Supplementary Information 6

1. Detailed results of the hypothesized agro-climate service delivery and adoption impact pathway testing

Risk occurrence → Perceived risk

For the VSLA group, 100% (41/41) of households indicated that they perceived at least one type of climate risk occurrence in their village and 85% (34/40) reported a high impact risk to their rice cultivation activities. Among farmers, who reported risk occurrence, 83% of households also perceived these as high risks for agricultural activities(x_1=34, n_1=41). Since everyone perceived climate change as a risk in their community (x_2=6, n_2=0), it is impossible to implement a statistical test for the Risk occurrence → Risk perception relationship.

For non-VSLA, 98% (40/41) of households reported risk occurrence in their community. Overall 73% (30/41) of households reported high risks from climate change to their household's rice cultivation.

Among non-VSLA farmers that reported risk occurrence, 75% (x_1=30, n_1=40) of households perceived high climate change risk impacts. The single farmer, who reported low/no risk occurrence in their community, also did not perceive climate change as a risk (x_2=0, n_2=1). This finding translates in the likelihood of non-VSLA farmers, who perceive high climate risk impacts, ranging between -6% and 85% (95% CI) higher among farmers, who reported risk occurrence, compared to farmers, who reported low/no risk occurrence. The evaluation of CI implies that the relationship between risk occurrence and perception variables is potentially relevant and likely to be positive.

Perceived risk → Need

In total, 75% (30/40) of VSLA households reported a need for ACS. Survey data also revealed that 75% of VSLA households (x_1=25, n_1=33) perceived high impacts from climate change risk, needing ACS. There was 66% (x_2=4, n_2=6) of households reported a need for ACS among those who perceived low/no impact by climate change risks. This result suggests a likelihood of VSLA households having a need for ACS difference is between -21% and 48% (95%CI) higher among farmers who perceived high impact from climate change risks than farmers who perceived low/no impact by climate change risks. The evaluation of CIs implies that the relationship between perceived risk and having a need is potentially relevant among VSLA households.

For non-VSLA group, the total percentage of farmers needing ACS remained at 54% (22/41). About 56% non-VSLA households (x_1=17, n_1=30) perceived high climate change risk impacts needing ACS while the likelihood to have a need for ACS was 45% (x_2=5, n_2=11) among households who perceived low/no impacts by climate change risks. This result suggests a likelihood of VSLA households having a need for ACS difference is between -21% and 41% (95%CI) higher among farmers who perceived high impact from climate change risks than farmers who perceived

low/no impact by climate change risks. The evaluation of CI suggests that the relationship between perceived risk and having a need is potentially relevant among non-VSLA households.

Need ⟶ Access

All VSLA households (41/41) reported access to ACS. Survey results also show that there were 100% of VSLA households (x_1=30, n_1=30) whose families accessed ACS also had a need. The ACS access rate was also 100% (x_2=10, n_2=10) among households that did not express a need. The 95% CI for the access rate difference between VSLA members who expressed a need and those did not express a need for ACS was between -11% and 27%.

There were 93% of non-VSLA households had access to ACS (38/41). All non-VSLA households (x_1=22, n_1=22) accessed ACS among the ones who reported a need for ACS, while 84% (x_2=15, n_2=19) of non-households that did not report a need for ACS also had an access to ACS. The 95% CI for the access rate difference was between -0.3% and 37% higher among the ones who reported a need and the ones who did not report a need for ACS.

The 95% CI results for both VSLA and non-VSLA households indicated a potential difference between the levels of access to ACS among households needing and households not needing ACS.

Access ⟶ Read/Listen

For the VSLA group, 95% (39/41) of households had someone read/listen to ACS. It was not possible to implement a statistical test for Access → Read/Listen relationship since no household had no access to advice (n_2=0).

For non-VSLA households, a total of 85% (35/41) of households had someone read/listened to ACS bulletins. Around 86% (x_1=33, n_1=38) of households had someone read after having direct access to project ACS bulletins while the read/listen rate was 66% (x_1=2, n_1=3) in households without having direct access to project ACS bulletins. The likelihood of households having someone who read/listened to ACS was between -11% and 67% (95% CI) higher among households having direct access to project ACS than for households having no direct access to ACS. The CI implies that the relationship between access to information and read/listen variables is potentially relevant. The relationship is quite likely to be positive.

Read/Listen → Discuss

90% (37/41) of households said that they discussed with neighbors and friends the contents of ACS. There were 89% (x_1=35, n_1=39) and 100% (x_2=2, n_2=2) of VSLA farm households having someone who discussed ACS bulletins among households having someone who read/listened and did not read/listened to ACS bulletins, respectively. This data imply the likelihood of households having someone discussing ACS is between -23% and 56% (95% CI) higher among households having someone read/listen to ACS than households having no one read/listen to ACS. For non-VSLA, the discussion rate was at 73% (30/41). There were 77% (x_1=27, n_1=35) and

50% (x_2=3, n_2=6) of households having discussed ACS among households having someone read/listened and not read/listened to the ACS bulletin, respectively. This data imply the likelihood of households with someone discussing ACS is between -8% and 61% (95% CI) higher among households having someone reading/listening to ACS than households having no one reading/listening to ACS. The 95% CI results for both VSLA and non-VSLA farmers reveal that there is a potentially relevant difference between the farmers who discuss ACS after having read/listened to ACS and farmers who do not read/listen to ACS.

Discuss → Understand

A total of about 83% (34/41) VSLA households with people understand ACS bulletins. The percentage of VSLA households with people understanding ACS after discussing was 81% (x_1=30, n_1=37) whereas this comprehension rate was 100% (x_2=4, n_2=4) among households having no one discussing ACS. These data indicate that in the VSLA group, the chance that a household has someone understanding ACS is between -34% and 31% (95% CI) higher among households with someone discussing ACS than households having no one discussing ACS. The 95% CI value, which is relatively wide and symmetric, indicates that there might be a potentially relevant relation between discussing and understanding variables within VSLA farmers, yet the chance is very low.

In the non-VSLA group, the total portion of households having someone understanding ACS bulletins remained at 49% (20/41). The percentage of households having someone understanding ACS after discussing was 60% (x_1=19, n_1=30) whereas this comprehension rate was 9% (x_2=1, n_2=11) among households without anyone discussing ACS. We can say with 95% confidence that the chance for non-VLSA households having someone understanding ACS is between 21% and 72% higher among households having someone discussing ACS than households without anyone discussing ACS. This confidence interval range implies a strong positive relationship between discussions leading to understanding ACS.

Understand → Perceive ACS positively

There were 100% (41/41) of VSLA households reported a positive perception in their households towards ACS bulletins. The percentage of VSLA households that had a positive perception of ACS bulletin among households with people who understood ACS was 100% (x_1=34, n_1=34). This positive perception rate was also similar at 100% (x_2=7, n_2=7) among farmers who did not understand ACS. The data imply that the likelihood for households with VSLA members to have positive perception ACS is between -10% and 35% (95% CI) higher among households that understand ACS than households that do not understand ACS. We can say that there is a potentially relevant difference between VSLA farmers who understand and those do not understand ACS leading to positive perception.

For the non-VSLA group, there were a total of 85% (35/41) of households had a positive perception of ACS. The rates of farmers having positive attitudes towards ACS were 100% (x_1=20, n_1=20) and 71% (x_2=15, n_2=21) among farmers who understood and did not understand ACS, respectively. The data suggest that the share of households having positive perception is 10%

and 49% higher among non-VSLA households that understand ACS than non-VSLA households that do not understand ACS, indicating a moderate strength of the relationship between Understand → Positive perception among non-VSLA households.

Perceive ACS positively → Intend to adopt

Around 95% (39/41) of households intended to adopt ACS among the VSLA group. It is impossible to implement a statistical test since no VSLA household was without a positive perception of ACS (n_2=0).

For non-VSLA, about 83% (34/40) of households intended to adopt ACS bulletins. There were 97% (x_1=33, n_1=34) of households that had the intention to adopt when having a positive perception of ACS bulletins while the intention rate stayed at 16% (x_1=2, n_1=6) among households without a positive perception of ACS bulletins. The results signify that the chance that farmers intend to adopt ACS is 40%-95% (95% CI) greater among non-VSLA farmers having positive perceptions than non-VSLA farmers without positive perceptions of ACS. The data indicate a strong relation between Positive perception → Intend to adopt.

Intend to adopt → Adopt

The total adoption rates among VSLA and non-VSLA households equally peaked at 98% (40/41). The percentage of VSLA households who adopted ACS while having intention was 97% (x_1=38, n_1=39) whereas this adoption rate was 100% (x_2=2, n_2=2) among households who did not have the intention to adopt ACS. Likewise, these respective percentages were 100% (x_1=34, n_1=34) and 83% (x_1=5, n_1=6) among non-VSLA households. These data reveal that the share of households adopting ACS is between -13% and 63% higher among VSLA households having the intention to adopt ACS than households that do not have the intention to adopt. We can say that there is a potentially relevant difference between the likelihood to adopt ACS among farmers who intend to adopt and farmers who do not intend to adopt ACS. The relationship is quite likely to be positive. On the other hand, the share of non-VSLA households adopting ACS is 3%-56% higher among households having the intention to adopt than households having no intention to adopt, spelling out a moderate relation between Intend to adopt → Adopt relation.

2. Detailed results of the test for dynamics of and adoption among VSLA and non-VSLA adopters

VSLA vs. non-VSLA adopters ⟶ Confirm need

All 100% VSLA and non-VSLA adopters confirmed the need to access ACS (x_1=39, n_1=39 and x_2=39, n_2=39). This result suggests that the share of adoption households needing ACS is between -8% and 8% (95% CI) higher among VSLA than non-VLSA households, implying no practical difference between the need for ACS among VSLA and non-VSLA households.

VSLA vs. non-VSLA adopters ⟶ Recommend to peers

Altogether, 92% (x_1=36, n_1=39) of VSLA households and 62% (x_2=25, n_2=40) of non-VSLA households recommended ACS to their peers. The chance that households recommend ACS to their peers is between 12% and 46% (95% CI) higher among VSLA households than non-VLSA households, implying a moderate strength of the relation between VSLA→ Recommend.

Our survey also revealed that out of 79 households, 61 households recommended ACS to other farmers. They shared ACS with at least 263 others. Altogether, 36 out of 39 VSLA households recommended ACS. They shared the advice with at least 176 other farmers, of which, 169 were said to have applied the recommendation. Similarly, 25 of 40 non-VSLA households recommended ACS advice to other farmers. They reported sharing with at least 87 other farmers, of which, 92 were said to have applied the recommendation. Recommendations ranged from 0 to more than 5 other farmers per household. In both groups, the most recommended ones were neighbors and followed by neighboring farms, relatives and close friends. Farmers did not report any other groups that they recommended.

Farmers reported their intention to dis-adopt some ACS advice as below

VSLA vs. non-VSLA adopters → Seed advice dis-adoption

Regarding seed advice, 39% (x_1=15, n_1=38) VSLA and 45% (x_2=17, n_2=38) non-VSLA farmers said that they would dis-adopt at least one type of advice regarding seed amount, seed type, sowing time, sowing technique. These data reveal that the share of households who dis-adopt at least one of ACS advice is between -26% and 16% higher among VSLA households than non-VSLA households. We can say that there is a potentially relevant difference between the likelihood of dis-adopting at least one ACS seed advice between VSLA and non-VSLA adopters. Farmers cited reasons for dis-adoption, including that they were used to existing routines; they were concerned that seeds would not germinate as expected; cold weather or heavy rain requires more seeds; advice is not appropriate with their farm conditions; preference of new varieties with higher yield; inability to practice advice.

VSLA vs. non-VSLA adopters → Fertilizer advice dis-adoption

Regarding fertilizing advice 23% (x_1=9, n_1=39) VSLA and 11% (x_2=4, n_2=36) non-VSLA farmers said that they would dis-adopt at least one type of ACS advice about the rate, type, timing/weather and place of fertilizer application. These data suggest that the share of households who dis-adopt at least one of ACS advice is between -5% and 29% higher among VSLA households than non-VSLA households. We can say that there is a potentially relevant difference between the likelihood of dis-adopting at least one ACS fertilizer advice between VSLA and non-VSLA adopters. They cited several reasons for dis-adopting including that they lack money to buy the right rate; concerns that fertilizers are not enough; rice does not grow well; recommended fertilizer not available in a local shop; fertilizer advice is not appropriate to their farm.

VSLA vs. non-VSLA adopters → Plant protection advice dis-adoption

Regarding plant protection advice: There were 21% (x_1=8, n_1=39) VSLA and 22% (x_1=8, n_1=37) non-VSLA farmers said that they would dis-adopt at least one type of advice, including right type, right rate, right time/weather, right place. These data imply that the share of households who dis-adopt at least one of ACS advice is between -19% and 17% higher among VSLA households than non-VSLA households. We can say that there is no practically relevant difference between the likelihood of dis-adopting at least one ACS plant protection advice between VSLA and non-VSLA adopters. Farmers mentioned reasons for dis-adoption, including that recommended pesticides were not available in local shops; farmers were unsure if they bought the right type from the recommended pesticide substance; farmers did not have money to buy the pesticide; farmers followed the advice but it was not effective.

VSLA vs. non-VSLA adopters → Water management advice dis-adoption

Water management: There were 38% (x_1=15, n_1=39) VSLA and 32% (x_1=12, n_1=38) non-VSLA farmers who said that they would dis-adopt at least one type of advice, including coordinated irrigation, pumping water during floods, droughts, shifting crop, regulating water at critical rice growth development stage, saving water. These data indicate that the share of households who dis-adopt at least one of ACS advice is between -14% and 27% higher among VSLA households than non-VSLA households. We can say that there is a potentially relevant difference between the likelihood of dis-adopting at least one ACS water advice between VSLA and non-VSLA adopters. Farmers raised several reasons for dis-adoption, including that the field locations were far from the canal system; farmers could not arrange a time for regular farm visits; there was no water available during some drought stages; farmers had no money to buy pumps.