others (range = 1 to 110; median = 6) and there were no statistically significant differences between the numbers of farmers men (11) and women (9) shared with. On average, men shared with more men (6 compared with 5 women) and women shared with more women (6 compared with 3 men).

## 5. Conclusions

Results from this quantitative survey show that most of the farmers were trained on the PICSA elements and that they understood them. Almost all farmers made changes in their farming or other livelihood activities as a result of PICSA training and they reported improved income and food security. Respondents also reported improved confidence and social status.

PICSA is an integrated approach that enables individual farmers to study their own resources and farming systems, the climatology of their area, identify, evaluate and plan appropriate options to cope with and adapt to climate variability and change. The results of this study show that this integrated approach has continued to stimulate innovation and change in farming communities as it has been scaled across Rwanda.

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