NACC Final Evaluation Report

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The author would like to thank the 545 households that spared their valuable time to answer our questions.

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LIST OF ABBREVIATIONS

CA	Conservation Agriculture
FANTA	Food And Nutrition Technical Assistance
FFS	Farmer Field School
FHH	Female Headed Household
HDDS	Household Dietary Diversity Score
HDMI	Household Decision Making Index
HH	Household
HHH	Head of Household
MAHFP	Months of Adequate Household Food Provisioning
MHH	Male Headed Households
NACC	Nampula Adaptation to Climate Change
NGO	Non Governmental Organization
PDMI	Public Decision Making Index
PROSAN	Programa de Segurança Alimentar e Nutricional (CARE program in Inhambane province)
SG	Savings Groups
VSLA	Village Saving and Loans Associations

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1 EXECUTIVE SUMMARY

The Nampula Adaptation to Climate Change (NACC) Project is a German Government funded project with a duration of 36 months. Focusing on enhancing household food and nutritional security it operates in Angoche, Larde and Moma districts, Nampula Province, Mozambique. The project officially started in January 2015 and will end in April 2018 following a no-cost extension of 4 months.
In October 2015 a baseline study was conducted that established the pre-project values for 11 indicators as per the M&E matrix. This report was commissioned as a follow up of the NACC baseline study with a strong focus on a quantitative survey which took up most of the time of the consultancy. In addition this report contains responses to some of the most important evaluation criteria.

1.1 Methodology

The quantitative study design used a control group during the endline study to allow for comparison over time and an analysis of project impact on participants at the end of the project compared to non-participants. As the objective of the endline survey was to evaluate the success of the intervention households participating in the NACC project were selected from the same villages as during the baseline survey and compared to a randomly selected control group from these villages. Participants were sampled among those who had participated in the project (FFS or SG or both) for at least a year and non-participants among those who participated in the baseline.
The survey design and the time of implementation were basically the same as during the baseline to allow for comparability of results. Some additional questions on participation were added. The electronic survey was administered by 8 local enumerators over a period of 10 days. A total of 543 valid interviews (269 participants and 274 non-participants) were conducted.
Data were analyzed using MS Excel and the statistical environment R using chi-square tests, permutation tests, logistic regression and linear regression models. The most important analysis criterion was the participation - non-participation to evaluate the effect of the interventions. Other disaggregation criteria remained the same as in the baseline.
Challenges that were encountered can be divided in sampling and analytical challenges. For one it was not always possible to encounter the randomly selected participants and non-participants in the field and thus some adjustments had to be made. The analytical challenges were related to determining the effect of the project as non-participants were from the same community and have been influenced by the project and that participants were not randomly selected which might have led to the participation of better off community members. Various comparisons were made to try and avoid any bias in the interpretation of results.
Qualitative interviews were held with key informants, community promoters, CARE and partner staff and government officials to triangulate information from the quantitative survey and to obtain responses on some of the evaluation criteria.

1.2 Quantitative survey findings

1.1.1 Interviewed households

Almost same proportion of participants and non-participants were interviewed. Almost half of the interviewees were female and most of them (82%) were living with a spouse. The interviewed population is resident to the area for more than 3 years without major in- and outmigration. High illiteracy rates among interviewed households (HH) continue as more than half of the households were illiterate. As in the baseline Moma and Female Headed Households (FHH) had the highest illiteracy rates at 58% and 91% respectively.
Poverty levels remain the same as in the baseline and so do the differences between districts and education levels. Residents of Larde and illiterate HH were the poorest. No major differences between participants and non-participants could be detected and thus there is no evidence that the project had an effect on poverty levels. However, it has to be considered that the poverty measurement using the poverty scorecard might not be sensitive enough to detect smaller changes.

1.2.1 Income sources

The number of income sources has decreased compared to the baseline. This is probably due to the general socio-economic situation after a drought and with low market prices. Participants report more

income sources compared to non-participants but this is probably not due to the project as those who joined the project had slightly more income sources at the start of the project than those who didn't join. FHH had a significantly lower number of income sources than MHH. Compared to the baseline the diversity of income sources has reduced and is more focused on sale of agricultural produce.

1.2.2 Female Headed Households (FHH)

FHH continue to report extremely high illiteracy levels with only 2% reporting to have attended school compared to 14% among MHH. Though the highest levels of FHH were reported in Moma and the lowest in Angoche these differences are not statistically significant. Poverty levels among FHH are still the highest compared to any other of the investigated population subgroups with 60% living with less than 1.25 USD/day compared to 51% MHH.

1.2.3 Project participants

An analysis of baseline data revealed that those who participated in the project were slightly poorer (not statistically significant), but had better access to extension services and savings, and more of them accessed at least one service compared to those who didn't participate. The average mortality rate for chicken was lower for those who participated than for those who didn't but chicken numbers were the same. Project participants had a higher PDMI but the same HDMI than those who didn't participate. Food access (MAHFP) was similar between part and non-participants but participants reported a slightly higher food diversity.
From the baseline data it can be concluded that the project has not targeted a specific group of better off and better educated but probably managed to work with a slightly poorer segment of the population.

1.2.4 Ability to recover from weather related shocks - Indicator 1

From the quantitative survey it is clear that project participants are in a better position to recover from shocks than they were at the beginning of the project. The evidence that this improvement can be attributed to the project is not very strong but is sufficient to credit the project with providing some support to the population in dealing with climate related shocks.
The occurrence of shocks has changed drastically since the baseline with a reduction in the number of shocks experienced and a shift from shocks caused by flood to shocks caused by drought. Health shocks, though slightly lower than during the baseline, were still at a high level with a quarter of the respondents reporting a death of a household member in the last 12 months.
The ability to recover from weather related shocks has increased from 46% to 82% among participants which was higher than for non-participants (71%). The increase among both participants and non-participants was probably due to the difference in type and magnitude of shocks reported as the flood shocks of 2015 were more difficult to overcome as the drought in early 2017.

1.2.5 Capacity to adapt to climate change - Indicator 2

The proportion of those who recognize the need to change agricultural practices remained almost the same compared to the baseline. Differences between participants and non-participants were also insignificant. Obviously there is no evidence that the project influenced the responses to this question but it also has to be noted that the levels at the baseline were already very high. The reasons provided for the need to change the agricultural practices shifted from declining harvests at baseline to insufficient and irregular rains at endline which reflects the recent droughts. These perceptions did not differ between participants and non-participants.
One of the great successes of the project is that it has increased knowledge about conservation agriculture (CA) tremendously. Almost all participants know at least two CA techniques and even among non-participants knowledge has increased significantly. The best known technique among non-participants is minimum tillage and the least know is green manure. Among participants there is hardly any difference between the techniques. Limited access to seeds is still a major obstacle for participants and non-participants to adopt the new techniques. Insufficient experience or knowledge only prevents non-participants from practicing CA techniques.
This increased level of knowledge is clearly a result of the threefold increase in households that access agricultural support services. Though also non-participants reported a slight increase, it is 93% of participants who now access these services compared to 23% at baseline.

1.2.6 Adoption of conservation agriculture techniques - Indicator 3

Adoption levels follow the same pattern as knowledge levels with minimum tillage having been adopted by 56% of non-participants and 94% of participants - a steep increase compared to the 32% at baseline. Adoption of minimum tillage was highest in Angoche. Improved seed varieties were adopted by 85% of participants and 21% of non-participants. These are surprisingly high levels, given the difficulties in accessing seed. Most likely not only project promoted varieties were considered when respondents referred to adoption. Angoche farmers reported the highest level of adoption once again. Green manure was the least frequently adopted technique. Only 21% of non-participants and 83% of participants reported using green manure mainly on an experimental basis on less than 50% of their land.
The adoption of at least two CA techniques also increased drastically from 15% at baseline to 88% among project participants. For non-participants a slight increase to 24% could be recorded. As can be expected from the individual techniques, adoption was highest in Angoche although it was highest in Larde during the baseline. Those who were literate and had access to agricultural support reported the highest adoption levels. No differences in adoption between MHH and FHH could be recorded. Almost all participants and most non-participants use other agricultural technologies than the three mentioned above. Most popular were not burning and leaving crop residues in field. Particularly avoiding burning in fields increased drastically from 9% during baseline to 86% and 69% for participants and non-participants respectively.

1.2.7 Infiltration rates - Indicator 4

Infiltration rates have increased by 45% (beyond the target of 30%) compared to BL levels on Conservation Agriculture (CA) plots while they have remained the same on Farmer Practice (FP) plots. The latest measurements in October 2017 reveal that CA plots have almost double the infiltration rates compared to the FP plots which is a clear indication of the positive effects of CA on infiltration rates.

1.2.8 Cassava yields - Indicator 5

Cassava yields could not easily be compared between BL and EL as treatments and varieties have changed. A general drop in cassava yields could be observed. In CA plots yields dropped by far less than in FP plots. Despite the general drop in yield, that can not be explained with the current data, the CA plots at EL yielded almost double the amount of cassava compared to the FP plot. This confirms the positive effect of CA on cassava yields that was also noted by farmers, FFS facilitators and AENA staff but the target of increasing the cassava yield could not be achieved.

1.2.9 Access to Savings and credit - Indicator 6

Savings

While access to savings has remained at almost the same level for non-participants it almost tripled for participants compared to baseline levels. An exceptional case is Angoche district where access to savings increased more than sixfold within two years. This is a great success and can be fully credited to project interventions as the almost exclusive form of savings is through Saving Groups (SG). Although levels of access among FHH and illiterate are still lower compared to MHH and literate the project has also managed to increase access to savings substantially for these disadvantaged groups. FHH's access to savings increased from 8% at baseline to 54% among participants at endline. Those with access to savings had a lower poverty level compared to those without.

Credit

Access to credit is much lower and did not increase as drastically as access to savings which is a positive result as it a sign that members were not pressurized to take loans. Among participants about half of those who have access to savings also have access to loans. The more disadvantaged groups also benefitted from the increase in access to loans. For example only 4% of FHH reported access to loans at baseline while now 30% of FHH participants have access to loans. This is only 9% less than MHH while the difference at baseline was 19%. Participants take credit almost exclusively from SG while for non-participants family members also play an important role.

Use of savings and credit

Among participants savings are mainly used to purchase assets and food. Credit is mainly used for emergencies. Non-participants also use credit to purchase food. Among participants the higher investment in education using both savings and credit is noteworthy. A slight increase could also be noted for non-participants.

1.2.10 Chicken ownership - Indicator 7

Chicken ownership and chicken numbers have reduced both for participants and non-participants from 65% at baseline to 60% and 51% respectively. Differences in districts are visible and correspond to the outreach of the vaccination campaign. In Larde the least people (42%) kept chickens and the least proportion of chicken keepers (27%) vaccinated their chickens. The same proportion of people as during the baseline (85%) reported a decrease in the chicken population. About the same proportion of the population (15%) at baseline kept more than 10 chickens with no difference between participants and non-participants. The use of chickens also reduced with about 60% slaughtering and 40% selling chickens. Levels for participants are slightly higher. No contribution to income and nutrition can be expected from such a low level of ownership and use.

1.2.11 Chicken mortality - Indicator 8

Chicken mortality as measured in this survey was the perception of respondents about the proportion of chickens that died rather than an exact measure of mortality. Perceived chicken mortality did not reduce since the start of the project and remains at close to 60%. The reported mortality rates among those who vaccinated their chickens was slightly lower (56%) but still far from the target of 12%. The greatest perceived problem in keeping chickens continues to be disease even among those who vaccinate.

1.2.12 Public decision making - Indicator 9

The Public Decision Making Index (PDMI) is calculated from the responses of interviewees to three declarations about women's involvement in public affairs. The PDMI increased among participants (from 2.19 at BL to 2.43 at EL) while it remained the same for non-participants. However, initial PDMI levels at baseline of those who participated in the project were already, higher than for those who didn't and the longitudinal study of individual households did not demonstrate any differences between participants and non-participants. Hence, there is no evidence that the project had an influence (yet) on the perceptions of people regarding women's engagement in public affairs.
The responses to the statements shifted to the middle with more respondents partially agreeing with the declarations compared to the baseline where more were in full agreement.

1.2.13 Women in leadership positions - Indicator 10

The project achieved its target with 56% women in the management committees and 51% of female presidents in the groups.

1.2.14 Household decision making - Indicator 11

Household decision making was measured using the Household Decision Making Index (HDMI) which was calculated from the responses to three questions about decision making within the household. Similar to the PDMI no changes could be detected in the HDMI not even among participants. Among FHH the HDMI increased which is a good sign but still did not reach 3 which would mean that women could take all the decisions in their household. FHH who participated in the project reported the highest HDMI and were the only group that reached the target.
Despite the limited improvements in the HDMI it needs to be noted that those who participated in the gender and nutrition days had a significantly higher HDMI (at 2.15) compared to those who didn't (1.47), which is an indication that the interventions have an effect but were not sufficient to make changes among a wider part of the community.
One concerning development is that women lost influence in decisions regarding their income and decisions regarding large expenditures. Joint decision making increased on the expense of women's own decision making power while men's influence remained the same. This development was also indicated in informal discussions and qualitative interviews. The reasons for this development are unclear but might be related to a misinterpretation of some gender messages (also see Recommendations).

1.2.15 Dietary diversity - Indicator 12

Dietary diversity was measured using the internationally accepted Household Dietary Diversity Score (HDDS) which investigates the consumption of 12 food groups in the last 24 hours. Participants consume a significantly more diverse diet than non-participants but did not have a higher HDDS when they joined the project. Though the longitudinal study did not reveal any differences between participants and non-participants this is an indication that the project managed to influence the HDDS of participating households. FHH still have a significantly lower HDDS compared to MHH but droughts

did not seem to influence the HDDS as they did during the baseline. Larde still reports the lowest HDDS though slight improvements could be reported. Access to savings and credit influenced the HDDS positively. Fruit consumption reduced and oil and fat consumption increased. For carbohydrates intake shifted towards cassava with less cereals consumed. Chicken did not contribute to the diet.

1.2.16 Adequate food supply - Indicator 13

Food supply was measured using the number of "Months of Adequate Household Food Provisioning" (MAHFP) which is an internationally recognized and commonly used method. The MAHFP is increased compared to baseline levels but this cannot be attributed the project as no differences between participants and non-participants could be detected.
Access to savings and credit did not influence MAHFP, but as reported above it did influence the HDDS. A simple conclusion could be that households do not use their savings to buy staple but to diversify their food intake.

1.2.17 Training of civil society and government officials - Indicator 14

To date 475 persons (17% female) were trained by the project mainly on climate change. No information is available about the effects of these trainings.

1.2.18 Access to at least one service - Indicator 15

Among participants a massive increase in access to services could be recorded. Basically all participants receive at least one service while access among non-participants remained at baseline levels. The project also managed to increase access to services among the disadvantaged groups such as FHH, chronically ill and illiterate. Agriculture services were most widely spread (93% of participants) followed by savings group services (68% of participants) and vaccination services (59% of participants).
Those who access these services are less poor but this difference is mainly visible among non-participants as almost all participants accessed services. Whether it is the services that reduce poverty levels or whether services reach the better off could not be determined with this study but even at baseline those who accessed services were slightly less poor than those who didn't.
Chicken vaccination services had the lowest outreach in Larde but access still increased significantly from baseline levels where vaccination services were basically unavailable in Larde and Moma. Surprisingly respondents were satisfied with the vaccination services despite the limited effects of the vaccination campaign in general. Vaccination services are mainly provided by community based vaccinators.
Agricultural support services were successful at including FHH but not as successful in including illiterate households. District differences were not noticeable. The most frequently provided advice was about planting in lines, followed by advice on green manure and new varieties. NGO extensionists are still the main providers of agricultural support which raises questions about sustainability of these services. Interviewees continue to be very satisfied with the services they receive.
Savings group services are provided to almost all participants that save in savings groups and also reach non-participants that save in saving groups. In line with access to savings FHH have significantly less access to savings group services. SG promoters are now providing 50% of these services while NGO extensionists still provide 38%. Despite a slight reduction in satisfaction levels interviewees are still very satisfied with SG services.

1.3 Evaluation aspects and conclusions

1.3.1 Project design

The project design was too ambitious given the time and resources that NACC had at its disposal. A multi component project with agricultural interventions that don't yield instant results can not achieve all its targets and objectives within the provided time and the provided resources. The difficulty of accessing the chicken vaccine might have been overlooked in the design. Yet, the project addressed key problems, used a highly appropriate implementation approach of building capacity at the community level, introduced appropriate agricultural technologies and savings groups that were highly appreciated at all levels.

1.3.2 Relevance

The relevance of the project is undisputed among all stakeholders. Climate change impacts the agricultural production and new agricultural interventions were very welcome. The SG methodology

introduced by the project was rated as very appropriate for the poorer and more vulnerable members of the community. The high prevailing mortality rate of chickens did not leave any doubt about the relevance of chicken vaccination.

1.3.3 Effectiveness

The question about the achievement of outcomes and the progress towards the overall goal is one of the core questions of every evaluation and will be summarized here very briefly. For more details survey results in the executive summary or in the body of the report need to be consulted.

Agriculture component and shock recovery

Project participants are in a better position to recover from shocks than they were before the project and this can partly be attributed to the project. Knowledge and adoption of Conservation Agriculture techniques has increased substantially through project interventions and these effects can also be noted among non-participants. Data about cassava yields and infiltration rates were not available but farmers reported increased yields.

Livelihood diversification

This component was based on the introduction of savings groups and chicken vaccination. Despite some successes in vaccinating chickens in 2016 this component of the NACC project was unsuccessful in increasing chicken numbers. None of the indicators improved from baseline levels despite significant efforts to vaccinate chickens.

In contrast the Saving Group component was highly successful in providing participants with access to savings and credit. This success can be clearly attributed to the project.

Equitable decision making

Though more women were noticed in public positions and the project has supported this development a slight increase in the PDMI can not be attributed to the project. The quantitative survey did not indicate any improvements of the HDMI among participants but a significant improvements could be detected among those who participated in gender and nutrition days. Unfortunately, it has to be noted that women seem to have lost some autonomy in taking decisions about their own income.

Food and nutrition security

The project was successful in diversifying the participant's diet to some extent and particularly the improvements among children's nutritional status were noted in qualitative interviews. Food availability also increased from baseline levels but this increase can not be attributed to the project though some reference was made in qualitative interviews about increased food security.

Increased capacity

A substantial number of government and civil society representatives were trained but effects of this training could not be measured. The project clearly managed to increase access to agriculture, vaccination and saving group services substantially.

The number of individuals that benefited from the NACC project is 13,951 (53% female) according to the project database. Close to 5,200 were reached by group memberships while an additional 8,776 were reached by other activities such as farmer field days, vaccinations, cooking demonstrations and training on key laws for women and girls. Targets for SG (Savings Groups) and FFS participation were surpassed as well as the targets for training on key laws. Farmer field days, vaccinations and cooking demonstrations did not reach the targeted number of participants.

A critical issue that was noted during the endline survey and that affects the effectiveness of the project is the critical water situation in many of the visited communities. Due to water shortages productive time and child care time gets diverted to efforts of fetching water.

1.3.4 Efficiency

Efficiency was not evaluated in any detail but there seem to be some unnecessary delays and frictions in financial reporting and administrative procedures that impact on the efficient application of resources.

1.3.5 Sustainability

Agricultural techniques that were introduced by the project will most likely continue to be used after the end of the project. One concern with regard to the use of green manure and new varieties is access to seeds that is not secured at the moment. Agricultural support will most likely only continue at a very basic level without demonstrations at farmer field schools.

There is no doubt that savings groups will continue to provide services to their members. The formation of new SG is likely to continue though on a reduced scale.
Vaccination services are very unlikely to continue due to difficulties in accessing the vaccine on time and the poor experiences over the past two years.
Gender and nutrition activities will most likely not continue or only at a very reduced level while the promising initial changes in gender relations will probably continue at a very slow pace.

1.3.6 Management

Project management changed mid project and received limited support from the Maputo offices. While the agricultural and savings group component were sufficiently staffed the gender and nutrition component was not particularly as it lacked the support of field staff. Overall management of the project could have been more flexible in adapting to challenges such as the difficulty to supply chicken vaccines in time, more proactive in the provision of seeds before the end of the project and firmer in demanding better performance and cooperation from AENA. Nevertheless, project management has made great efforts to achieve targets in a challenging environment with limited resources and time.

2 INTRODUCTION

2.1 Project Background

Adapted from the Project Proposal: The Nampula Adaptation to Climate Change (NACC) Project is a German Government funded project with a duration of 36 months. NACC is embedded in the Primeiras e Segundas Programme (P&S) of the CARE/WWF Alliance and operates in Angoche, Larde and Moma districts, Nampula Province. It's main focus is enhancing household food and nutritional security. NACC will aim at reaching 17,760 direct participants and 98,000 indirect participants from poor and food insecure households, of which 60% will be women from CARE's impact group, "socially, economically and politically excluded women experiencing food and nutritional insecurity who are highly dependent on natural resources'.
NACC's overall approach can be divided into two main pillars: economic empowerment on the one hand and social empowerment on the other. The economic pillar will tackle household food and nutrition insecurity while strengthening resilience to natural disasters and climate change. Low agricultural production, the dependence on farm and natural resource based incomes and limited climate change adaptive capacity will be addressed in an effort to reduce the poverty and vulnerability of targeted communities. The social pillar, which will increase the efficacy of the economic pillar, will address gender and power inequality. Addressing the underlying causes of vulnerability is therefore a fundamental component of NACC's framework, distinguishing CARE's methodology from typical food security and adaptation initiatives. NACC's strategy includes empowerment of the most vulnerable, women in particular, in decision-making in their households, communities, and in local governance. Using a rights based approach, NACC will ensure all actors and stakeholders reached by the initiative will understand their rights and obligations, as well as the most appropriate and effective ways of claiming and exercising them.

The key strategies for improving household food security under the economic empowerment pillar were to use a mixed intercropping system, primarily designed for home consumption, using conservation agriculture techniques. This was supported through the development of a cost effective, responsive and flexible agricultural extension system that was be designed around Farmers Field Schools and a network of community promoters and producers groups linked to formal extension services. This group formation process involved ongoing support and accompaniment of the groups on agriculture but also more broadly on "associativism" and internal governance. A poultry component, focusing on New Castle Vaccination and improved management practices of chickens, was added to the mixed intercropping system. Livelihood diversification efforts aimed at generating non-farm and non-natural resource based incomes for which NACC used community based micro finance through CARE's Village Saving and Loans Associations (VSLA) model, to allow NACC's participants access basic financial services at an affordable price and invest in non farm businesses and income generating activities.
NACC is a nutrition sensitive intervention. All of NACC's interventions and activities have been considered against their potential to have a positive effect on nutrition, including the choice of crops to be included in the mixed intercropping system. Nutrition and cooking demonstrations were planned to be integrated into the Farmer Field School curriculum and activities and in other group activities, when feasible and key nutrition messages were disseminated through participating groups.
The social equity and empowerment pillar of NACC worked with women and program participants on strengthening their self confidence, self image and self esteem by giving them the necessary skills, capacity and knowledge to negotiate in their economic activities and at home. NACC also worked with men, as farmers, economic actors in value chains and as heads of households and community leaders, on their behavior so as to reach more equal power sharing in both the economic and private spheres. Training and personal transformation of CARE and partners staff in gender and men engagement to support this work at community level was seen to be critical. Empowering women and marginalized groups also meant that NACC pro-actively identified and prepared them for roles as promoters, agricultural extensionists, FFS trainers, VSLA Village Agents, etc. Mainstreaming social equity and gender also implies the program needed to be flexible enough to accommodate the impact group's schedules, their limited mobility, their labor and care giving responsibilities, their possible limited literacy skills, language etc. NACC was planned to be a learning initiative capable of rapidly identifying what works and what does not and to adapt. Key activities of the social equity and empowerment pillar include gender training, training on the

three most critical laws for women and vulnerable people (the Land Law, the Family Law and the Domestic Violence Law).
CARE worked closely with Government institutions to ensure CARE's approach and activities are aligned with key Government strategies and policies, that models developed by the project are accepted and potentially scaled up and replicated by government (e.g. farmer field schools and the agricultural extension model) and to ensure that all opportunities for sharing resources and exchange of knowledge and experiences are identified and leveraged to build capacity where possible. Key government partners include: Instituto de Investigação Agronomica de Moçambique - IIAM, National Disaster Management Institute (Instituto Nacional de Gestão de Calamidades – INGC), Ministry of Environmental Coordination (Ministerio de Coordenação Ambiental - MICOA), Ministry of Agriculture and related Departments such as the National Directorate of Rural Extension (Direcção Nacional de Extensão Rural - DNER), the National Directorate of Agrarian Services (Direcção Nacional de Serviços Agrários - DNSA), Ministério da Mulher e da Acção Social (MMAS), Departamento Provincial de Agricultura de Nampula - DPA, Serviços Distritais de Actividades Económicas de Angoche, Moma and Larde - SDAE.
In line with CARE's own program approach that puts CSO strengthening and working in partnership at the center of CARE's work, NACC was implemented through and by local CSO partner organizations, with ongoing technical support, capacity building assistance and accompaniment from CARE. Ophavela implemented the VSL component and AENA implemented the agriculture and chicken vaccination component.

2.2 Objectives of the study

The two main objectives of this consultancy as described in the ToR were to:
1. Review the monitoring database and project indicators
2. Conduct the endline and final project evaluation

In preparation for the study the consultant, in coordination with CARE's director of programs and the project manager, agreed to focus on the endline study and integrate as far as possible aspects of an evaluation.

3 METHODOLOGY

The NACC evaluation focused on a quantitative survey that was designed to capture key information on the indicators of the NACC project and the changes between the baseline and the endline study. The key data collection instrument was a quantitative questionnaire which was complemented by qualitative key informant interviews and an interview with the enumerators at the end of the survey. In addition interviews were conducted with CARE and partner staff and government partners to evaluate management, design and sustainability aspects of the project. This section describes the methodology used for both quantitative and qualitative approaches.

3.1 Quantitative survey

3.1.1 Study design

The proposed endline study used a simplified impact evaluation design involving a comparison group. The best possible option for an impact evaluation would be a Randomized Control Trial (RCT) which involves random selection of control group and project participants. The NACC project was not set up to randomly select project participants and thus a simplified approach involving a comparison group was be applied. The comparison group was selected and interviewed during the endline survey only. While this design is weaker than a full RCT it is relatively strong as it permits comparison over time and an analysis of project impact on participants at the end of the project compared to non-participants[1].

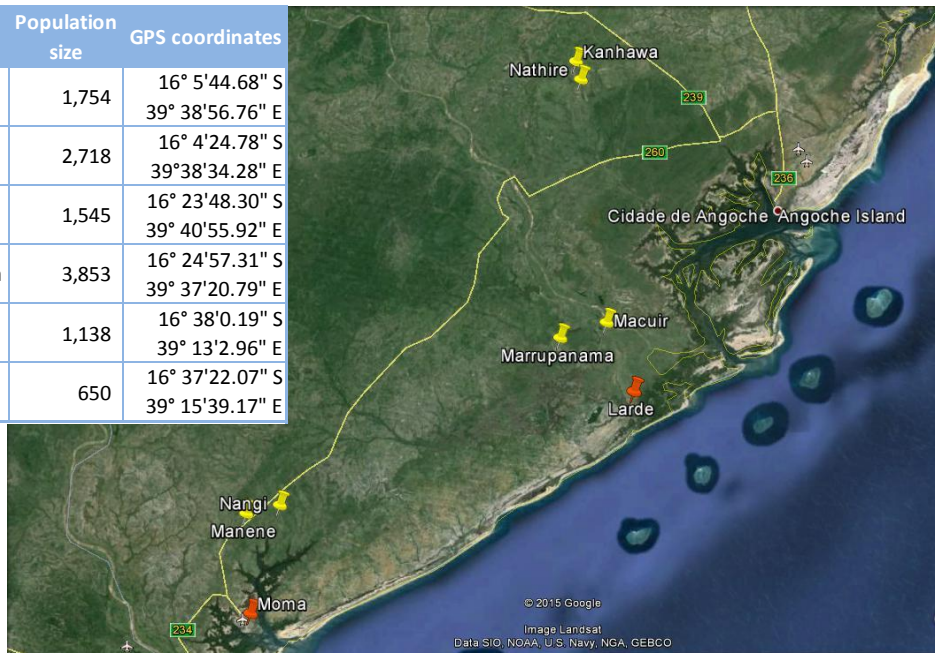
[1] World Bank 2006. *Conducting Quality Impact Evaluations under Budget, Time and Data Constraints*. Independent Evaluation Group Knowledge Programs and Evaluation Capacity Development (IEGKE). Web link

3.1.2 Sampling

The baseline applied a cluster sampling approach took the spectrum of different village sizes into account and from each of the districts 2 villages were selected from a village list that was provided by CARE. To ensure that no village was oversampled in the overall sample the sample size was proportional to the population of the village[2]. See Table 1 for village names and location.

Table 1: Selected sample villages and map

District	Village	Population size	GPS coordinates
Angoche	Nathire	1,754	16° 5'44.68" S 39° 38'56.76" E
	Kanhaua	2,718	16° 4'24.78" S 39°38'34.28" E
Larde	Macuir	1,545	16° 23'48.30" S 39° 40'55.92" E
	Marrupanama	3,853	16° 24'57.31" S 39° 37'20.79" E
Moma	Manene	1,138	16° 38'0.19" S 39° 13'2.96" E
	Nangi	650	16° 37'22.07" S 39° 15'39.17" E



The objective of the endline survey was to evaluate the success of the intervention. The target population, consisting of all households participating in the NACC program, was compared to an unmatched randomly selected control group. As in the baseline survey, these households were drawn from six different communities in three different regions. In total the project's participant database counts 4,473[3] unique records in all communities in which the project had interventions. In the selected six communities 479 households have enrolled in the program, whereas the remaining 1,853 households of the village population did not. However, overall only 2,447 participants were registered before the end of September 2016. Out of these 311 are located in the sample communities. This study concentrated on participants that have participated at least one full year in the program (before the study date) as otherwise the effects of interventions were expected to be very weak. Due to the limited number, the sample size calculation for the treatment effect study is based on a test comparing proportions in two finite populations.

If we assume equal samples in the treatment and the comparison group, a treatment population of 311, a control population of 1,853, and an effect size of 10%, the required sample size to obtain a type-I-error of 0.05 is 135. This calculated sample size must be corrected for the homogeneity of the sampled communities as compared to the overall population. Thus, design factor of 2 shall account for the cluster sampling approach, yielding a sample size of 270 per group.

Comparison group interviewees were selected from those community members that have participated in the baseline survey but not in the project. This allowed a longitudinal study of their situation compared to the situation of project participants. In cases where it was not possible to locate the participants of the baseline survey, interviewees were randomly selected from the general public.

The selection of study participants for each study is summarized in the table below.

[2] Details can be found in the Baseline Report.
[3] Database without duplicate records in September 2017. Actual figures might differ as adjustments were made during the evaluation.

Type of study participants	Baseline	Endline
Participants		All participants registered after 30/09/2016 including 33 participants who were interviewed in the baseline study
Non Participants	Random selection from Village population	Random selection of non-participants who participated in baseline survey

It has to be noted that the concept of project participant was based mainly on being listed in the project database and on participating in a FFS. Participation in a savings group (SG) did not exclude non-participants as interview partners, as many people in the selected villages are members of SG that have not necessarily been formed by the NACC project. Interviewees who participated in NACC activities other than SG or FFS, such as participation in farmer field days, cooking demonstrations and chicken vaccination, were not considered project participants as these activities occur only few times a year and strong impact can not be expected. In addition it would have been impossible to identify the names of participants in these activities.

Table 2: Interview numbers per village

	# of interviews		
District/Village	Part.	Non-Part.	Total
Angoche	**84**	**58**	**142**
Kanhaua	29	22	51
Nathire	55	36	91
Larde	**108**	**126**	**234**
Macuir	43	49	92
Marrupanama	65	77	142
Moma	**77**	**90**	**167**
Manene	36	34	70
Nangi	41	56	97
Total	**269**	**274**	**543**

Each interviewer was instructed to conduct at least eight household interviews per day. With a team of 8 interviewers it was possible to conduct 543 valid interviews over a period of 10 days, enough for a statistically valid analysis. The distribution of the interviews numbers per village is demonstrated in Table 2.

3.1.3 Survey design and administration

The survey was designed to collect a broad range of information about household demographics, activities, and economic conditions of the interviewed households. The survey included sections on characteristics of the head of household and his/her spouse, chicken keeping, agricultural production and technologies used, savings and credit, nutritional information, household income sources, technical support received by the household and their satisfaction with the support, shocks and gender perceptions. The survey also included the 10 questions from the Simple Poverty Scorecard for Mozambique[4] which was used to determine the poverty likelihood of a household. Unfortunately the newest version of the Poverty Scorecard was only released after the preparations for the evaluation and thus the 2013 scorecard was used in this survey. To avoid often error prone and time consuming data entry, the survey was administered as electronic survey using software from https://www.harvestyourdata.com/. The full transcript[5] of the electronic survey is provided in Annex 2: Questionnaire.

A total of 10 enumerators (2 female) were trained over a period of 3 days on interview principles, the meaning and administration of all survey questions and the application of the survey in local language. All the enumerators were provided with a manual that contained principles of interviewing and rules on how to code different answers in the questionnaire. The full manual is provided in Annex 3: Enumerator Manual. Two half days were used to practice data collection in nearby villages. After each data collection exercise difficulties and errors were discussed. Based on these discussions the survey was adjusted and a final version produced for the enumerators to use. After the test period in the villages the management team of the survey (NACC project manager, Gender and Nutrition officer and the consultant) decided that two of the enumerators were not in a position to administer the survey and they were excluded from the survey team.
The electronic survey was downloaded to eight tablet computers and one smart phone which were used by the enumerators to collect data. Some personal smart phones were also loaded with the software as backup and a paper based version of the survey was provided in case of failure of the device. However,

[4] See www.microfinance.com/#Mozambique for scorecard and description.
[5] The transcript is different to the survey design that appeared on the electronic devices and was used as a backup in case of failure of a device.

during the entire survey no problems were encountered with any device, nor with battery life and thus none of the backup options was ever needed.
Collected data were uploaded to the cloud at the end of each survey day using a mobile phone internet connection. After the daily upload data was checked for errors[6] or inconsistencies and enumerators were confronted with obvious or possible errors and clarification was provided on specific interview questions. Enumerators were also provided with an error form on which they could note any errors they noted after completing a survey. Errors were corrected in the uploaded data once they were confirmed by the enumerator. Preliminary analysis was conducted on a daily basis using the software's "dashboard chart" feature. At the end of the survey the full dataset in excel format was used to analyze the data, create tables and graphs and then the dataset was also provided to the statistician for further analysis.
The survey was administered in the 6 communities between Oct. 16th and 26th 2017, about 10 days earlier in the calendar year than during the baseline survey. The enumerators managed to complete between 4 and 13 surveys per day and the average time to complete a survey was 17 minutes. The main limitation for the number of surveys to complete was the availability of interviewees rather than the ability of enumerators to conduct the interviews. It was important to keep the time of the survey to less than 30 minutes to avoid response fatigue which is common in very long surveys and impacts on quality of data. The relatively short time to complete a survey also allowed enumerators to complete the required number of surveys in the allocated time and the entire survey team to manage the distances between villages and accommodation. At the end of the survey the consultant conducted an interview with the enumerators to validate some of the results and to extract some meta data. Information from this interview is woven into the report where relevant.

3.1.4 Data analysis

Data were analyzed using MS Excel and the statistical environment R.
The responses to the ten poverty scorecard questions were used to compute a poverty score[7]. The look-up tables were then used to determine the poverty likelihood. The internationally most widespread poverty line of 1.25 USD/day was then used to compare poverty likelihoods and percentages of poor people for different segments of the analysis.[8]

Frequencies and cross tables were computed in Excel to explore data. The calculation of the indicated p-values was based on different tests depending on the nature of the variables:

- Chi-square Test[9]: In the case of two categorical variables Pearson's chi-square test was used to test for the independence of the variables. The implementation chisq.test in the stats package of the R environment was used. A number of chi-square tests were also performed in MS Excel.
- Permutation test[10]: The influence of a dichotomous variable on a continuous one was tested using a permutation test. This test was used to determine whether there was a significant difference between the means of the two states of the dichotomous variable. To avoid parametric assumptions we opted for the permutation test, which is implemented in the exactRankTests package and called perm.test.
- Logistic Regression: If the response was dichotomous and more than one variable was involved, a logistic regression was performed. This is implemented in the glm function with the argument family="binomial". The stated p-values result from the test whether the coefficient under investigation equals zero.
- Linear Regression Model: If the response was numeric and the covariate had more than two levels or more than one covariate was considered a linear regression model was used. This is implemented in the lm function. To assess the overall significance, the F-test from the anova function was applied.

[6] Whenever there was time in the field, results were reviewed on the devices. Enumerators were also encouraged to do so after each interview.
[7] See http://www.microfinance.com/English/Papers/Scoring_Poverty_Mozambique_2008_EN.pdf for details.
[8] See https://www.youtube.com/watch?v=lHATRXBgi9g for calculating the rate of poverty using the PPI (Progress out of Poverty Index)
[9] See https://en.wikipedia.org/wiki/Pearson%27s_chi-squared_test for a detailed description of the test.
[10] See https://en.wikipedia.org/wiki/Resampling_(statistics)#Permutation_tests for a detailed description of the test.

3.1.5 Analysis criteria - data disaggregation

For each indicator a comparison was made between *project participants and non-participants* and baseline values as the objective of this survey was to evaluate the success of the intervention.

For most indicators data were also disaggregated using criteria which described disadvantaged population segments. These criteria were the same as the ones used during the baseline:

- *Sex of the head of household (HHH)*: as from experience in other programs female headed households (FHH) are often disadvantaged this criterion was applied in disaggregation
- *Health status of the head of household or spouse*: the questionnaire inquired about the health status (normal, acute illness, chronic illness) of both the head of household and the spouse. Households with either head of household or spouse reporting a chronic illness were termed "chronically ill" and used as disaggregation criterion.
- *Age of household head*: to determine if elderly households were particularly disadvantaged a category of household heads above 60 was established and compared with households younger than 60.
- *Education level of household*: Three categories were established: illiterate, those who can read and write and those who were formally educated (i.e. had attended school).
- *District*: to establish regional differences data were disaggregated by districts wherever useful. In some cases village specific data was used for analysis.

Other disaggregation criteria were used in some specific instances, particularly where influences of specific factors on a variable were explored.

3.1.6 Challenges and limitations

All the enumerators but one came from the town of Angoche and spoke the local language - Emacua - well. However, some did struggle with technical terms that were used in the questionnaire and needed to be translated to the local language. Although during the training great emphasis was put on the correct interpretation of the questions in the local languages it is possible that different interviewers finally used slightly different interpretations. It also needs to be understood that some concepts (e.g. some of the new agricultural technologies) are difficult to explain in local language and different people might interpret them differently. But it does seem that this did not affect the general trend of the results.

Sampling challenges

Field staff and village leaders were responsible to request the selected persons to appear for interviews at the village center. This approach worked for the majority of cases. However, in some villages it was not possible to organize all people listed and thus they were substituted by participants and non-participants who were named by the village leaders and project staff in the respective villages. In some few cases the random walk method[11], as applied during the baseline[12], had to be used to interview additional non-participants and participants.

Analytical limitations

Three issues had to be kept in mind during the analysis of data. One is that non-participants are from the same community as participants and thus might have benefitted from the project indirectly through knowledge dissemination and/or the progress of other members of the community who influence the economy of a village (e.g. more opportunities to earn from day labor for poorer people if project participants expand their fields and use new agricultural techniques). This aspect was kept in mind during analysis and interpretation of the results.

The second limitation was the short duration of the project interventions that might not have created sufficient, measurable impact. This was partly compensated by selecting only participants that have been registered with the project for more than one year. Yet, an intervention period of 2 agricultural seasons is very short to achieve substantial results in agricultural production and even shorter to see behavior changes.

The third limitation is one that is common to most development projects: participants are not randomly selected but self-selected. This can influence results as the more successful and those who are already better off are often more likely to participate in a project than those who are poorer and less successful. This potential bias was taken into consideration during analysis and for each indicator the status of participants and non-participants at the time of the baseline was evaluated. This meant that the names of

[11] For a general discussion of random walk procedures, see Sampling Guide, by Robert Magnani, FANTA Project, 1997.
[12] For details see NACC Baseline Report 3.2 final

interviewees at endline (both participants and non participants) were identified in the dataset of the baseline and their indicator values were compared. The socio economic profile of participants and non-participants at baseline and endline were also compared.

3.2 Qualitative interviews

To complement the quantitative survey and triangulate some information, key informants were interviewed with a qualitative interview guide (see Annex 4: Key informant interview guide). In each village one interview with male and one with female informants was held. A total of 11 interviews with 56 (31 male and 25 female) informants were held. The results of the interviews were used to verify and complement the results of the quantitative survey and to inform some of the evaluation questions.
In addition to key informant interviews local promoters were interviewed to capture their views on promoter work, relevance and sustainability of the program. FFS facilitators and vaccinators were interviewed together (interview held by NACC staff) and Gender/Nutrition and Savings Group (SG) animators were interviewed by the consultant. See Annex 5: Promoter interview guides for the two interview guides. In total 7 FFS facilitators (4 male, 3 female), 7 vaccinators (3 male, 4 female), 7 Gender/Nutrition promoters (2 male, 5 female) and 5 SG animators (3 male, 2 female) were interviewed. Results of these interviews informed evaluation questions and complemented the quantitative survey results.

4 SURVEY FINDINGS

4.1 Household Demographics

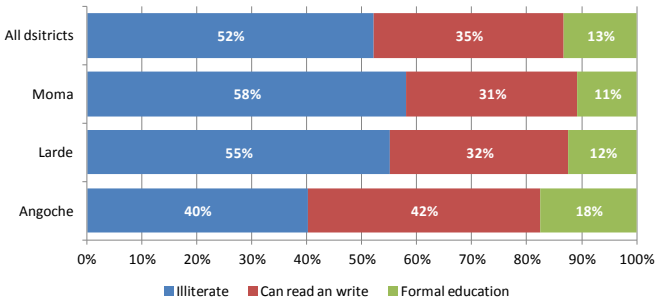
4.1.1 Interviewee profile

In total 543 valid interviews were conducted of which just less than half (269) were with project participants (P) and just above half (274) with non-participants (NP). Of all interviews 76% were with household heads and 24% with spouses of household heads almost exactly the same proportions as in the baseline survey. Almost half of the interviewees (45%) were female which was higher than during the baseline (37%). This was due to the high (55%) proportion of females among the participant interviewees. The great majority (82%) of the interviewees had a spouse living in the same household with no major differences between participants and non-participants. Almost half of the interviewees (46%) were below the age of 45 and only 11% were over 60 while 15% were not able to provide information about their age. This differs from the baseline in which almost 60% were below 45. The proportion under 45 did not differ between participants and non-participants but among non-participants there was a higher proportion of interviewees above 60. The educational level of interviewees was very low with 58% of participants and 71% of non-participants reporting to be illiterate (64% all interviewees). This compares with the baseline figure of 62%. Only 13% of participants and 8% of non-participants reported having attended formal education (17% for baseline). Most interviewees, both participants and non-participants, reported to be in good health with only 12% reporting current illness. However, among non participants a significantly higher percentage (NP 7.30%, P 1.49%, all 4.42%) reported to be chronically ill. The baseline interviewees reported 5% chronic illnesses.
The spouses of the interviewees (64% female) are slightly younger (55% below 45,) and less educated (71% illiterate), though differences between participants (61% illiterate) and non-participants (81% illiterate) are notable.

4.1.2 Households (HH) demographics

Heads of households were predominantly male (85%, BL86%) with no significant difference between participants and non-participants. Household heads were younger than in the baseline survey with 86% below the age of 60 (BL 77%). Chronic illness of the household head or spouse was reported in 5% (BL 7%) of all interviewed households. High mobility among the interviewed population could not be observed as 96% (BL 93%) reported to have lived in their community for more than 3 years and 99% BL(94%) do not leave their homes for longer periods.

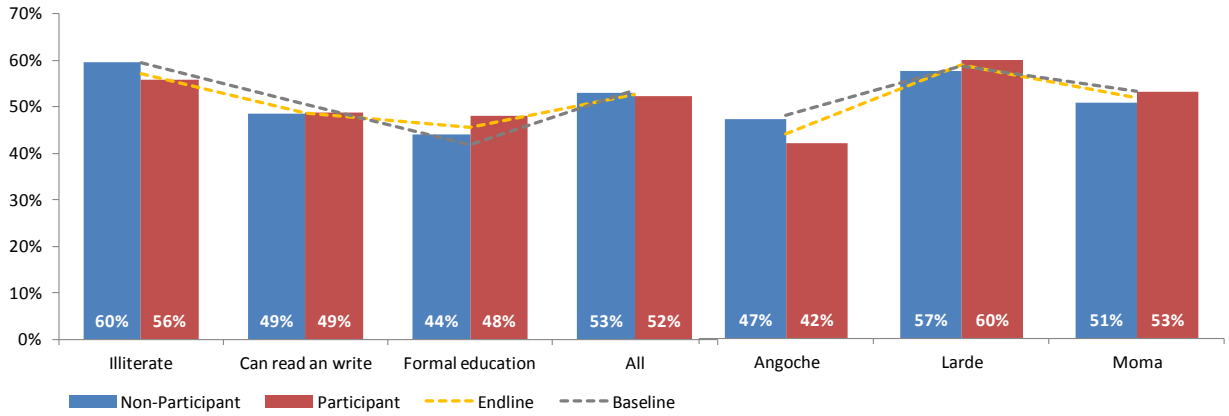
Chart 1: Highest education of household



Education levels of households (highest level of head or spouse) are low with about 87% (80% for HHH in BL) not having had any formal education and more than half reporting that they are not able to read and write. The highest illiteracy rate was reported from Moma (58%, BL 63%) followed by Larde (55%) while in Angoche household had the lowest illiteracy rate at 40% (BL 46%). (see Chart 1)
The average number of household members in the interviewed households is approximately 5.2[13], the same as in the baseline and with little difference between districts (Angoche 5.4, Larde 5.3, Moma 5.0).
Poverty levels are high with 53% of all interviewed households living below the poverty line of 1.25 USD/day while 86% live below the 2.50 USD/day poverty line. Both poverty levels tally exactly with baseline results. There are no significant differences between participants and non-participants. However, as in the baseline survey significant ($p<0.01$) differences could be noted between poverty levels in Larde (59%, BL 58%) and those in Angoche (44%, BL 48%). There is also a highly significant ($p<0.01$) influence of education level of the household head on poverty levels. While 57% (BL59%) of illiterate households live below the poverty line, "only" 46% (BL 42%) of those with formal education do. (see Chart 2: Poverty levels of household)

[13] The value might be slightly higher as more than eight members were recorded as 8.

Chart 2: Poverty levels of households



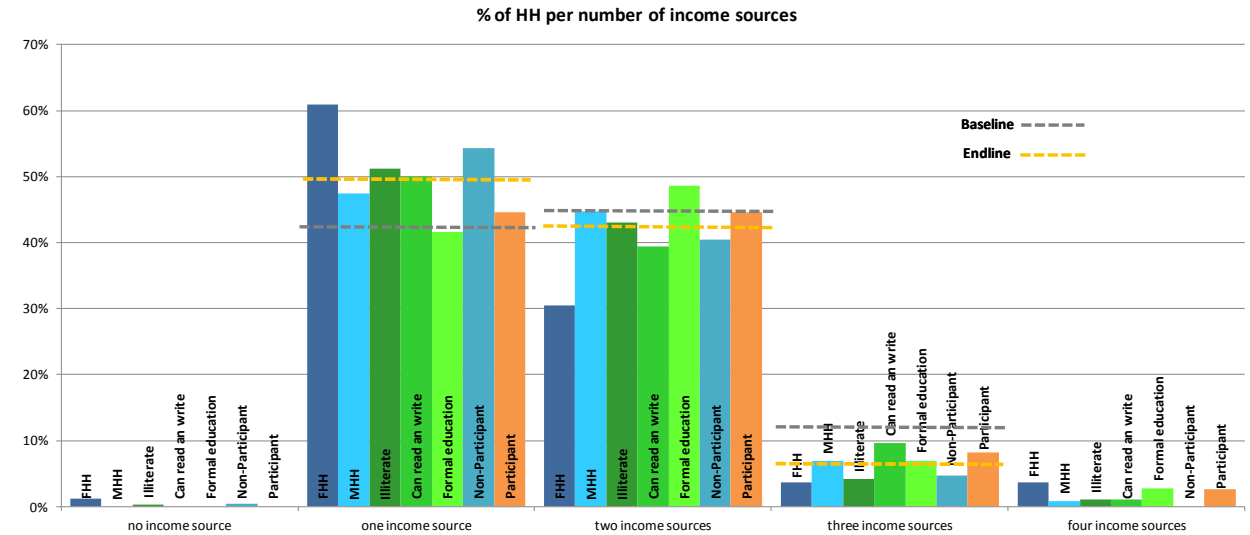
4.1.3 Income sources

Households in the survey area had few income sources with an average of 1.6 sources (P 1.7, NP 1.5, BL 1.7). Just over one percent of all interviewed had four income sources and only 6% (BL 12%) reported three income sources. About 92% (BL 85%) had one or two income sources only (49% one source BL42%, 43% two sources BL44%) and only 7% (BL13%) reported having 3 or more income sources. Compared to the baseline values the number of income sources have dropped slightly with less HH relying on three and two income sources and more reporting only one income source. The reasons for this shift could not be determined but might be linked to the erratic rainfall and drop of prices for agricultural commodities.

The differences between Male Headed Households (MHH) and Female Headed Households (FHH) remain significant with a much greater proportion of FHH having only one income source. Education levels of households also play a role in the number of income sources with better educated HH having more income sources, though the pattern is less distinct than in the baseline survey. Participants report more income sources compared to non-participants. This cannot be attributed to the project as those who joined the project had slightly more income sources at the start of the project than those who didn't join.

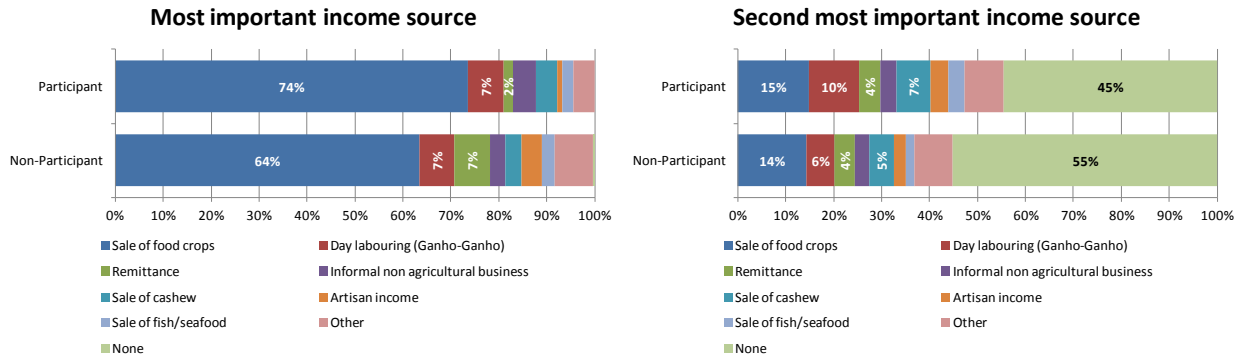
Among those with only one income source FHH, the illiterate and non-participants are clearly overrepresented with 61% (FHH), 51% (Illiterate) and 54% respectively. Among those with two income sources MHH, household heads those with formal education and participants are overrepresented with 45%, 49% and 45% respectively.

Chart 3: Number of income sources



An analysis of the type of income sources reveals that the sale of food crops has gained importance as the primary source of income compared to the baseline. While during the baseline almost half of the population depended on this source of income, almost 70% of the endline respondents state that their primary source of income is sale of agricultural products. For participants this income source was even more important than for non-participants. All other sources were mentioned by less than 10% of interviewees. For 7% of both, participants and non participants, day laboring was the most important income source. This is mainly due to the proximity of two villages to a sisal plantation in Angoche. Remittances were more important for non participants as primary income source and so was artisan income.
About 15% (same as in baseline), still the highest percentage, reported that sale of food crops was their second most important income source with little difference between participants and non-participants. However, day laboring was more important to participants as their second most important income source. The sale of cashew was mentioned by 7% and 5% of participants and non-participants respectively.
Compared to the baseline the diversity of income sources has reduced and is more focused on agriculture than it was. It is not clear from this study what the causes for this reduction are.

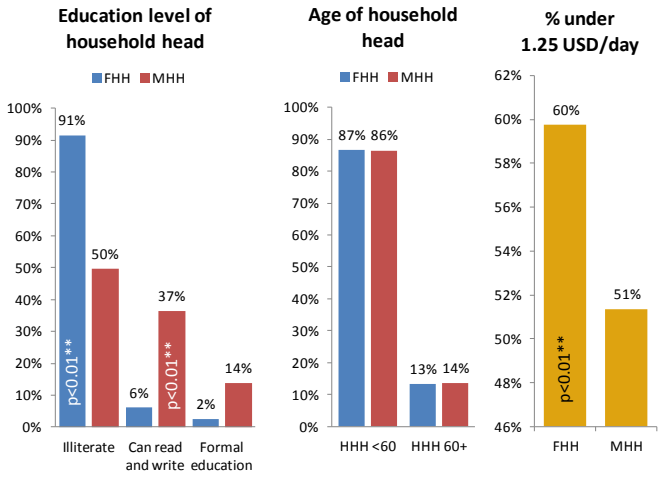
Chart 4: Type of income sources



4.1.4 Female headed households (FHH)

Female headed households remain a disadvantaged population group in many aspects as will be described further in each indicator. This section explores some of the general statistics for FHH describing their situation which has not changed significantly from the baseline.
The proportion of FHH among participants and non-participants is almost the same and no significant difference in the proportion of FHH in each district was recorded, though a trend can be noted with the lowest levels at 10% in Angoche and 16% in Larde to the highest levels in Moma at 19%. Contrary to the baseline no differences in the age of FHH could be observed but significant differences can be noted between education levels of FHH and MHH. More than 90% of FHH report to be illiterate compared to 50% of MHH. No major differences can be observed in the health status. FHH are also significantly ($p<0.01$) poorer than MHH with 60% living below the 1.25 USD/day poverty line (90% live below the 2.5 USD/day poverty line), while "only" 51% of MHH live below 1.25 USD/day. These levels are almost exactly the same as those recorded in during the baseline.

Chart 5: Characteristics of FHH

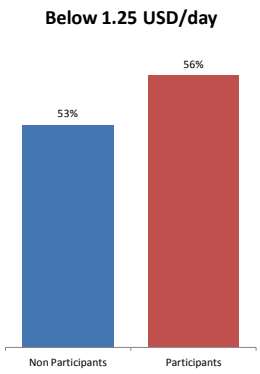


4.1.5 Project participant profile - Who participated in the project?

The baseline data was consulted once again to determine if specific population groups joined the NACC program. Those who were identified as project participants in the endline survey were highlighted in the baseline data as participants and their socio economic parameters as well as their data on the project indicators were compared to those who did not participate in the project.

Out of the 545 persons interviewed during the baseline 164 participated in the endline interviews again. Out of these 45 were registered as participants. No differences could be detected in sex of household head, health status, age and education level between participants and non participants. No significant differences could be detected in poverty levels either, though a slight trend is visible (see Chart 6). This is an indication that it was not an elite or the better off who participated in the project. However, from this data it can not be concluded that the poorer part of the population participated as was intended by the wealth ranking exercises.

Chart 6: Poverty level of participants at baseline



Participants and non-participants did not differ in their ability to recover from shocks and whether they suffered shocks or not (Indicator 1). Among those who joined the project significantly more had access to extension services at the baseline (participants 45% compared to 21% for non-participants, $p<0.01$) but no difference could be detected in their knowledge of conservation agriculture techniques (Indicator 2) and their adoption (Indicator 3). Almost half (47%) of those who joined the project already had access to savings (Indicator 6) at the baseline, while only 22% of non-participants did ($p<0.01$). No significant difference could be detected for access to credit. Participants and non-participants did not differ in chicken ownership as among both groups less than 10% owned 10 or more chickens (Indicator 7). A slight but insignificant difference could be detected in the perception of mortality rates (Indicator 8) as participants reported lower mortality rates (52%) than non-participants (58%). The PDMI (Indicator 9) among those who joined the project was insignificantly higher (2.36) than for those who didn't (2.16). The difference in the HDMI (Indicator 11) of participants and non-participants was also insignificant. Dietary diversity (HDDS) differed slightly with a slightly ($p=0.10$) higher proportion (47%) of participants reporting an HDDS>4 than non-participants (34%) but no differences could be detected in the number of months with adequate food provision (MAHFP - Indicator 13). More than half (56%) of those who joined the project were already accessing at least one service (vaccination, support for savings groups or agriculture services) while it was only 40% among those who didn't join ($p<0.05$).

From the baseline data it can be concluded that the project has not targeted a specific group of better off and better educated but managed to work with the slightly poorer population. Among that groups those who already had access to services and savings and demonstrated more acceptance for gender and nutrition aspects joined the project.

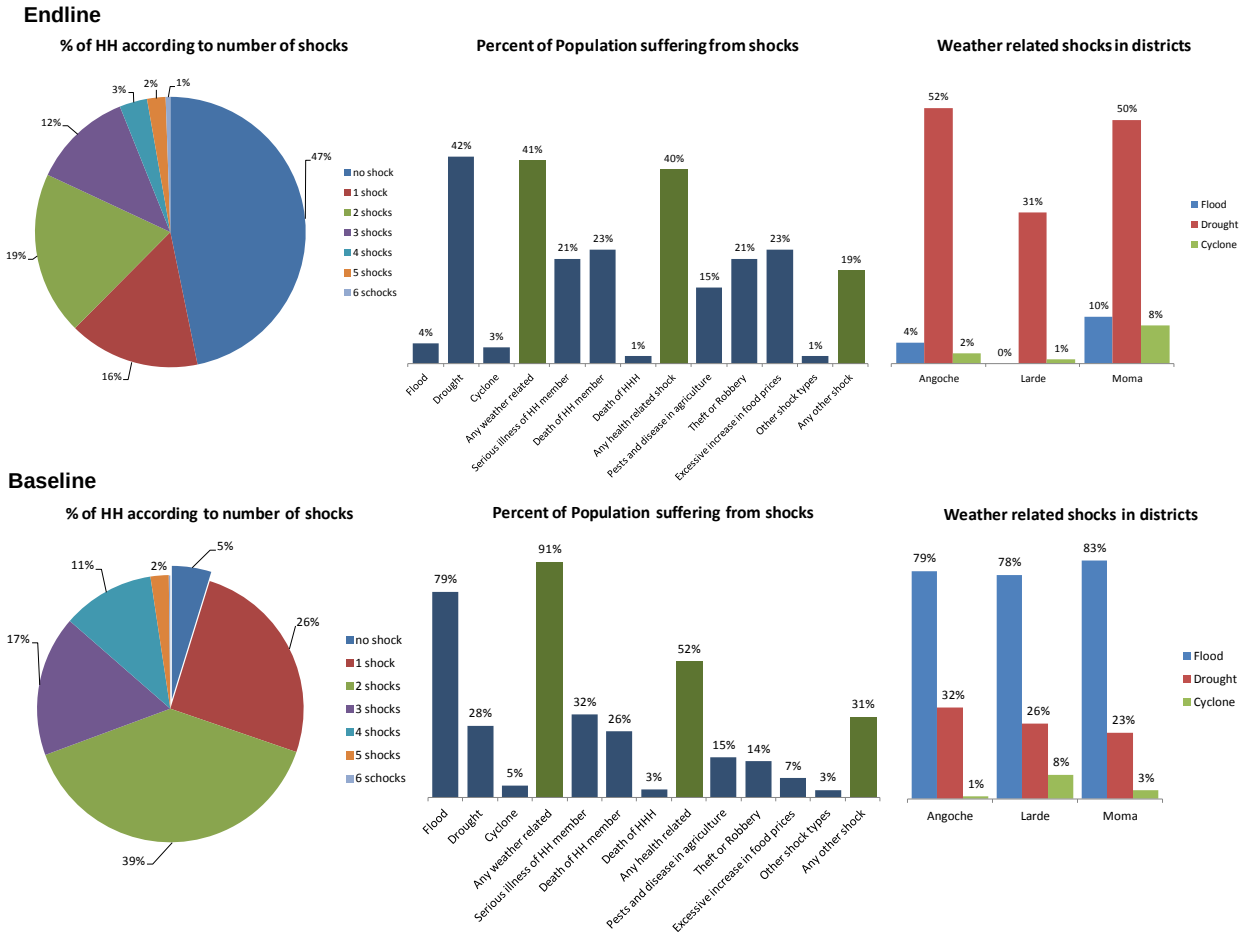
4.2 Indicator 1: Reported ability of smallholder farmers to recover from weather

Baseline	Target	Endline
46% fully or partially recovered from weather related shocks	60%	77% (P 82%, NP 71% (p=0.06))

related shocks

Households were interviewed about occurrence and impact of three weather related shocks and about the occurrence of seven other shocks including health related shocks. Contrary to the baseline, where very few households, less than 5%, reported not having suffered a shock in the last 12 months, almost half (47%) of the endline interviewees reported not having suffering from a shock. Those who suffered two or more shocks dropped from almost 70% to 38% during the endline. On average households suffered from 1.2 shocks down from 2.1 shocks during the baseline. Differences between participants and non-participants were not significant and will not be discussed below.

Chart 7: Shocks - Endline and Baseline



Contrary to the baseline FHH did not suffer more from shocks than MHH. Differences between districts though were highly significant ($p<0.01$) with the highest proportion of interviewees reporting shocks in Angoche (68%) while in Larde "only" 43% reported having suffered from a shock. In Moma it was 56%. The most frequently reported shocks were still weather related (41%) though there was a drastic reduction compared to the baseline (91%) which was conducted in a year after heavy floods. During the endline health related shocks (40%) were almost as frequently reported as weather related shocks. Among the weather related shocks, droughts were reported by 42% (BL 28%) of the households. Floods and Cyclones/strong winds were reported by less than 5%. This situation is very different to the situation at

the baseline where 80% of the population reported to have suffered from the heavy floods of 2015. In Larde significantly less people reported weather related shocks (30%) compared to Angoche (52%) and Moma (49%). The pattern during the baseline was the same though with much higher levels of weather related shocks. During the baseline the lower level of weather related shocks was mainly due to a lower incidence of drought related shocks and a slightly lower incidence of flood related shocks. The same applies for the endline survey and it appears that Larde is less drought prone than the other two districts. For details see Table 4 below.

Table 3: Shocks in districts

Interviewees that suffered from	Angoche		Larde		Moma		All districts	
	#	%	#	%	#	%	#	%
Any type of shock	96	67.6%	100	42.7%	94	56.3%	290	53.4%
No shock	46	32.4%	134	57.3%	73	43.7%	253	46.6%
Total	*142*	*100.0%*	*234*	*100.0%*	*167*	*100.0%*	*543*	*100.0%*
Flood	6	4.2%	0	0.0%	16	9.6%	22	4.1%
Drought	74	52.1%	72	30.8%	83	49.7%	229	42.2%
Cyclone	3	2.1%	2	0.9%	13	7.8%	18	3.3%
Any weather related	*74*	52.1%	*70*	29.9%	*81*	48.5%	*225*	*41.4%*
Serious illness of HH member	31	21.8%	48	20.5%	37	22.2%	116	21.4%
Death of HH member	43	30.3%	35	15.0%	48	28.7%	126	23.2%
Death of HHH	4	2.8%	1	0.4%	3	1.8%	8	1.5%
Any health related shock	*71*	50.0%	*74*	31.6%	*70*	41.9%	*215*	*39.6%*
Pests and disease in agriculture	11	7.7%	20	8.5%	9	5.4%	84	15.5%
Theft or Robbery	31	21.8%	48	20.5%	37	22.2%	116	21.4%
Excessive increase in food prices	43	30.3%	35	15.0%	48	28.7%	126	23.2%
Other shock types	4	2.8%	1	0.4%	3	1.8%	8	1.5%
Any other shock	*32*	22.5%	*33*	14.1%	*38*	22.8%	*103*	*19.0%*

Health related shocks were still prominent during the endline survey at 40%, though less than during the baseline survey (53%). Deaths among household members were reported by 25% and serious illnesses by 21%. These levels are slightly lower than those reported in the baseline. During the baseline some doubts were raised about these high levels of health related shocks but the endline confirms the poor health situation in the interviewed villages which might be related to poor health services on the one hand but also the poor water supply situation. Qualitative interviews revealed that in all villages there are acute water shortages and water quality issues that affect the productivity but also the hygiene and susceptibility of the population to waterborne diseases. See also 5.3.3.

Among other shocks pests and diseases were at the same level as during the baseline while thefts and particularly shocks regarding the excessive increase of prices increased significantly compared to the baseline levels. Excessive increase in prices refers to prices of food and other necessities that households regularly purchase.

For weather related shocks respondents were asked if the shock had an impact, and if it had, they were further asked if they were able to recover from the shock. For analysis purposes any reported recovery (from drought or flood or cyclone/strong wind) was considered as ability to recover.

While during the baseline survey less than half (46%) of those who suffered from a weather related shock had recovered from its impact, 71% of endline respondents said that they had recovered. Most likely this is due to the different nature and magnitude of the shocks recorded during the baseline and endline. The floods which were the major shock during the baseline interviews were catastrophic in many cases, while the effects of the drought during the last agricultural season were probably less difficult to overcome.

Slightly more participants (82%) reported the ability to recover than non-participants (71%) but the difference was not highly significant (p=0.06). Yet, this trend is an indication that project activities have started to support participants in shock recovery[14]. The influence of the sex of HHH, health status, age and education level were tested but none of these factors significantly influenced the ability to recover from shocks. However, a closer look suggest that there are differences between participants and non participants among some subgroups. More participants among FHH (84%) compared to non-participants (69%) reported that they were able to recover from shocks. The same applies for chronically ill where 100% of participants reported the ability to recover while it was only 58% of non participants. Differences could also be noted for illiterate (P 82%, NP 72%) and those who can read and write (P 85%, NP 62%). This suggests that project participation is supporting the recovery from shocks particularly for

[14] No significant difference could be noted in shock recovery during the baseline between those who joined the project and those who didn't though a slight trend to higher levels of recovery among participants could be noted.

the more vulnerable households, the main target group of the project. Contrary to the baseline access to credit did not influence shock recovery at a significant level. A slightly higher percentage of those who had access to savings (81%) reported recovery from shocks, compared to those without access to savings (72%). This difference was not significant though (p=0.1). The differences to the baseline could once again be based on the type of shock that people reported. While floods would require an immediate response through credit, drought shock mitigation might rely on other coping mechanisms. No differences in poverty levels could be determined between those who recovered from shocks and those who didn't.

4.3 Indicator 2: Capacity of HH to adapt to climate change based on knowledge and access to resources

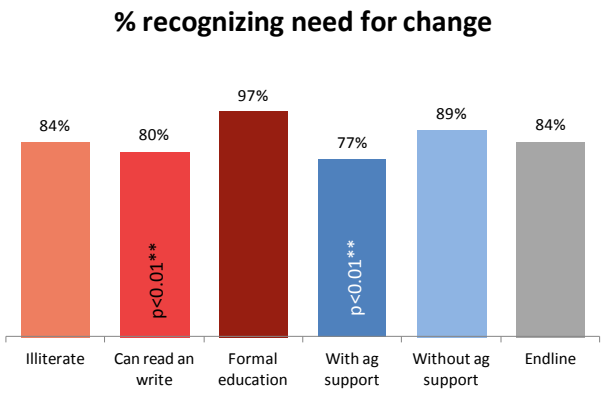
Baseline	Target	Endline
88% recognition of need for change	95%	84% (P 87%, NP 82%, p=0.13)
40% know at least two Conservation Agriculture technologies	60%	77% (P 96%, NP 59%, p<0.01)
More than 60% report that access to resources and knowledge prevents adoption of CA technologies (62% for min. tillage, 84% for green manure and 100% for new varieties)	40%	31% (P 13%, NP 34% p<0.05) (31% min. tillage, 74% green manure, 64% new varieties)
23% have access to agricultural extension services	40%	61% (P 93%, NP 28%, p<0.01)

4.3.1 Need for change in agricultural practices

Respondents were asked to reflect about their experience in agriculture during the last five years and state if they see a need to change their agricultural practices. The high recognition for a need to change which was recorded during the baseline (88%) remained almost the same (84%) during the endline. Slightly more participants stated that a change in agriculture is needed but the difference was not statistically significant (p=0.13). Thus the project has had a limited impact on the perception for change but this is unsurprising as the levels were extremely high during the baseline already. Sex of the household head, health status and age of the household head did not have a significant effect on the recognition of agricultural changes. Contrary to the baseline, the education level of household heads did influence perceptions, with 97% of those with formal education recognizing the need for change, while only 84% of illiterate and 80% of those who can read and write did (p<0.01). As in the baseline a significantly higher proportion (89%) of those who accessed agricultural support services recognized the need for change compared to those who did not receive agricultural support (77%) (p<0.01).

The percentage of households living below the 1.25 USD/day poverty line was significantly higher (59%) among those who did not recognize a need for change compared to those who did (51%, p<0.01). This is the complete opposite to the results obtained in the baseline survey which might suggest that either this question was interpreted differently in the two surveys or that there is no consistent relation between poverty levels and recognition for agricultural change.

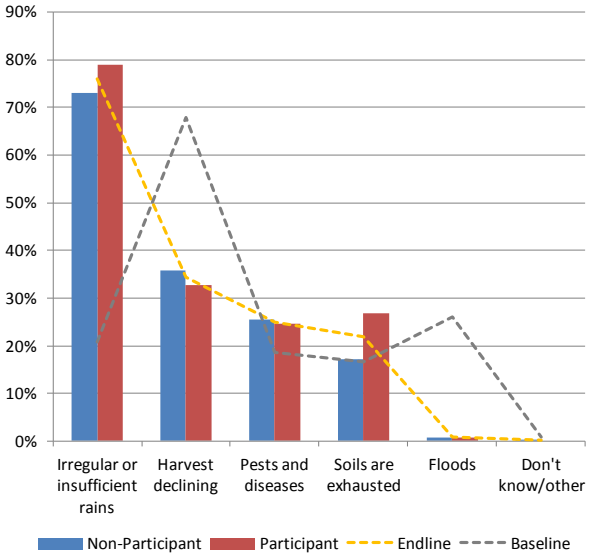
Chart 8: Recognizing need for change in agriculture



4.3.2 Reasons for change

Those who responded that they want to change agricultural practices were further asked for their reasons. In comparison to the baseline values it becomes clear that the recent weather shocks that the respondents have experienced influence the responses. While 76% of the endline interviewees felt that irregular rains were the main reason that agriculture needs to be changed during the baseline declining harvests and floods were more prominent. It is unlikely that this shift in perceptions is due to project interventions as differences between participants and non participants are minimal. Participants also seem to be more aware about the issues that affect agriculture as more of them mentioned exhausted soils and irregular rains. The proportion of those who mentioned any weather related reason (irregular rains and floods) increased from a baseline level of 42% to 77% during the endline. This seems to indicate that agriculture has become even more susceptible to adverse weather patterns in the views of interviewees.

Chart 9: Reasons for agricultural change



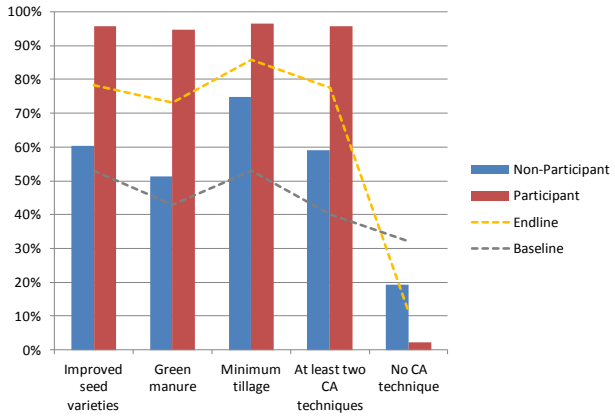
4.3.3 Knowledge about conservation agriculture

Knowledge of at least two Conservation Agriculture (CA) technologies has increased from 40% at baseline to 78% at the endline. Almost all (96%) participants report knowledge of at least 2 CA practices which is significantly ($p<0.01$) more than the 59% non-participants. Adoption will be discussed in the following indicator.

Table 4: Knowledge of CA techniques

Knowledge	Non-Participant	Participant	Endline	Baseline
Improved seed varieties	60%	96%	78%	53%
Green manure	51%	95%	73%	43%
Minimum tillage	75%	97%	86%	53%
At least two CA techniques	59%	96%	78%	40%
No CA technique	19%	2%	11%	32%

Chart 10: Knowledge of CA techniques



The CA technologies in question included the use of new, improved varieties, green manure and minimum tillage. Green manure continued to be the least known technology with 73% (BL 43%) reporting to know the technology, while new varieties were recognized by 78% (BL 53%) and minimum tillage by 86% (BL 53%) of all interviewed (see Table 4). Differences between participants and non participants are significant with almost all participants recognizing these three techniques while far less non-participants reported knowing these techniques. The greatest difference was recorded for green manure which only half of the non participants recognized (still an increase from the baseline levels). It has to be noted though that all non-participants also increased their knowledge on CA techniques. The highest increase was recorded for minimum tillage which is recognized by three quarters of the non-participants while at baseline it was only recognized by slightly more than half the population. No significant difference could be observed between districts regarding the knowledge of 2CA techniques.

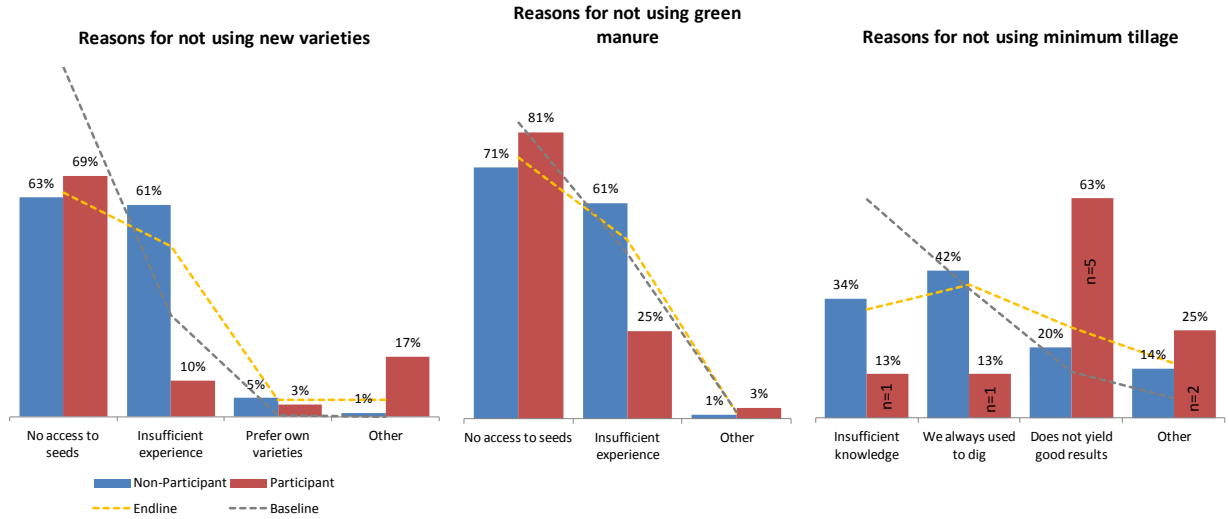
4.3.4 Reasons for not practicing CA

Interview partners that knew about a CA technology but did not practice it were asked why they were not practicing the technology on their fields. The main reasons for not practicing CA technologies were

difficulties in accessing seeds, a fact that did not change since the baseline. In the case of new varieties the percentage of those who didn't have access to seeds dropped from 100% to 64% but still remains high. Difficulties in accessing seeds also remained the most frequently mentioned reason for not applying green manure. The main reason for not applying minimum tillage was the reluctance to change ("We always used to dig"). The proportions for participants need to be interpreted with caution as most participants actually implement CA technologies and for minimum tillage it was only 9 individual that didn't (for green manure 32 individuals and for new varieties 29).
Insufficient knowledge (experience) about the technique accounted for the largest difference between participants and non participants. While more than 60% of non-participants stated that they didn't have sufficient experience to implement new varieties and green manure the levels were at 10% and 25% for participants, respectively.

Seed availability for the introduction of new varieties and green manure remains one of the major obstacles for adoptions and the project has not managed to make these seeds available yet.

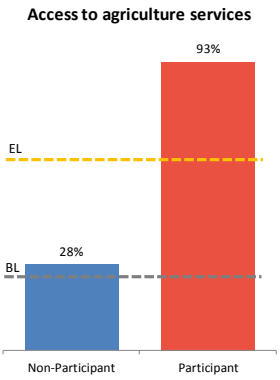
Chart 11: Reasons for not using CA practices



4.3.5 Agricultural support services

The project has increased access to agricultural support services almost threefold from a level of 23% at baseline to 61% at endline. The difference between participants and non-participants is highly significant ($p<0.01$) with almost all participants (93%) stating that they access agricultural services. But also non-participants have stated an increase in agricultural services from 23% to 28%. Differences between districts and villages were insignificant. The main providers of agricultural support services are NGO extensionists (59%) followed by local promoters (26%) which is very similar to the distribution at baseline. For participants though NGO extensionists have a much higher importance as 67% of them state that they are their main source of information. More details on services will be discussed under indicator 14 (see 4.16).

Chart 12: Access to agriculture support services



4.4 Indicator 3: Adoption of at least two climate smart farming techniques

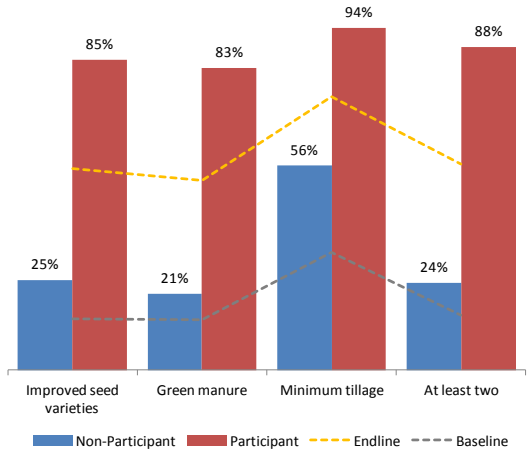
Baseline	Target	Endline
15% have adopted at least two climate smart farming techniques	60% (P) 25% (NP)	P 88% NP 24% (p<0.01)

To determine current adoption rates interviewees were asked whether they practice one or more of the three Conservation Agriculture (CA) techniques promoted by the project (new varieties, green manure, minimum tillage). No difference was made for analysis purposes whether the respondents practice the technique on more or less than 50% of the area they cultivate.

Table 5: Adoption of CA techniques

Adoption	Non-Participant	Participant	Endline	Baseline
Improved seed varieties	25%	85%	55%	14%
Green manure	21%	83%	52%	14%
Minimum tillage	56%	94%	75%	32%
At least two	24%	88%	56%	15%
No CA technology	40%	4%	22%	60%

Chart 13: Adoption of CA practices

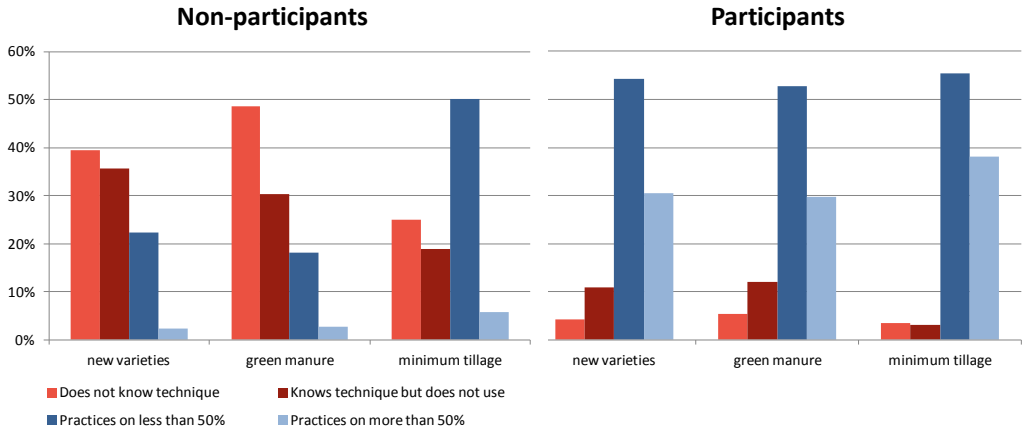


Minimum tillage was the technology most adopted both by participants and non participants. Despite a relatively high level of knowledge and adoption during the baseline the project has managed to increase adoption of this technology to 94% among participants and to 56% among non-participants. Almost 40% of participants (compared to 8% during the baseline) have adopted this technique on more than half of their land. These high adoption rates are possible because the technique is similar to what many farmers have been doing when they cultivate cassava. Differences between districts in minimum tillage adoption among participants were significant ($p<0.05$) with Larde and Moma reporting lower adoption rates (72%) than Angoche (82%).

Improved seed varieties were adopted by 55% of respondents compared to 14% at baseline. In general it has to be noted that new varieties might have been interpreted by respondents more broadly. Most likely not only project promoted varieties were considered when respondents referred to adoption since the difficulty to access seed seem to contradict the relatively high adoption rates. Nevertheless, the project has made great strides to improve the spread of new varieties even among non participants. Again highly significant ($p<0.01$) differences could be noted between participants with adoption rates of 85% and 25% among non-participants. However, compared to minimum tillage less farmers adopted new varieties on more than half of their land which probably reflects the difficulties to acquire seeds. Once again differences between districts were notable ($p<0.05$) with adoption rates highest in Angoche (61%) and lower in Larde (52%) and Moma (54%).

Green manure, had a slightly lower overall adoption rate (52%) than improved seed varieties but this is still a steep increase from baseline levels (14%). Once again differences between participants and non-

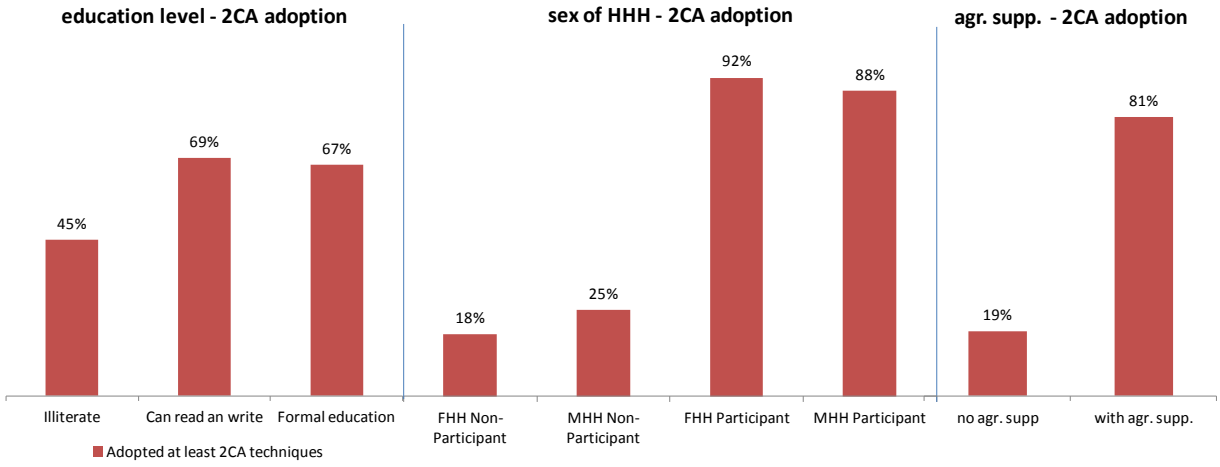
Chart 14: Knowledge and adoption of CA practices



participants were highly significant ($p<0.01$) with an 83% adoption among participants and 21% among non-participants. Green manure was the least adopted technology among non-participants and almost half of them did not know the technique. Once again Angoche was leading adoption of green manure with 57% while in Larde and Moma adoption rates were at 50% ($p<0.05$). Similar to new varieties over half of the participants applied green manure on less than half of their land and only about 30% applied it on more than half of their land.

2 CA techniques: In total 56% of all farmers interviewed reported that they adopted at least two out of the three CA techniques which is a great increase from the 15% reported at baseline. For the measurement of this indicator no differentiation was made between adoption on more or less than 50% of the area. Participants reported adoption levels of 88% - a 73% increase from baseline level - compared to 24% among non-participants ($p<0.01$). The trend of higher adoption in Angoche that was noted for individual techniques is also visible for the adoption of 2 CA techniques, with 65% for Angoche and 52% for Larde ($p<0.05$) and 55% for Moma. Either extension services were better in Angoche or farmers were more open to adopt new techniques. It has to be noted that levels of adoption during the baseline were highest in Larde which indicates that farmers there already had some (positive or negative) experience with these techniques while farmers in Angoche might have been more open to adopt new cultivation methods. Differences between MHH and FHH were not substantial in the overall endline. However, when responses were split into participants and non-participants it could be noted that among participants MHH and FHH had almost the same adoption rates (slightly higher for FHH at 91%), but among non-participants FHH had much lower adoption rates at 18% compared to 25% for MHH. Age of the HHH did not have any influence on adoption rates but the education level did. While only 45% of the illiterate adopted 2 CA techniques two thirds of those who can read and write and those who have a formal education had adopted ($p<0.01$). However, this difference was visible among non-participants only while the project managed to support adoption both among illiterate (87%), those who can read and write (88%) and those with formal education (91%). Obviously access to agricultural support services had a significant ($p<0.01$) influence on the adoption of CA techniques. While 81% of those who received support services (regularly or rarely) adopted the new techniques, only 19% of those without access to services did. This is still more than the adoption levels recorded during the baseline (10%) for those without services. Poverty levels among adopters and non- adopters were not significantly different.

Chart 15: Adoption levels for at least 2 CA techniques



4.4.1 Other technologies

Table 6: Use of other technologies

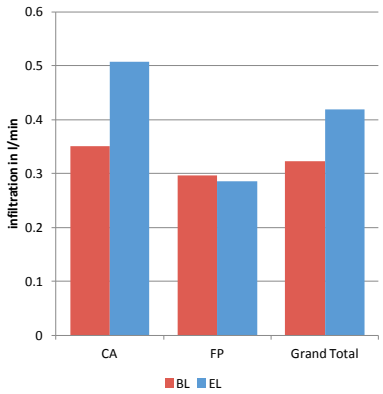
Technique	Non-Participant	Participant	Endline	Baseline
No further techn.	21%	2%	11%	38%
Sowing in lines / rec. spacing	13%	59%	36%	35%
Crop rotation	9%	18%	14%	19%
Leaving crop residues in field	69%	86%	78%	18%
Avoid burning fields	56%	77%	66%	9%
Other	0%	0%	0%	1%

Interviewees were also asked which other technologies they use in their fields. Only 11% (BL 38%) of the respondents reported that they don't use additional agricultural technologies. Among participants hardly anyone reported not using additional technologies but even among non-participants less than in the baseline reported not using additional technologies. The technology that increased most in its use was to leave crop residues in fields. From a level of 18% at baseline now 86% of participant and 69% of non-participants have adopted this practice. Observations from the field confirmed this finding as many fields with a mulch cover, even if not very rich, could be noted. Avoiding burning in agricultural fields experienced a similar increase in adoption from a level of 9% at baseline to 66% at endline, again with higher adoption among participants. This finding could also be confirmed by field observations. Sowing in lines and with recommended spacing increased moderately among participants and was lower among non-participants compared to baseline levels. However, observations in the field and qualitative interviews indicated that many farmers loved planting in lines and the main reason given was that harvests are easy to calculate when the field is well arranged. The level of use of these techniques at baseline were analyzed for those who joined the project and those who didn't but no major differences were detected apart from "avoid burning" which more participants already practiced than those who didn't join the project (21% compared to 7%).

4.5 Indicator 4: Water infiltration rate

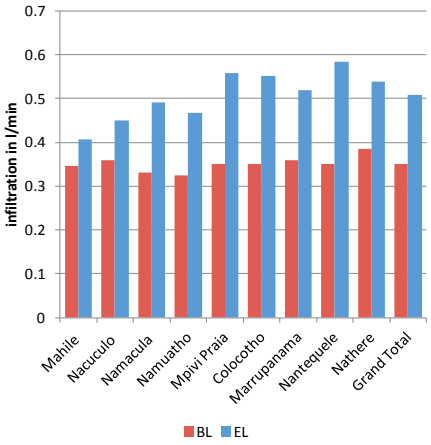
The water infiltration rate was chosen as one of the indicators to measure the effects of Conservation Agriculture (CA) on the soils. It was measured using a standardized procedure which measures the time that 2 l of water take to infiltrate into the soil. The measurements were taken in nine different sites, three in each district. Out of the nine sites 6 were located on previous FFS fields while 3 (in Larde) were established on sites without previous conservation agriculture interventions. The sites with previous FFS were measured in October 2015 for Baseline (BL) values while the sites without previous interventions were measured after one year in October 2016 for baseline values. Despite the different history and measurement timing no major differences between old FFS sites and newly established ones could be detected.

Chart 16: Infiltration rates by practice



An analysis of BL and EL data clearly indicates a 45% increase in infiltration rates on sites where conservation agriculture (CA) was practiced while infiltration rates on sites with farmer practice (FP) did not change. Infiltration rates on CA plots at EL (0.51 l/min) were almost double the infiltration rates measured on FP plots (0.29 l/min). These results confirm the positive effect of CA on infiltration rates. This positive trend could be observed in all nine sites despite considerable differences in soils. The lowest increases can be observed in Mahile and Nacuculo in Angoche with only 18% and 26% increase compared to BL figures, while the highest increases were observed in Nantequele (Larde) and Mpivi Praia and Colocoto (Moma) with increases of 67%, 58% and 58% respectively. These increases refer to measurements on sites that received conservation agriculture treatment.

Chart 17: Infiltration increase on sites with CA treatment



The effect of different treatments (combination of crops)

could not be tested as the treatments changed over time and were not comparable between BL and EL. It is noteworthy though that the three highest infiltration rates were measured at EL on plots that grew Canavalia in combination with other crops. This might indicate a positive effect of Canavalia on infiltration rates.

4.6 Indicator 5: Cassava yield (t/ha)

Cassava yields were determined by measuring the yield of 10 cassava plants on a plot of 20m². These figures were then converted into yields of t/ha. Measurements were taken at the same time as infiltration rates were measured. Thus the same limitations with regards to the history of the plot applies. It also has to be noted that yields are not directly comparable between BL and EL as in some cases cassava varieties on the CA and FP plots changed and after the first year the number of plots was reduced from 10 to 5. This meant that some parts of CA plots only received CA treatment for one year while the other part already had CA treatment for years.

An analysis of BL and EL figures reveals that yields have dropped both in CA practice and FP plots. With the data presented it is not possible to establish the reasons for this drop in yield. Climatic conditions, the different treatment options and different cassava varieties could have all contributed to this change. However, it has to be noted that the drop in yield that was observed on CA plots was less compared to the reduction in yield on FP plots. Compared to BL levels the yield dropped by 28% on CA plots while it dropped by 48% on FP plots.

All sites with CA treatment registered a drop in yield apart from Namacula (Angoche) where the drop was minimal (3%). In Namuatho (Moma) also a rather low drop of 11% was recorded while the highest decrease in cassava yield was measured in Mpivi Praia where yields decreased by 46% compared to BL values. Surprisingly in Mpivi Praia one of the highest increases in water infiltration was measured (see above) which is an indication that there were other factors determining the yield rather than conservation agriculture practices. Further investigation will be necessary to determine the reasons. The case of Mpivi Praia also demonstrates that no relationship between infiltration rates and yield could be observed. The data was screened with a scatterplot and a comparison of yield and infiltration data but no relationship could be detected.

Chart 18: Cassava yield by practice

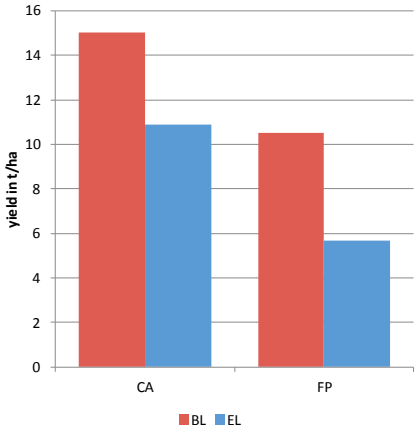
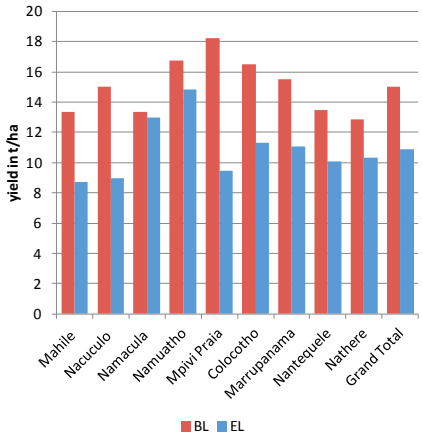


Chart 19: Yield on sites with CA treatment



Qualitative interviews with key informants, FFS facilitators and AENA staff indicate that cassava yields have increased with the introduction of new varieties which seems to contradict the measurements above. However, it is important to note that both during BL and EL measurements the CA plots yielded more than the FP plots. At BL the CA plots yielded 41% more than the FP plots while at EL the difference was 91% which means that farmers can harvest almost double the quantity of cassava on CA plots than they can on traditionally cultivated plots.

Baseline	Target	Endline
24% have access to savings	30% (P)	47% (P 69%, NP 26% (p<0.01))
20% accessed loans		26% (P 37%, NP 16% (p<0.01))

4.7 Indicator 6: % of households with access to savings

4.7.1 Savings

Despite the relatively high initial level of access to savings during the baseline the project managed to increase this level steeply to almost half of the interviewed population. There are significant differences between participants of which almost 70% report access to savings and non-participants (26%). So it is mainly the project participants who are responsible for the large increase.

This is particularly visible in Angoche where access to savings went from a very low level of 12% at baseline to an extraordinary high level of 81% among participants.

Drilling further down to village level the case of Kanhaua has to be pointed out where access levels at baseline were at 7% and now 83% of participants report to have savings. Even 27% of non participants report access to savings (see Table 8). This is an extraordinary increase within a period of 2 years and would merit further investigation as to what factors enabled this success. The lowest overall increase was observed in Larde from baseline levels of 38% to 50% at the endline. A further analysis of the baseline data revealed that a higher proportion of future project participants had access to savings already. For example in Larde 59% of those who joined the project already had access to savings while only 35% of those who didn't join had access to savings. Overall 47% of those who joined the project had access already while only 22% of those who didn't join the project had access to savings. Despite this higher initial level a further test, in which the situation of individual households was tracked from baseline to endline, confirmed that a higher proportion of those who joined the project also joined SG than those who didn't join the project ($p<0.05$).

Chart 20: Access to savings

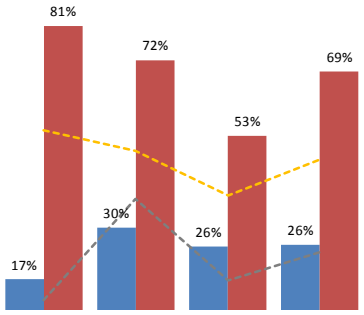


Table 8: HH with access to savings by location

	% of HH with savings			
	Non-Participant	Participant	Endline All	Baseline
Angoche	17%	81%	55%	**12%**
Kanhaua	27%	83%	59%	7%
Nathire	11%	80%	52%	17%
Larde	30%	72%	50%	**38%**
Macuir	24%	63%	42%	37%
Marrupanama	34%	78%	54%	38%
Moma	26%	53%	38%	**17%**

Table 7: HH with access to savings by socio-economic characteristics

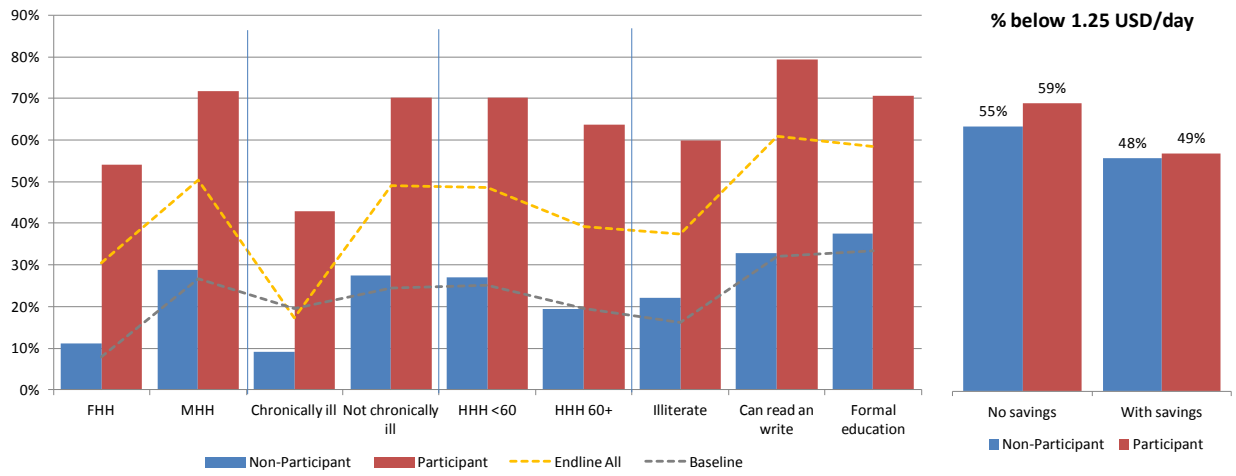
	% of HH with savings			
	Non-Participant	Participant	Endline All	Baseline
All	**26%**	**69%**	**47%**	**24%**
FHH	11%	54%	**30%**	8%
MHH	29%	72%	**50%**	27%
Chronically ill	9%	43%	**17%**	19%
Not chronically ill	27%	70%	**49%**	24%
Illiterate	22%	60%	**37%**	16%
Can read an write	33%	79%	**61%**	32%
Formal education	38%	71%	**58%**	33%

As in the baseline some specific groups are still disadvantaged with regard to access to savings. Only 30% of FHH reported access to savings while half of the MHH did ($p<0.01$). This trend is visible among participants and non-participants with 54% of participant FHH and 72% MHH accessing savings. Only 11% of non-participant FHH access savings, still higher though as during the baseline. The group with the lowest level of access to savings (9%) are chronically ill non-participants while those who can read and write and participate in the project report the highest levels of access to savings (79%). The low overall level of HH with savings among chronically ill - the dip in the graph below - is due to the fact that there are very few chronically ill HH that participate in the project. Less illiterate HH saved up money than those who can read and write and those with a formal education. This was the case for participants and non participants.

Despite these differences among certain population groups, the project has managed to increase access to savings dramatically for all of them including those who had higher poverty levels such as FHH (see Chart 17 below) while non-participants of these groups remained at more or less the same levels.

An analysis of poverty levels also clearly indicates that a significantly ($p<0.01$) lower percentage (49%) of households with savings are living below the 1.25 USD poverty line compared to households without savings (56%). Differences between participants and non participants are not significant though.

Chart 21: % of HH with savings



4.7.2 Savings forms

Savings groups remain the most important savings form. Participants almost exclusively save their money in SG while some (7%) non participants also save at their homes and at traditional savings groups. Banks are still no valid option as distances to the next branch do not allow regular transactions.

Table 9: Savings forms

Savings form	Non-Participant	Participant	Endline	Baseline
Savings Groups	87%	98%	95%	90%
At home / other safe place	7%	2%	3%	5%
Traditional savings group	4%	0%	1%	4%
Bank	0%	1%	0%	1%
Other	1%	0%	0%	0%

The savings group methodology introduced by the project was viewed as very appropriate for the poorer part of the population by key informants, animators and Ophavela staff. The fact that economic differences among members are balanced by the limitation to save a maximum of 5 shares was evaluated positively as it avoids great differences at share out that may make the poorer part of the group feel bad.

Table 10: Credit access

4.7.3 Credit

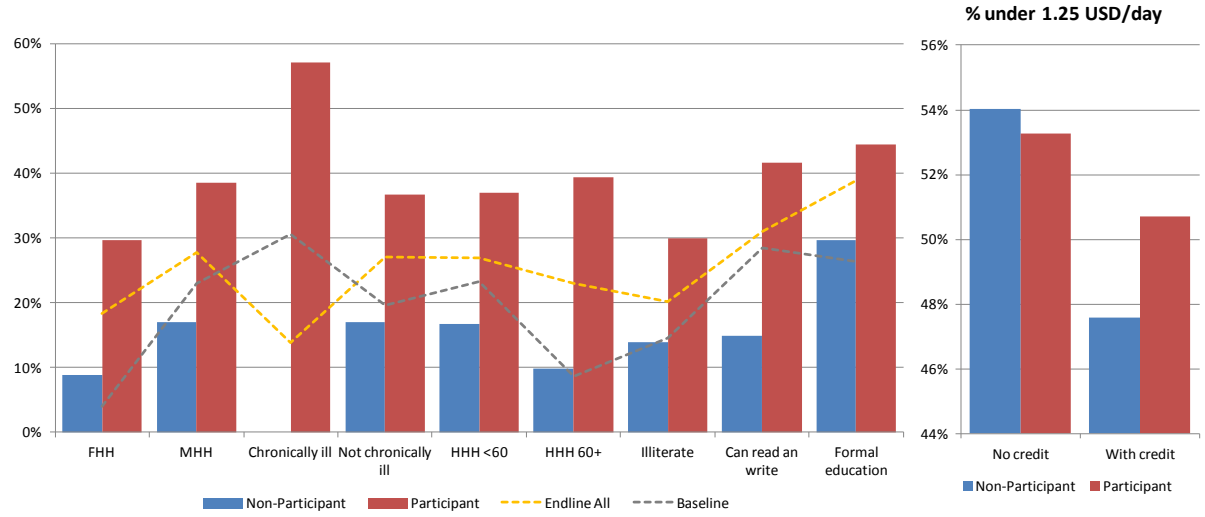
Access to credit is substantially lower than access to savings. Only 26% reported to have taken a loan in the last 12 months, once again with significant ($p<0.01$) differences between participants and non-participants. But even among participants it is clearly visible that savings are more important or more useful to the population in the project area than credit, as only about half of those who save take out a loan (69% save, 37% take out loans). As for savings differences between districts are significant ($p<0.05$) with Moma reporting the lowest levels (19%) and Larde and Angoche reporting higher levels (30%). This trend is also visible among participants, yet at a higher level. The steepest increase in access to credit is visible in Kanhaua from a low of 16% at baseline to 55% among participants at the endline. This is the highest level recorded in the project area. Notable for Kanhaua is also that non-participants have the lowest access to credit in the project area. This result is difficult to interpret without further investigation but it appears that the ones that joined SG are the more entrepreneurial part of the population. FHH continued to be disadvantaged ($p=0.07$) with regard to access to credit, but the project made great strides to increase access among participants. While only 4% of FHH had access to credit during the baseline 30% of participating FHH had access to credit during the endline. Differences between FHH and MHH remain but are less drastic among participants than they were at the beginning of the project. Similarly fewer illiterate HH have access to credit than those who can read and write and with formal education ($p<0.01$) but among participants the gap between these groups could be closed compared to the situation at the baseline. A strong relationship between poverty levels and access to credit could not be confirmed ($p=0.09$).

Chart 22: % of HH with credit

	% of HH with credit			
	Non-Participant	Participant	Endline All	Baseline
Angoche	9%	45%	30%	15%
Kanhaua	5%	55%	33%	16%
Nathire	11%	39%	28%	14%
Larde	22%	38%	29%	27%
Macuir	12%	26%	18%	17%
Marrupanama	29%	46%	37%	32%
Moma	11%	29%	19%	15%
Manene	12%	28%	20%	19%
Nangi	11%	29%	19%	10%
All	**16%**	**37%**	**26%**	**20%**

Table 11: HH with access to credit by socio-economic characteristics

	% of HH with credit			
	Non-Participant	Participant	Endline All	Baseline
FHH	9%	30%	18%	4%
MHH	17%	39%	28%	23%
Chronically ill	0%	57%	14%	31%
Not chronically ill	17%	37%	27%	20%
HHH <60	17%	37%	27%	23%
HHH 60+	10%	39%	23%	9%
Illiterate	14%	30%	20%	15%
Can read an write	15%	42%	31%	28%
Formal education	30%	44%	39%	26%



4.7.4 Credit sources

Compared to the baseline credit sources have shifted, mainly among participants. While during the baseline 55% accessed credit from savings groups almost 90% of participants reported SG as their primary source of credit. For non-participants SG were equally important as during the baseline but more of them turned to their family for credit. Money lenders played an even less important role than during the baseline, but it is interesting to note that only participants mentioned them as a source of credit.

Table 12: Credit sources

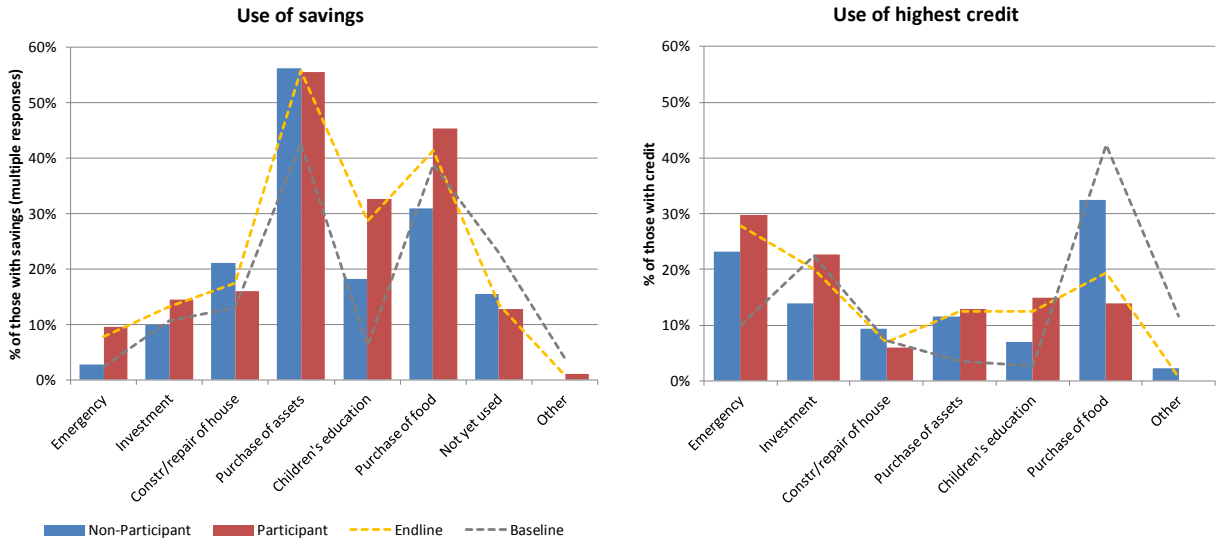
Credit source	Non-Participant	Participant	Endline	Baseline
Savings Groups	56%	89%	79%	55%
Family	39%	4%	15%	27%
Money lenders	0%	3%	2%	9%
Bank	0%	1%	1%	0%
Other	5%	3%	3%	9%

4.7.5 Use of savings and credit

Interviewees that reported saving money and those who reported having taken a loan were asked how they used these funds. For savings this referred to the use

of the payout in case of savings groups (which was the most common savings form). For credit, interviewees were asked how they mainly used the highest loan taken in the last 12 months. Several changes can be observed in the use of savings and credit compared to the baseline (see Chart 23). Food purchases continue to be an important expenditure but now among participants mainly savings are used for this purpose while non-participants still mainly use credit to top up their food supply. A higher proportion of both participants and non-participants now use credit to resolve emergencies. More participants are able to use savings and even more so credit for investments. Investment in education (using savings and credit) increased substantially compared to baseline levels. While only 6% invested their savings for the education of their children during the baseline, it was 29% of endline respondents. The use of credit for educational purposes increased from 3% to 13% at the endline. Though this effect was more visible for participants even non-participants increased their level of investment in education.

Chart 23: Savings and Credit use



4.7.6 Savings and credit in relation to shocks

Contrary to the baseline access to savings or credit did not influence the ability to recover from shocks.

Baseline	Target	Endline
15% report increase or same number of chickens	60%	15% (P 12%, NP 19% (not sig.))
65% own chickens		56% (P 60%, NP 51% (p<0.05))
15% own 10 or more chickens	30%	14% (P 16%, NP 12% (not sig.))

4.8 Indicator 7: Number of chickens per household

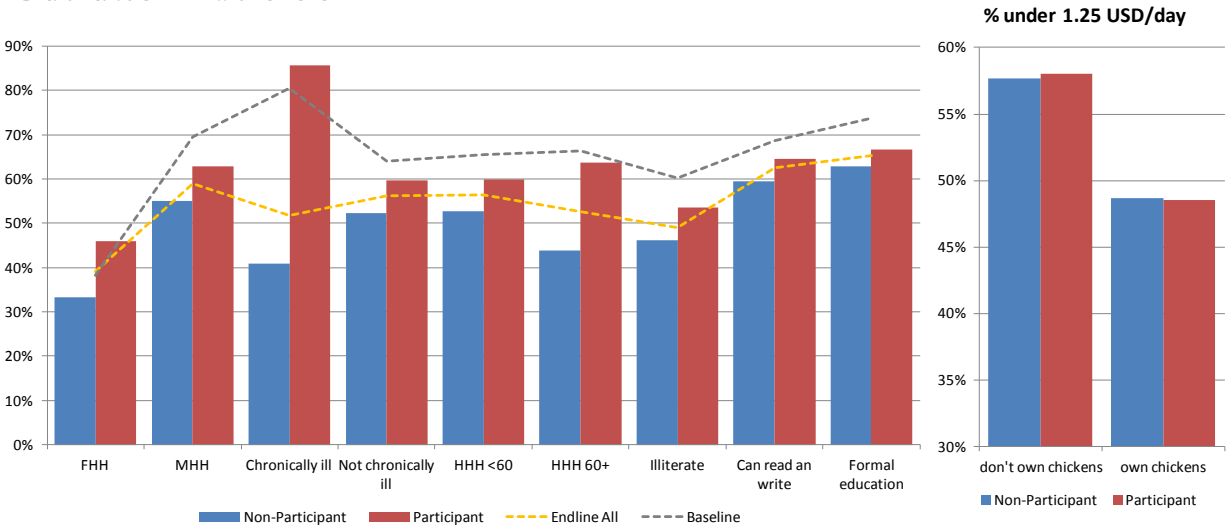
All interviewees were asked whether they had chickens. Those who had chickens were further asked about the numbers they were keeping last year and the number they had at present and the numbers they slaughtered and sold. Unfortunately it has to be noted that chicken ownership reduced both among participants and non-participants. While at baseline 65% kept chickens during the endline only 56% (60% among participants and only 51% among non-participatns) reported to have chickens. Participants suffered less from the decrease than non-participants. The number of chicken owners reduced among all groups both among participants and non-participants (see Chart 24) apart from participating FHH and participating HH with chronic illness. Why more HH among these two groups managed to keep chickens is hard to determine from the data of this study.

Differences among districts could be noted with Larde reporting the lowest proportion of HH that keep chicken (42%) and Angoche reporting the highest (70%). Unsurprisingly, this correlates very well with the outreach of the vaccination campaign with only 27% of chicken keepers being able to vaccinate their chicken in Larde as opposed to 64% in Angoche (47% in Moma).

Chicken numbers per HH remain very low levels with only 14% reporting to keep 10 or more chickens. Though slightly more participants (16%) than non-participants (12%) reported to keep 10 or more chickens this difference was not statistically significant. The average number of chickens for all households remained at baseline levels of 6 with slightly higher numbers reported by participants (6.8) compared to non-participants (5.0). The median increased slightly from 2 chickens per household to 3.5, still indicating that there were few households with significantly larger numbers of chickens. The intention of the project to increase chicken numbers was not successful.

The chicken numbers reported above refer to the current population. The population 12 months before the interview was generally larger and 85% reported a decrease in their chicken population while only 15% reported an increase or a steady population. Unfortunately this situation did not change compared to the baseline. Despite a slightly more participants reported having more chickens than 12 months ago this difference was not statistically significant.

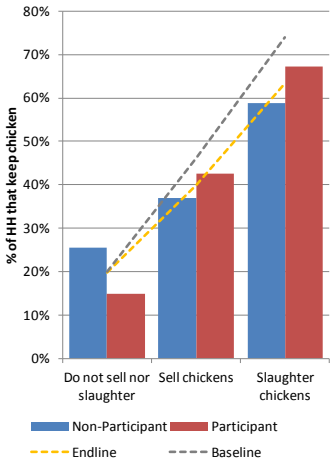
Chart 24: % of HH with chicken



4.8.1 Use of chickens

As can be expected from the reduced number of chickens also the use of chickens decreased from baseline levels, both among participants and non participants. Though a slightly higher level of participants reported using their chickens the differences to non-participants was not significant. Overall, those who do not sell nor slaughter their chickens remained at the same level with more non-participants not using their chickens in one of these ways. It was not investigated how they use their chickens but it can be assumed that they consume the eggs or have a very low number of chickens that did not allow for utilization.

Chart 25: Chicken use



4.9 Indicator 8: Perceived chicken mortality and % of households reporting disease as greatest problem in chicken rearing

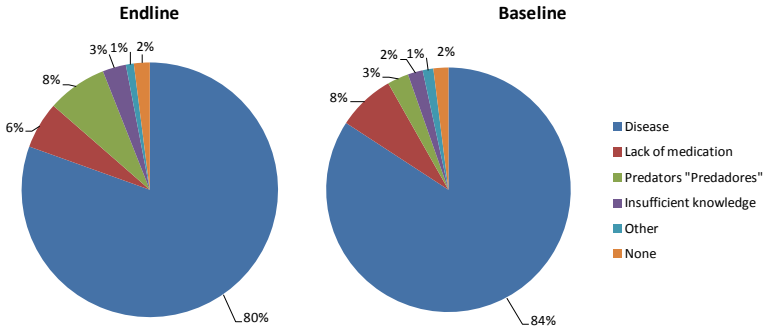
Baseline	Target	Endline
58% perceived mortality rate	12%	59% (P 60%, NP 58%)
92% report disease or disease related issues as greatest problem in chicken rearing	20%	86% (P88%, NP 84%)

The perceived mortality rate was determined using the ten-seed method whereby interviewees were asked to divide 10 seeds which represented the chicken they had 12 months ago into two piles: one for chicken that had survived and one for chicken that died. The number of seeds of the pile for the chicken that died was then recorded. The average perceived mortality rate was calculated at 59% for all chicken keepers, which is basically the same as reported during the baseline. Differences between participants and non-participants were insignificant. Since non-participants also had access to chicken vaccination the

perceived mortality rate was also compared between those who vaccinated their chickens and those who didn't. Those who vaccinated their chickens reported a slightly lower mortality rate at 56% compared to those who didn't at 62% (p=0.07).

Chicken keepers were also asked about the greatest problem they faced in keeping chicken and responses to this question made it clear that disease was still the most pressing problem mentioned by 80% of all chicken keepers (BL 84%). Adding those who mentioned "lack of medication" as the greatest problem, 86% referred to disease as the most important problem in keeping chicken (BL 92%). Only 2% of the interviewees responded that they did not recognize a problem in keeping chickens. Even among those who vaccinated their chicken (also see section 4.16.2) 77% reported disease as the major problem compared to 84% among those who did not vaccinate (p=0.13).

Chart 26: Problems with chicken keeping



4.10 Indicator 9: Public decision making index (PDMI) - Men and women's perception about women's involvement in public decisions

Baseline	Target	Endline
PDMI is 2.19	2.5	2.30 (P 2.43, NP 2.17, (p<0.01))
2.44 for female respondents	2.75	2.38 (P 2.46, NP 2.26)
2.05 for male respondents	2.35	2.24 (P 2.39, NP 2.13); m/f (p<0.01)

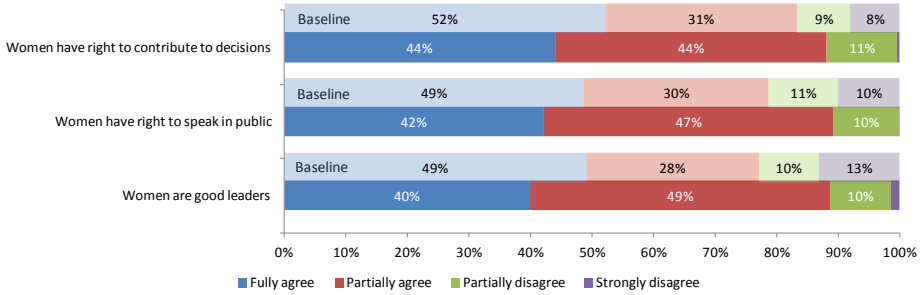
To simplify data collection and indicator tracking a public decision making index was developed. This index combines the agreement or disagreement of each respondent with three statements regarding women's role in the public realm (see Annex 2: Questionnaire for details). The first question referred to women in leadership positions, the second to the perception about women's rights to speak in public and the third one was about women's right to contribute to public decisions (i.e. in associations). Each response (fully agree, partially agree, partially disagree and fully disagree) was given a value between 0 (fully disagree) and 3 (fully agree). The values were then added up and divided by 3 to attain an index between 0 and 3. Thus a high PDMI indicates agreement with women's involvement in public affairs while a low PDMI indicates disagreement. The PDMI is a measure of perceptions not of the actual situation.

The average PDMI changed from 2.19 at baseline to 2.30 at endline across all interviewees. Among participants the PDMI was significantly (p<0.01) higher (2.43) than among non-participants (2.17). As in the baseline the differences between men's and women's responses remained highly significant (p<0.01) with female interviewees reporting a PDMI of 2.38 and male interviewees one of 2.23. Compared to baseline levels men's PDMI has increased while women's PDMI has slightly decreased. However, a further analysis of the baseline data revealed that among those who joined the project it was men who reported a higher PDMI (2.43) and women who reported a lower PDMI (2.28). As these results are somewhat contradicting the longitudinal study of baseline and endline participants was consulted. This study that compared changes among individual households between baseline and endline did not reveal any differences in PDMI between those who participated and those who didn't. Hence, there is no evidence that the project had an influence (yet) on the perceptions of people regarding women's engagement in public affairs.

Education of the interviewee also had a significant (p<0.05) influence on the PDMI. However, it was not the formally educated but those who can read and write who had the highest PDMI at 2.40, slightly higher even than that for female respondents.

As in the baseline no substantial differences could be noted in the responses to the three questions. However, there was a shift towards the middle with more respondents in the endline stating that they partially agree compared to those who fully agree. Partial disagreement remained at the same levels while strong disagreement disappeared among endline respondents. Qualitative interviews would be indicated to investigate in more detail what the reasons for these changes are.

Chart 27: Women's involvement in public decision



4.11 Indicator 10: % of women in group/association leadership positions

The project database records all members of groups and their positions within the group. It differentiates between normal members, members of the management committee and presidents of the groups. In the latest version of the database (11/12/2017) 56% of the management committees were made up of women and 51% of the groups' presidents were women. Thus the project has achieved its target.

Baseline	Target	Endline
HDMI is 1.55	1.65	1.55 (P 1.57, NP 1.54, (not significant))
2.75 for FHH	2.80	2.79 (P 2.84, NP 2.76)

4.12 Indicator 11: Household decision making index (HDMI) - Participation of women in household decision-making

A household decision making index (HDMI) was adapted from indices developed by C-Change[15], in which CARE is a partner, and suggestions by MEASURE Evaluation[16]. Three questions about decisions regarding women's income, about major household expenses and about visits to family and relatives were asked. Decisions which were made jointly or by the woman were assigned a value of 1 while decisions taken by the man or by another person were assigned the value 0. The values were then added up to form an index between 0 and 3. A higher value indicates a higher involvement of women in household decision making.

The overall HDMI did not change since the baseline survey and remained at 1.55 points which is about mid range. Similar to the PDMI there was a significant difference between responses of male and female interviewees (1.3 and 1.8 respectively, $p<0.01$) which did not differ from the baseline either. In the case of the HDMI this was more obvious as part of the female respondents were FHH. However, it needs to be noted that even the FHH reported a HDMI of less than 3 at 2.79, slightly higher than at baseline (2.75), but still an indication that not all of them can take the household decisions on their own and have to consult others (often male relatives[17]) before they take decisions. FHH who participated in the project reported the highest HDMI and were the only group that reached the target.

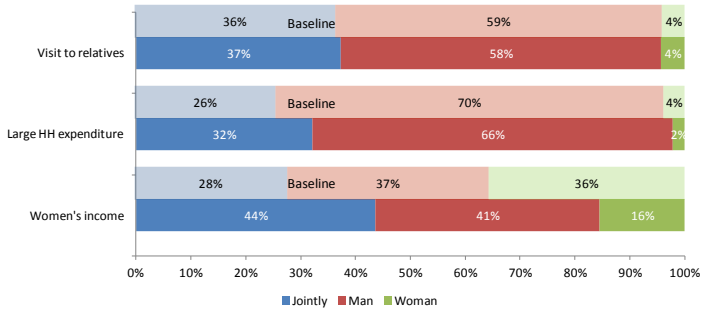
Illiterate households continued to have the highest HDMI with 1.75 at about the same level as during the baseline, as most FHH also are part of this category. Those who can read and write had the lowest HDMI

[15] Nanda, Geeta. 2011. Compendium of Gender Scales. Washington, DC: FHI 360/C-Change.
[16] http://www.cpc.unc.edu/measure/prh/rh_indicators/crosscutting/wgse/participation-of-women-in-household-decision
[17] Information obtained from interviews with interviewers and informal discussions.

(1.21, p<0.01). The highest, and only increase in HDMI from baseline levels, could be noted for those with formal education (1.63).
These findings would suggest that the gender interventions did not produce results with regards to household decision making. But the HDMI for those who participated in the gender and nutrition days was 2.15 (the highest apart from that for FHH) and differed (p<0.01) significantly from the HDMI of those who didn't (1.47). It also appears that gender interventions were most successful in Larde as it was the only district that could record increases in the HDMI.

In a more detailed analysis of the responses it becomes evident that women continue to have very little decision making power in MHH. A particularly concerning development is that men have gained decision making power over women's income while the proportion of women who can decide over their income has halved. This means joint decision making increased on the expense of women's autonomy over their income but the same proportion of men continue to decide over women's income. For large HH expenses men's and women's influence dropped slightly in favor of joint decision making while the decision making patterns about visits to relatives did not change.

Chart 28: Women's involvement in household decision making

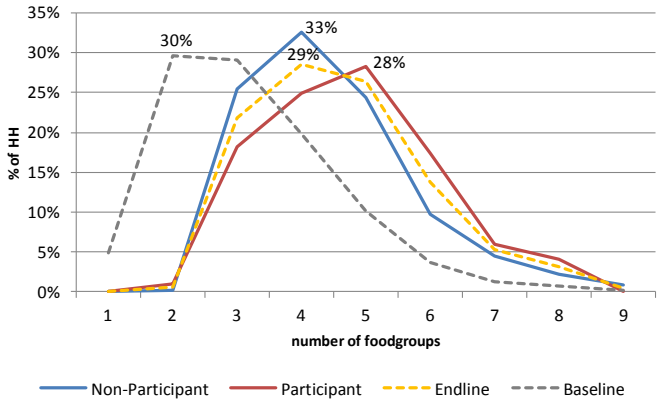


4.13 Indicator 12: % of households with a Household Dietary Diversity Score > 4

Baseline	Target	Endline
36% of households have an HDDS >4 Average HDDS is 4.20	50%	37% (P 44%, NP 31%, (p<0.01)) 4.24 (P 4.40, NP 4.09, (p<0.01))

The household dietary diversity score is an internationally accepted and commonly used measure for the diversity of the diet that household members consume. It requires the interviewees to recall what the family members have consumed in the previous 24 hours. To keep the survey and analysis simple the HDDS was recorded and analyzed for the entire household. The FANTA indicator guide[18] was used to guide the questionnaire and the analysis.
Out of 12 food groups the maximum number of food groups consumed were 9. It is clearly visible from Chart 29 that the peak for the number of food groups that households consume has shifted towards more food groups. While during the baseline 30% of households had consumed 2 food groups, the same proportion of endline respondents reported to have consumed 4 food groups. A further disaggregation into participants and non-participants revealed that the highest proportion of participants reported the consumption of 5 food groups while a third of non-participants reported to consume 4 food groups. To determine whether those who participated in the project were in a better position at the beginning of the project, the baseline data was consulted again. No major difference could be determined as the highest

Chart 29: HDDS among households



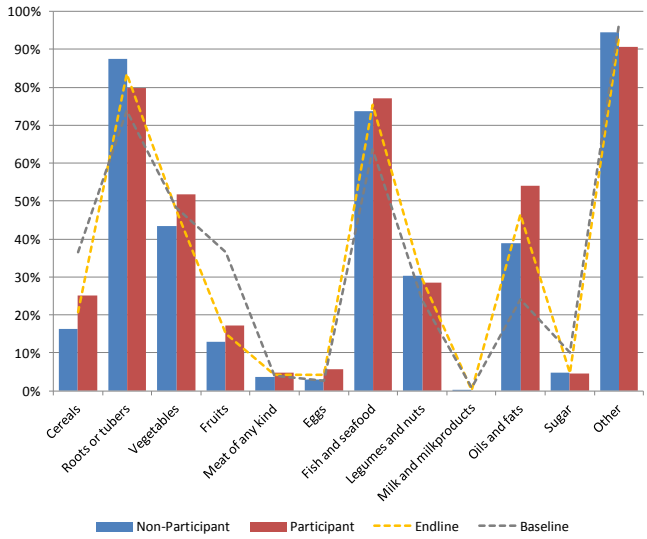
[18] Swindale, Anne, and Paula Bilinsky. 2006. Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide (v.2). Washington, D.C.: FHI 360/FANTA.
http://www.fantaproject.org/sites/default/files/resources/HDDS_v2_Sep06_0.pdf

proportion of both, those who joined the project and those who didn't, reported 3 food groups. This seems to indicate that the overall situation with regard to dietary diversity has improved but it appears that it has improved more for participants. After exploring which food groups are being consumed the situation with regards to the average HDDS and the HDDS>4 will be explored in the following paragraphs.

4.13.1 What is being consumed

The consumption patterns did not change substantially between baseline and endline with two exceptions. Fruit consumption halved from 36% at baseline to 15% at endline and the consumption of oils and fats almost doubled from 24% at baseline to 46% at endline.
Though the fruit intake is slightly higher among participants the low level of fruit consumption compared to the baseline could be attributed to seasonality - though survey was carried out at the same time of the year, during the endline mango season had not yet started, while during baseline fruits were in abundant supply. The increase in oil and fat consumption was mainly reported by participants. Most likely they are able to purchase oil as they are slightly better off compared to non-participants. In the carbohydrate consumption there was a shift towards the consumption of roots and tubers. This is more pronounced for non-participants than for participants and corresponds with qualitative interviews in which many mentioned that food production has increased but they remain with cassava only whereas they had a variety of cereals and tubers before. Fish and seafood consumption also increased for both non-participants and participants. Legume and nut intake increased slightly but meat intake remained low. So did egg consumption, though slight increase for participants could be registered. This indicates that chickens did not contribute significantly to the diet. Though vegetable consumption remained the same for the overall population an increase could be registered for participants while for non-participants a drop has to be noted.

Chart 30: Types of food groups being consumed

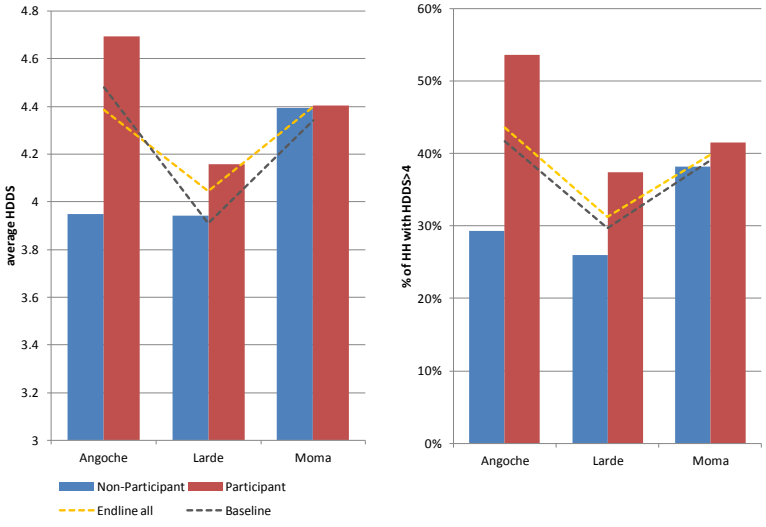


4.13.2 Average HDDS

The average HDDS hardly changed between the baseline (4.20) and endline (4.24), however differences between participants and non participants were significant ($p<0.01$) with an average HDDS of 4.40 for participants and one of 4.09 for non participants. Baseline data was consulted to check if those who joined the project had a higher HDDS to start with. But both, those who decided to join the project and those who didn't, had almost the same average HDDS, with a slightly higher HDDS for those who didn't join (4.21 compared to 4.11). Though the longitudinal study did not confirm a difference between participants and non-participants there is a strong indication that the project has positively influenced the HDDS of participating households.
FHH continued to report a significantly ($p<0.01$) lower average HDDS than MHH. The health status and education level did not influence the HDDS significantly but age did. Households with a household head above 60 had a higher HDDS (4.61, $p<0.01$) compared to those below 60 (4.18). It is not possible with the current data to identify what contributed to the higher HDDS among older population groups. Contrary to the baseline the effect of drought shocks on the HDDS were not visible.

4.13.3 District influence

Chart 31: District influence on HDDS

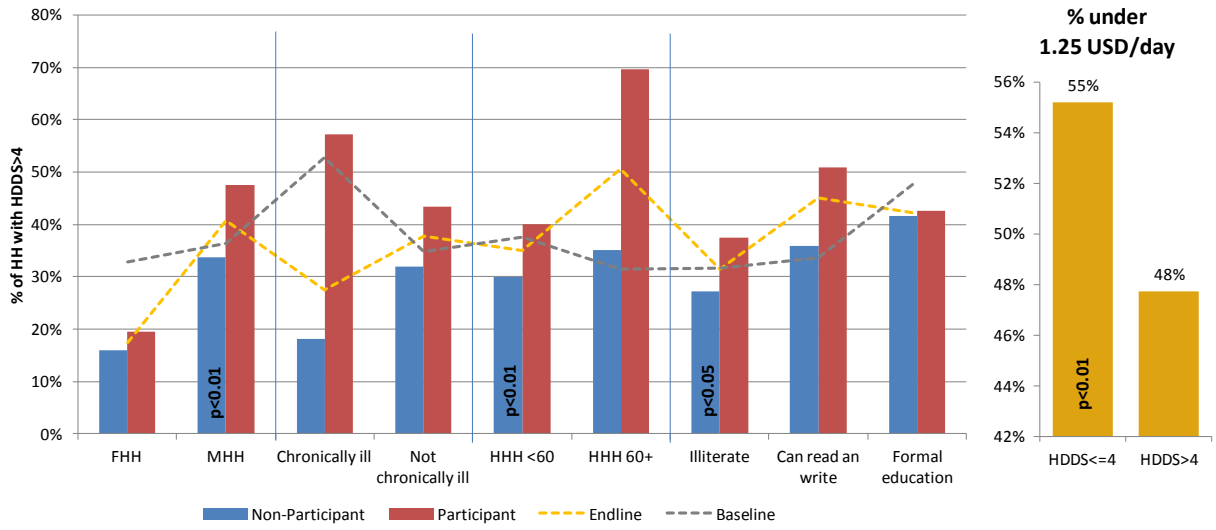


There were significant differences between districts, both for *average HDDS* and % of HH with an *HDDS>4*. Larde ($p<0.01$) continued to report the lowest average HDDS (4.04) compared to Angoche, which reported the highest average HDDS (4.39). While in Angoche only participants could increase the average HDDS (which dropped for non-participants), in the two other districts both participants and non-participants increased their HDDS, albeit not substantially. Likewise the % of HH with and HDDS>4 were significantly ($p<0.05$) lower in Larde compared to Angoche. In Larde only the proportion of participants with HDDS>4 increased. This seems to confirms the effect of the project on dietary diversity though a direct tracking of those who participated in the baseline and endline did not confirm this hypothesis. The same proportion of participants and non-participants had increased their HDDS in this sample which would suggest that the project did not have an effect.
These regional differences were also noticed during the field work and during the qualitative interviews. It is not entirely clear though what influenced the lower HDDS in Larde as the quantitative data pointed at a lower incidence of drought impact in Larde and access to services was not significantly lower compared to other districts.

4.13.4 HDDS>4

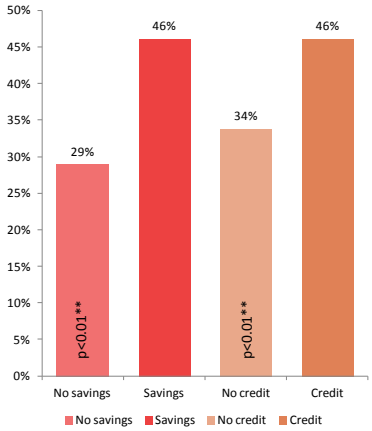
Apart from the regional differences the % of households with a HDDS>4 was significantly ($p<0.01$) different between participants and non-participants. While 44% of participants reported a HDDS>4 only 31% of non-participants did. The HDDS>4 was also influenced by the sex and age of household head and the educational level. Unfortunately, a smaller proportion of FHH compared to the baseline had a HDDS above 4 and the difference to MHH was highly significant. Even among participating FHH a lower proportion reported a HDDS>4 compared to baseline levels. No significant differences between chronically ill and not chronically ill could be detected. While the same proportion of illiterate HH as in the baseline reported a HDDS>4 (31%), the proportion among those who can read and write was significantly higher in the endline (45%). This increase can be attributed mainly to participants with 51% reporting a HDDS>4.
The impact of drought could not be measured as too few interviewees reported not suffering from drought.
The different HDDS categories also had significantly different poverty levels at almost the same levels as during the baseline. Among those with a "HDDS<=4", 55% (BL 56%) of the households lived below the 1.25 USD/day poverty line, while only 48% (BL 48%) were under the poverty line among those with a HDDS>4. The fact that the better off are the ones that can afford a more diverse diet compared to the poorer part of the population remains the same as in the baseline.

Chart 32: households with a HDDS>4



Access to savings and credit also influenced the HDDS as can be seen from Chart 33. Significantly more of those with access to savings and significantly more of those with access to credit had a HDDS>4 compared to those who did not have access to savings or credit. Thus the diversity may depend on the possibility of accessing additional monetary resources while the quantity of food (see MAHFP) does not depend on access to savings or credit.

Chart 33: households with a HDDS>4, influence of savings



Baseline	Target	Endline
Average MAHFP is 9.19 8.55 for FHH	9.40 9.00 for FHH	10.61 (P 10.65, NP 10.57, (not significant)) 10.55 for FHH

4.14 Indicator 13: Months of Adequate Household Food Provisioning (MAHFP)

Food access was determined using the number of "Months of Adequate Household Food Provisioning" (MAHFP) which is an internationally recognized and commonly used method. The FANTA indicator guide[19] was used for the questionnaire and the analysis.

Compared to the baseline where only 19% of all households had sufficient food for more than 10 months, 45% of endline interviewees had food almost all year round but there was no difference between participants and non participants. This indicates that there are great differences between the baseline situation and the endline situation but these differences cannot be attributed to the interventions of the project (see also 4.14.2).

Chart 34: MAHFP distribution

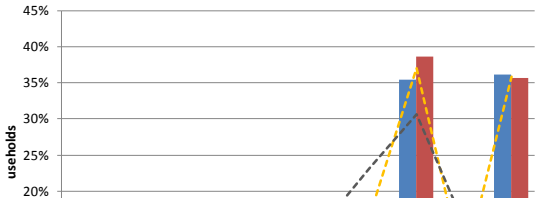
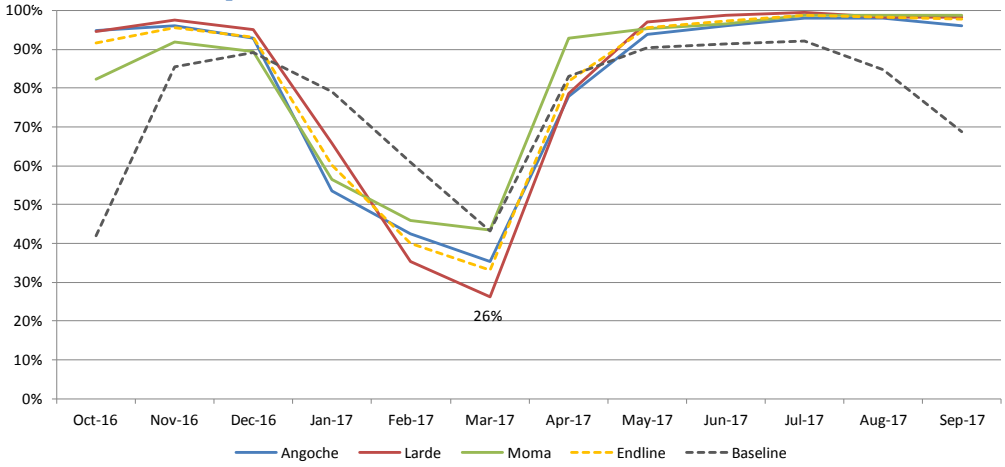


Chart 35: MAHFP per months and district



[19] Bilinsky, Paula; and Swindale, Anne. 2010. Months of Adequate Household Food Provisioning (MAHFP) for Measurement of Household Food Access: Indicator Guide (v.4). Washington, D.C.: FHI 360/FANTA.
http://www.fantaproject.org/sites/default/files/resources/MAHFP_June_2010_ENGLISH_v4.pdf

4.14.1 Months with adequate food

The inquiry about months with insufficient food supply started with October 2016 and tended with September 2017. This was slightly different to the baseline where the months of Nov 2015 to October 2016 were investigated. Despite this small difference Chart 35 demonstrates that the overall food provision pattern remains the same with most households have difficulties in providing sufficient food during the period of February and March. The low levels in October recorded during the baseline were due to the impact of the floods of 2015. Differences between districts were not substantial but Larde reported the lowest percentage of HH with sufficient food supply in March while Moma reported levels above the endline average in the same month.

4.14.2 Average MAHFP

The average MAHFP increased substantially from 9.19 to 10.61 compared to baseline levels. However, as already noted above it is unlikely that this increase is due to the project's efforts as there is no significant difference between participants and non participants. In contrast to the baseline no significant differences could be detected for sex and age of the household head. Chronically ill households had a slightly lower average MAHFP (10.17) compared to not chronically ill (10.63, $p<0.05$). Surprisingly those with formal education reported the lowest average MAHFP (10.4, $p<0.05$) compared to those who can read and write (10.72) and those who are illiterate (10.61). Access to savings or credit did not influence the average MAHFP.

The relatively high levels of food security possibly eliminate the differences that were visible during the baseline when small differences in purchasing power might determine if a household can arrange sufficient food.

4.15 Indicator 14: Number of civil society and government staff trained

Civil society members, NGO staff and government staff were trained in 8 different areas over the course of the project. To date 718 persons were trained of which 12% were female. Training was provided on a wide range of training topics as can be seen in Table 14 but the majority were trained on topics of climate change. This training was for government officials and community leaders who made up the majority of trainees (85%). Other training topics that reached more than 5% of all trainees were an internal meeting about conservation agriculture (CA), the gender and nutrition training for staff and M&E training for partners.

The consultant does not have information about the effects of these training sessions.

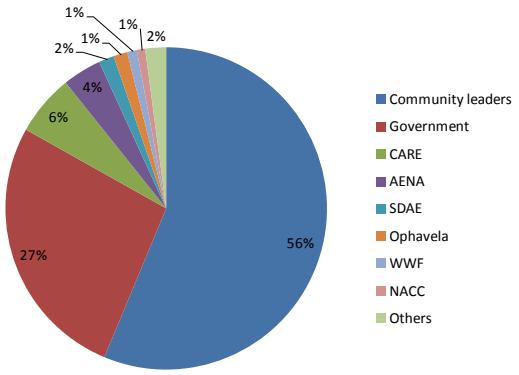
Table 13: Number and type of trainees

Type of trainee	F	M	Total
Community leaders	35	369	404
Government	22	171	193
CARE	10	34	44
AENA	7	21	28
SDAE		11	11
Ophavela	6	4	10
WWF	1	6	7
NACC	2	4	6
Others	4	11	15
Grand Total	**87**	**631**	**718**

Table 14: Training of civil society and government by topic

Training topic	F	M	Total	% of all trained
Climate change training (gov. and comm. leaders)	56	553	609	85%
Internal meeting about CA	9	52	61	8%
Gender and Nutrition training (staff)	14	38	52	7%
M&E training partners	12	32	44	6%
Sustainable Agr. Workshop in Mussuril	5	32	37	5%
Project launch workshop	8	22	30	4%
Procurement training	9	9	18	3%
Monitoring and evaluation training (CARE)	1	5	6	1%

Chart 36: Proportions of trainees



4.16 Indicator 15: % of men and women farmers receiving at least one service

Baseline	Target	Endline
41% use at least one service	75%	71% (P 98%, NP 43%, (p<0.01))
23% access agricultural extension services	40%	60% (P 93%, NP 28%, (p<0.01))
21% access savings group services	30%	45% (P 68%, NP 23%, (p<0.01))
10% access vaccination services	56%	46% (P 59%, NP 32%, (p<0.01))

from civil society and government partners

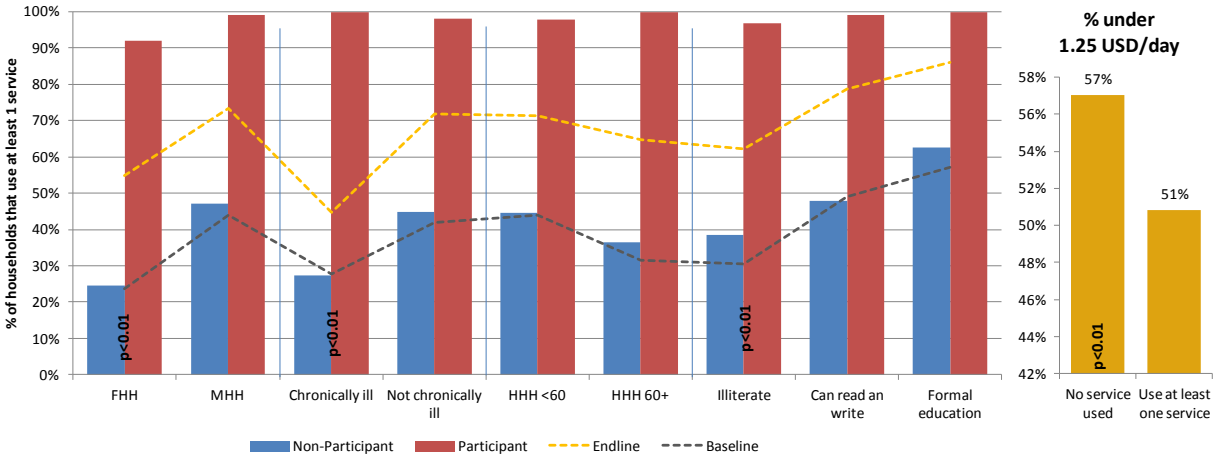
Interviewees were asked if they receive services in three areas that the project addressed. These services were chicken vaccination, agricultural advice or training and training on savings groups. Interviewees were also asked about their satisfaction with the services and what type of agricultural services they receive.

4.16.1 Service use

A substantial increase could be registered for the use of at least one service, notably from 41% at baseline to 71% at endline. This increase is clearly due to project interventions as non-participants report almost the same level as prior to the project while almost all participants report to access at least one service. The significant differences between population groups that were detected during the baseline remain but those between districts were not visible after project interventions. However, it has to be noted that these differences mainly occur between groups of non-participants as access levels for them has not changed substantially. The p values provided in Chart 37 are for differences between endline values and not for differences between non-participants. Thus among non-participants FHH (24%), chronically ill (27%) and illiterate (38%) remain largely excluded from services. Only the illiterate group managed to increase access slightly from 30% at baseline to 38% at endline. For participating households the situation is completely different as access levels for all groups are over 90%.

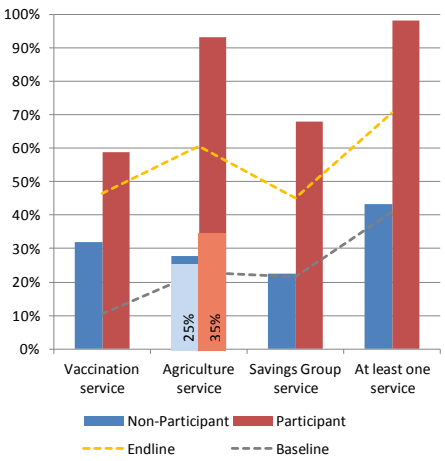
Those who don't access services are significantly poorer than those who do. While just over half of those who access at least one service live below the poverty line of 1.25USD/day, 57% of those who don't access services live below the poverty line. Once again this difference is basically confined to non-participating households as only 5 out of the 268 participating households that were interviewed did not use at least one service. Whether it is the services that reduce poverty levels or whether services reach the better off could not be determined with this study but even at baseline those who accessed services were slightly less poor (p=0.08) than those who didn't.

Chart 37: HH using at least one service



Different services were accessed at different levels. Vaccination services and Savings group (SG) services were utilized at about the same level (45%) while agricultural services were used by 61% of all interviewed households. Obviously the great differences between participants and non-participants were visible once again particularly in savings group and agriculture services. For vaccination services the differences were less as these services offered widely also to non-participating households. For agricultural services it is worth noting that almost all non-participants (25% of 28%) reported that they receive these services rarely (see lighter colored column in Chart 38) while almost two thirds of participating households receive agricultural services on a regular basis (and only 35% rarely).

Chart 38: access to different services

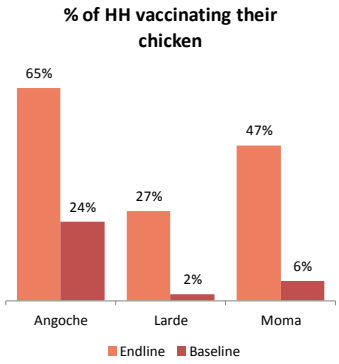


4.16.2 Chicken vaccination

Chicken vaccination increased substantially from 10% at baseline to 46% at endline. A lower proportion of FHH vaccinated their chicken (31%) compared to MHH (48%) but the difference was not statistically significant (p=0.07). This trend could also be noted among participants where more than 60% of MHH and only 41% of FHH vaccinated their chicken.

Differences between districts still exist but even in Larde and Moma, which recorded very low levels of vaccination, the project managed to increase vaccination levels significantly (see Chart 45). The main reasons for not vaccinating chickens changed since the project began. While during the baseline almost three quarter of respondents stated that there were no vaccination services in their village, only 39% of endline respondents gave the same reason. The second most important reason reported during the endline (at 18%) was that chicken keepers did not know about the vaccination. During the baseline less chicken keepers reported this reason which is probably due to the fact that most chicken keepers who know about the service already vaccinated their chickens and more of those who don't know about vaccination services remain in the group that does not vaccinate their chickens. Considering that during the endline another 14% did not vaccinate their chicken because they were not reached by the vaccination campaign or because there was an insufficient quantity of vaccine, probably more chicken keepers could have been reached with this service. Unfortunately, there is no evidence that the vaccination services had any effects on the chicken population (see section 4.8 and 4.9).

Chart 39: vaccination in districts

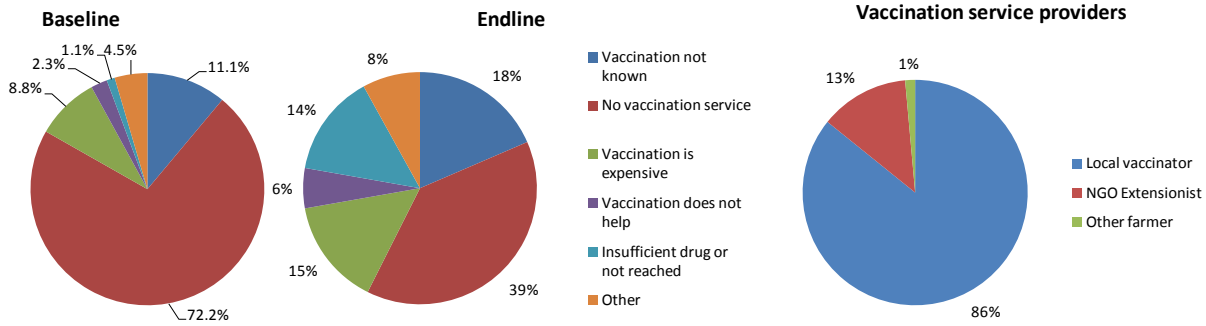


The role of local vaccinators increased significantly since the beginning of the project and at the endline they provided for 86% (BL 60%) of the vaccinations. NGO extensionists were mentioned by 13% (BL 32%) of chicken keepers as service providers. Government extension agents were not mentioned at all.

Table 15: vaccination satisfaction level

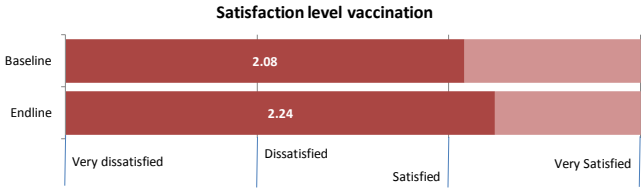
Satisfaction level	Endline	Baseline
Very satisfied	43%	51%
Satisfied	40%	24%
Dissatisfied	13%	5%
Very dissatisfied	3%	19%

Chart 40: vaccination services: reasons for not vaccinating and service providers



Satisfaction levels with the services were high with over 80% reporting that they were very satisfied or satisfied. Less than 20% were dissatisfied or very dissatisfied. Compared to the baseline less responses were recorded from the extremes very satisfied (BL 51%, EL 43%) and very dissatisfied (BL 19%, EL 3%). An average satisfaction level was calculated by assigning values between 0 (very dissatisfied) and 3 (very satisfied) to the responses. This makes satisfaction levels easily comparable to other services. The satisfaction level for vaccination increased from 2.08 to 2.24 which could be interpreted as a "well satisfied". This is surprising given the limited effectiveness of the vaccination campaign that did not reduce mortality and increase the flock of participants. It is worth noting that there were a number of cases in which interviewees reported a high mortality rate but were satisfied with vaccination services. In the interview with the enumerators it became clear that in those cases mortality was due to other reasons or the vaccination happened after having lost a good part of their chicken. In some cases chicken keepers vaccinated only part of their flock and were satisfied with the result but other, not vaccinated, chickens died.

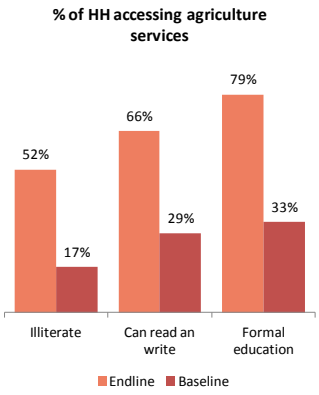
Chart 41: vaccination satisfaction level



4.16.3 Agriculture services

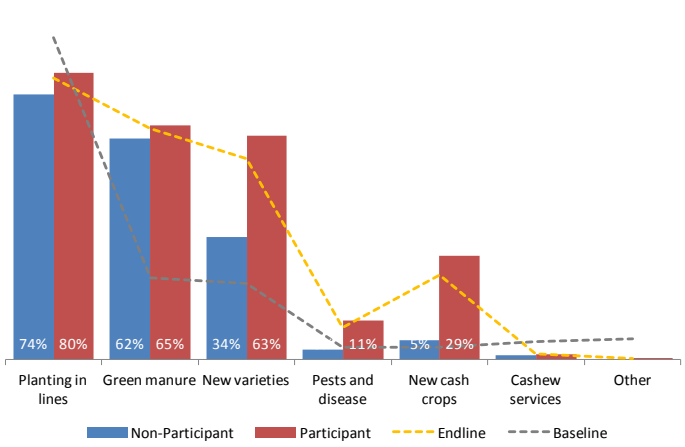
Agricultural support services were successfully expanded to almost all participants. Differences in access between FHH (55%) and MHH (62%) were visible but not at a statistically significant level. This indicates that the project also successfully included FHH in agricultural services as during the baseline a significantly lower proportion of FHH received agricultural services. Unfortunately this was not the case for illiterate households of whom just over half reported access to services while more than three quarters of those with formal education accessed agricultural services ($p<0.01$). This trend did not change since the project started and indicates the difficulties in accessing less educated farmers. Differences between health status and age could not be detected. Those with chronic illnesses also reported a significantly lower access to agricultural support services (32% compared to 62%, $p<0.01$). No major differences could be noted across districts.

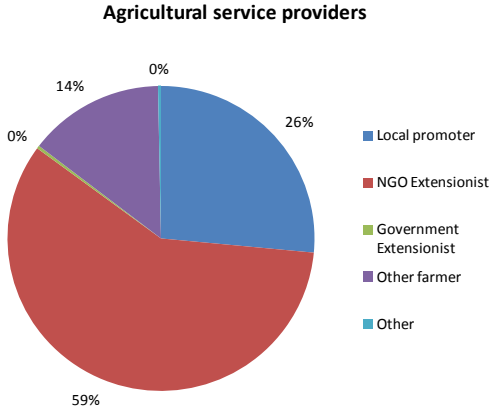
Chart 43: agriculture services by education level



By far the most frequently provided technical advice was about planting in lines with appropriate spacing which was mentioned by 79% of those who had received support services. Yet, it was not the technique with the highest adoption rates (see section 4.4.1).Around two thirds received information on green manure and more than half learned about new varieties. Differences between participants and non participants were relatively low for planting in lines and green manure while more pronounced for new varieties.

Chart 42: agricultural services





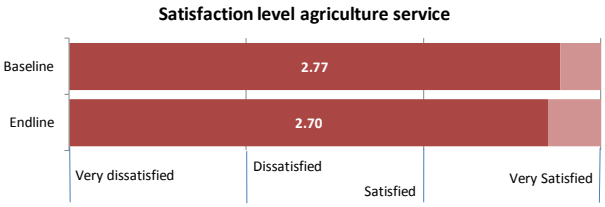
In contrast to vaccination services, and despite the introduction of FFS facilitators, NGO extensionists are still considered the main suppliers of agricultural technical information, accounting for 59% (BL 63%) of all services provided while a quarter of the services are provided by a locally trained and village based promoter. Another 14% received their agricultural information from fellow farmers while government extensionists were hardly mentioned. The high proportion of NGO extensionists could be an indication that farmers do not consider the advice and training from local facilitators as agricultural services or it could be an indication that the project has not yet managed to equip the local facilitators in a way that they can provide valuable agricultural services to their fellow farmers. If the latter is the case the sustainability of these services is not guaranteed.

Table 16: agriculture services satisfaction level

Satisfaction level	Endline	Baseline
Very satisfied	70%	81%
Satisfied	30%	15%
Dissatisfied	0%	3%
Very dissatisfied	0%	1%

Satisfaction with agricultural services was even higher than for vaccination services with 70% (BL 81%) stating that they were very satisfied with the services, while no one reported to be dissatisfied. The calculated satisfaction score was 2.70, slightly lower than the 2.77 recorded during the baseline. Given that there are more services available and farmers also experience different type of services they can evaluate the services more critically. Nevertheless, the satisfaction level can be almost considered as "Very satisfied".

Chart 44: agriculture services satisfaction level



4.16.4 Savings group services

Those who have savings and save in a savings group (SG) were asked if they received savings group services and from which source. Those who reported to have received services from project related sources (Extensionist and local promoter) were considered here as receiving services. As 95% of all respondents used SG to save their money the responses are closely related to those who reported to have savings (see section 4.7).

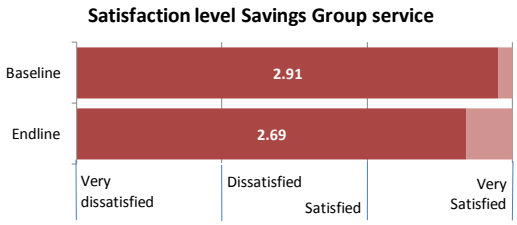
Among all interviewed 40% responded that they received savings group training with 66% of the participants and 14% of non-participants ($p<0.01$). This means that out of the 68% of participants that saved in SG almost all received training from project related sources while out of the 23% of non-participants almost two thirds received training from the project. The fact that project supported services also reach non-participants is a good sign that services start to spread to the wider community. As for access to savings significant differences could be detected between FHH and MHH (28%, 42%, $p<0.01$), chronically ill and not chronically ill (10%, 41%, $p<0.01$) and education levels (illiterate 27%, can read and write 55%, formal education 50%, $p<0.01$). Differences in districts followed the pattern detected in access to savings with Angoche reporting the highest levels (48%) and Moma the lowest levels (29%) of SG services.

While the main service providers at the beginning of the project were NGO extensionists (51%) during the endline half of the respondents reported that they receive services from the local promoter. The role of NGO extensionists is still relatively high (38%) considering that the project is in its final months. It is also worth noting that there are considerable differences between districts. In Angoche the role of NGO extensionists is very prominent while in Larde and Moma NGO extensionists makes up only about a third of all service providers. In Larde the role of promoters is most prominent while in Moma other farmers are more important as service providers than in other districts. The important role of NGO extensionists in Angoche as service provider could be due to the fact that the extensionist is visiting the villages more frequently and, whenever present in a group, members would consider advice from an extensionist more valuable than from the promoter. However, it could also be that local promoters have less room to form and support groups due to the presence of the extensionist. Nevertheless, it has to be recognized that the extensionist for Angoche has managed to increase SG participation tremendously over a period of only 2 years.

Table 17: SG services satisfaction level

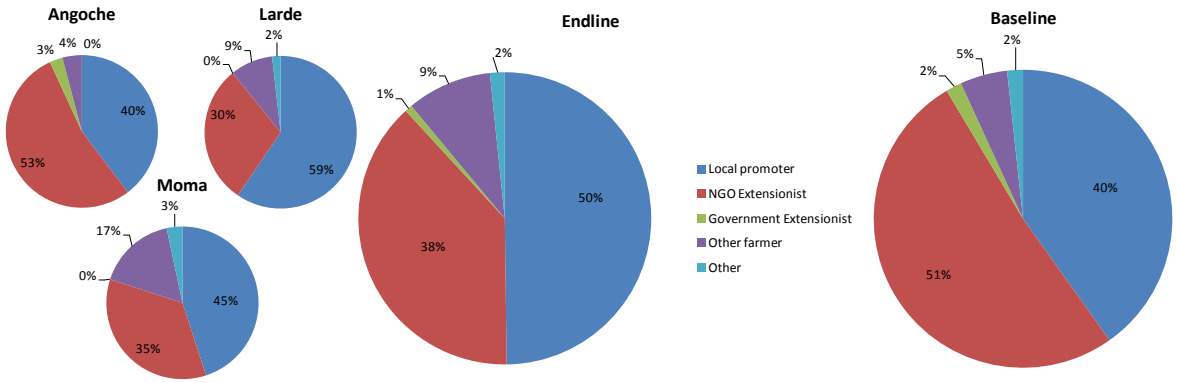
Satisfaction level	Endline	Baseline
Very satisfied	69%	81%
Satisfied	30%	15%
Dissatisfied	1%	3%
Very dissatisfied	0%	1%

Chart 45: SG satisfaction level



Satisfaction levels reduced compared to the baseline where they were extremely high. With a steep increase in the number of services provided and a shift towards local promoters a slight reduction in the satisfaction level might be expected. It has to be noted that only 1% mentioned to be dissatisfied and the slight reduction was mainly due to more responses among the "Satisfied" compared to "Very satisfied".

Chart 46: SG service providers



5 EVALUATION ASPECTS AND CONCLUSIONS

The views below are based on the quantitative survey and qualitative interviews with community members, staff from CARE and partner organizations and with government officials. Unfortunately it was not possible to discuss with CARE country management and a CARE Deutschland representative. Thus these views may have a "field bias".

5.1 Project design

The project's overall objective is about enhancing capacity to adapt to climate change with the expectation that this will lead to improved food and nutrition security. This overall objective was expected to be achieved by:

- improving capacity of smallholder farmers in the area of agriculture to deal with climate change,
- diversifying livelihoods
- enhancing gender equitable decision making
- increasing food availability and diversity and
- increasing capacity of government and civil society with the intention that they can support the community with climate change adaptations

These objectives should have been achieved within a period of 36 months in 3 districts with an annual budget of roughly 650,000 Euro.
Given the country context, the delays in the start up of projects and the spread out operational area the design was overly optimistic of what could be achieved. For a project with a strong focus on agriculture and specifically a focus on conservation agriculture a period of 3 years is very short. Considering the start date of January 2015 and a planned end of December 2017 the first agricultural season that the project could utilize was 2015/16 which would have left the project with only two full seasons. With the current extension to 2018 one more agricultural season was included in the project.
Nevertheless, this timeframe is insufficient for an approach of building capacity at the village level and getting farmers to adopt agricultural practices that are sustainable and resilient to climate change but do not show immediate results. This view was shared by many of the interviewed CARE and partner staff and government officials.
The project design also seems to be overambitious with regards to all the different objectives to be achieved with the resources and time provided. For a project that implements agricultural components, a livestock component (chicken vaccination), a savings group component, nutritional education and a gender transformative approach more resources, including more staff, and time would be required.
A number of interviewees and the consultant feel that a focus on less components would have benefitted the program and ensured higher impact within the project duration. Yet, many interviewees (staff, partners and farmers alike) felt that a commercialization component was missing to increase income and promote the new agricultural techniques.
It seems the difficulties in accessing the vaccine were not considered or were not noticed when the chicken vaccination component was designed, though this is a common problem in Mozambique and has been experienced in other CARE projects.
Some staff felt that the resource allocation throughout the project was inappropriate with the bulk of resources reserved for the last year of implementation. However, this aspect could not be confirmed by the consultant as he was not provided with the project budget.
The project, however, did address key problems (see 5.2), used a highly appropriate implementation approach of building capacity at the community level, introduced appropriate agricultural technologies and savings groups that were highly appreciated at all levels.

5.2 Relevance of project

The project was unanimously rated as very relevant to the context of the target districts. Climate change impact and the struggle of farmers to adapt to the effects of adverse weather patterns are clearly visible and recognized by the target population, by key informants, partners, including government, and staff. Agriculture, like in many parts of the country, is the backbone of the smallholder economy and food supply as confirmed in the quantitative survey where about 70% stated that their most important income

source is the sale of food crops (see 4.1.3). Conservation agriculture and the introduction of new varieties were seen as an appropriate approach to tackle the challenges of climate change. Given the relevance of this approach suggestions were made by government and AENA that the project should have also expanded to communities further inland that have a higher agricultural potential. As discussed above many felt that an agricultural commercialization component could have increased the relevance of the project.
The introduction of Savings Groups (SG) was also viewed as a very appropriate intervention to support community members in accumulating savings and being able to purchase assets. SG have been implemented in the target area before and are well accepted. However, the methodology that the NACC project has introduced (VSLA - Village Savings and Loans Associations) was new to project participants in the districts of Larde and Moma. Key informants, staff and SG animators found it to be more appropriate for the poorer and more vulnerable than the more widely spread PCR (Poupança e Credito Rotativo) method.
Chicken vaccination was mentioned by numerous key informants and vaccinators as a very relevant intervention with a great potential to increase chicken numbers. The quantitative survey also revealed that it attracted many chicken keepers (see also 4.16.1 and 4.16.2) who wanted to reduce the mortality rates of their chicken.
In four out of the six visited villages key informants and promoters referred to nutritional information and training as very relevant, particularly for the nutritional status of children.
Concluding remarks: the project promoted highly relevant interventions from the perspective of the target population and the government representatives. The consultant shares this view.

5.3 Effectiveness

One of the most important evaluation criteria is effectiveness of the results achieved in the project. In most evaluations the main question is: "has the project achieved the expected outcomes and made progress towards the ultimate outcome as per the intervention logic?" Though no specific evaluation questions were provided, the consultant answered this question by assessing the progress that has been made towards the achievement of expected outcomes using a quantitative survey that investigated the achievements in each indicator. In addition qualitative consultations with staff, partners and community members were held to complement the findings of the quantitative survey.

5.3.1 Achievements

AGRICULTURE COMPONENT AND SHOCK RECOVERY
From the quantitative survey it is clear that project participants are in a better position to recover from shocks than they were at the beginning of the project (see 4.2). The evidence that this improvement can be attributed to the project is not very strong but is sufficient to credit the project with providing some support to the population in dealing with climate related shocks. The increase in knowledge and adoption of Conservation Agriculture (CA) techniques are very clearly associated with the project interventions and targets have been achieved or surpassed in this area (see 4.4). An increase in adoption of CA practices could also be noted for non-participants. Access to agricultural extension services also increased significantly for project participants and this can also be clearly attributed to the interventions of NACC (see 4.3.5). Meaningful data that allowed for a clear assessment of the improvements of infiltration rates and cassava yield could not be obtained from the project. However, key informants, promoters, project staff and government officials unanimously recognized the contribution of the project to increased cassava yields. Increased yields were reported despite the adverse weather conditions which is a clear indication that the project promoted techniques to make cassava yields less susceptible to drought.

LIVELIHOOD DIVERSIFICATION
The objective of livelihood diversification was based on strengthening chicken keeping and introducing savings groups (SG). These two components were not sufficient in increasing the number of income streams. Although the number of income streams was not a project indicator it has to be noted that the endline survey could not detect an increase for participants and for non-participants the number of income streams dropped (see 4.1.3).
Chicken vaccination
The chicken vaccination component of NACC was unsuccessful in increasing chicken numbers. None of the indicators improved from baseline levels despite significant efforts to vaccinate chickens (see 4.8 and

4.9). In some communities a successful vaccination in 2016 was reported with great increases in numbers of chickens. But this success turned into a failure in 2017 when most chickens died again due to the late arrival of vaccines. Timely access to the vaccine was the major problem in reducing mortality rates and without certainty that the vaccine is available on time any chicken vaccination campaign is meaningless. Yet, chickens are a very important component in the economy of smallholders since they serve as "cash reserve" for smaller expenditures mainly for schooling or emergencies.

Savings groups

NACC managed to increase access to savings tremendously (see 4.7). For participants access to savings tripled since the beginning of the project. There was unanimous agreement and quantitative evidence on the positive impact of SG participation which allows its members to purchase assets, access food that diversifies the diet and invest in education (see 4.7.5). This success can also be clearly attributed to the project as the main form of savings are project promoted savings groups and the longitudinal comparison (baseline - endline) of participants and non participants was highly significant.

EQUITABLE DECISION MAKING

Equitable decision making was measured using a public decision making index (PDMI) and a household decision making index (HDMI) to assess changes in the public and private sphere.

Public decision making

The PDMI (Public Decision Making Index) is a measure about the acceptance of women's involvement in the public sphere. It increased from baseline levels and a difference could be noted between participants and non participants (see 4.10). Attribution of this increase to the project's efforts is not possible as the PDMI was higher among those who joined the project at baseline level and the longitudinal study did not reveal any differences between participants and non-participants. In qualitative interviews with key informants and staff there was a recognition that more women are present in the public sphere compared to two years ago. The project has at least partly contributed to this increase by encouraging women to form part of SG management committees, by taking up positions of SG animators, FFS facilitators, Gender and Nutrition animators and vaccinators. These women have become important role models in their villages.

Household decision making

The HDMI (Household Decision making index) measures decisions made at household level about expenditures and visits to relatives. The quantitative survey did not indicate any improvements of the HDMI among participants (see 4.12) but a significant improvement could be detected among those who participated in gender and nutrition days. Key informants and the quantitative survey suggest that there is a tendency to take more decisions jointly compared to when the project started. While this is generally a positive development joint decisions are increasing mainly at the expense of women's decision making power. Yet, gender roles are changing as could be noted from discussions with staff, key informants and gender and nutrition animators. One intervention that, according to staff, was very successful was the explanation of inheritance laws in communities which many women appreciated. However, within two years great strides cannot be expected in achieving gender equality - a battle that is continuing in Europe and the US after some 100 years of women's rights movements. The project also had very limited resources to implement the gender component.

FOOD AND NUTRITION SECURITY

Dietary diversity

The HDDI (Household Dietary Diversity Index) was used to measure diversity of food consumed. The quantitative survey suggests that dietary diversity did increase though not substantially and not to the level of the target (see 4.13). This is unsurprising given the limited interventions in the area of nutritional education. Yet, the differences between participants and non-participants at endline are significant and suggest that the project was successful in diversifying the participant's diets. In qualitative interviews key informants and nutrition animators mainly mentioned the improvements in children's nutritional status. In some communities though, interviewees mentioned that diversity has decreased as a result of drought. Cassava is their only staple food now while they used to have a variety of foods and increased food prices do not allow to diversify their own supply. In conclusion it appears that the project has made some (limited) progress towards a more diverse diet.

Food availability

From the quantitative data it is clear that food availability has increased since the beginning of the project but it is unlikely that the project has brought about this change. Differences between participants and non participants are minimal and not significant (see 4.14). In qualitative interviews key informants and promoters in three communities mentioned that food security had improved due to the new agricultural techniques. But in one village the responses between key informants and promoters were contradicting. It might be that the situation has improved more for some participants than for others or that some attributed the general improvement to the project while others didn't. Interviewees seem to agree that the new agricultural techniques have improved production. Data on yield measurements would be important to confirm this. But it has to be noted that an increased cassava production does not immediately result in higher food availability during the lean period. From the baseline survey we know that some households sell their harvest and then have to purchase food later in the year.

INCREASED CAPACITY

Training for civil society and government

In the training database 475 trainees were registered among civil society and government who received training on various topics. Community leaders who were trained on "climate change" made up more than three quarters of the training sessions. The effects of the training are not recorded and could not be verified in the evaluation.

Access to services

The project did manage to increase the access to services in agriculture, savings and chicken vaccination substantially. Differences between participants and non-participants are highly significant and clearly attributable to the project (see 4.16). The effects of these trainings are discussed in the respective sections above.

5.3.2 Number of participants

The number of participants both for longer term engagement of participants in FFS and SG and for occasional engagement such as in chicken vaccination, farmer field days, cooking demonstrations and training on key gender laws were recorded in the project databases.

The latest version of the project member database provided to the consultant (11/12/2017) reported a total of 5,175 individuals who participated in the groups of the project. From the SAVIX database[20] (accessed 12/12/2017) it is clear that the SG component has surpassed the target (240 groups, 4,800 members) by creating 265 SG with 4,873 members (61% female). The project database records 2,196 FFS participants of which 372 are also part of a SG[21]. The target for FFS members (2,160 members) was also achieved according to the project database figures.

Table 18: Participant numbers

Component	M	%M	F	%F	Total
Groups [1]	**3,120**	**60%**	**2,055**	**40%**	**5,175**
SG	*1,900*	*39%*	*2,973*	*61%*	*4,873*
FFS	*1,211*	*55%*	*986*	*45%*	*2,197*
Activities [2]	**3,408**	**39%**	**5,368**	**61%**	**8,776**
Farmer field day	*1,815*	*42%*	*2,555*	*58%*	*4,370*
Vaccination	*2,517*	*32%*	*5,300*	*68%*	*7,817*
Cooking demo.	*1,507*	*64%*	*845*	*36%*	*2,352*
Key law trng.	*333*	*62%*	*208*	*38%*	*541*
Total	**6,528**	**47%**	**7,423**	**53%**	**13,951**

1. numbers refer to persons who are registered as group members without duplicate counts.
2. numbers refer to persons who participated in activities without duplicate counts.

The project activity database (version 11/12/2017) reports 4,370 individuals who participated in farmer field days (42% female). More than half of the farmer field day visitors (2,439) were not members of project groups (FFS or SG) but from the general public. Among those from the general public only a third were women.

The same database also reports that 7,817 individuals vaccinated their chickens. Out of these 4,509 were persons who did not participate in project groups. About one third of them were women.

Cooking demonstrations were attended by 2,352 individuals with the highest female participation of 64%. More than two thirds (1,646) were from the general public with a similar female participation and thus this activity attracted the highest proportion of non-group members.

Training on key laws for women and girls was provided to 541 individuals (38% women) of which only a third (182) were from the general public.

[20] http://mis.thesavix.org

[21] In the project database the primary figure of 1,825 FFS participants indicates those who started participating in FFS. The 372 members added to this figure are those who started in a SG and then joined a FFS.

FFS	1,069	59%	756	41%	1,825
FFS2	142	38%	230	62%	372
FFS tot	1,211	55%	986	45%	2,197

Overall the project managed to reach 13,951 individuals with its activities, of which 48% were women. This means that 8,776 persons were reached outside group activities (SG and FFS).
These figures indicate that the project has not managed to fully achieve its overall target of reaching 17,760 households.

5.3.3 Availability of water affecting effectiveness

Availability of water (for household consumption) is a major concern to many communities in the project area. In four out of six communities water was classified as the number one problem by key informants. The difficulties that communities face in accessing water have a huge impact on the development opportunities in a village. Cases where children could no longer go to school due to hygiene reasons, where women (and men) spent many hours a day just to fetch water, where long distances had to be travelled to fetch water and where the absence of water contributed to the spread of diseases were mentioned. During the field work of the survey long queues at water points were visible in most of the communities visited and those along the roads. One of the main effects of this water shortage is that people - mainly women - spend a large amount of their time and energy on fetching water rather than on productive activities or on child care and preparation of meals. The project's efforts to improve nutrition, balance workload and draw attention to improvements in agriculture might be in vain if access to water is not improved. Other factors affecting effectiveness are closely related to management and will be discussed in section 5.6.

5.4 Efficiency

Assessing efficiency with regards to the use of monetary project resources was not part of the objectives of this consultancy. Discussions with management and staff and observations from the visits to the project did raise some questions though. Apparently there are difficulties in determining the actual project balance with differences between reports that are produced by CARE Mozambique and those produced by CARE Germany. Delays in financial reports that are supposed to be produced by the finance department in Maputo are frequent and efforts are required from project managers both in Germany and Angoche to receive them in time. Delays were also reported for other Maputo based decisions regarding procurement and human resources.

5.5 Sustainability

Sustainability is an important issue and a concern for all development assistance projects. With the limited time available for evaluation questions the consultant tried to approach the question about the sustainability of benefits from project interventions through interviews with key informants, promoters and project staff (CARE and partners).

Agriculture

It is very likely that agricultural techniques that were introduced by the project such as planting in lines and with recommended spacing, minimum tillage and to some extent the use of new varieties and green manure will continue beyond the project life. These techniques show positive results and key informants unanimously stated that farmers would continue to apply them. One of the greatest obstacles to the further introduction of new varieties and the application of green manure is access to seeds. While for cassava new varieties may be promoted by vegetative propagation on an annual basis, other crops such as short duration cow peas will require regular access to quality seed material. Seeds for Canavalia - one of the most effective green manure plants - are available only in very small quantities and might not reach a critical mass of people before the end of the project. Access to seed was a concern that was raised by many community members and will require careful attention in the remaining months and in future projects. Agricultural support services and the demonstration of new techniques in FFS are less likely to continue. FFS facilitators are mainly motivated by the project's presence and some small benefits they receive from the project. Though some state that they will continue to provide services, project staff believe that the level of their support will reduce drastically post project. Together with the difficulties in accessing seed, this will probably limit the spread of these new technologies to other community members.

Saving Groups

From interviews with key informants and staff it was also clear that the benefits from SG will continue beyond the project. This is not specific to NACC as in many SG projects SG continue to operate well

beyond the project providing their members with access to savings and credit services. The formation of new SG is likely to continue though on a reduced scale. The SG animators are being paid by groups for their services and thus have a motivation to continue to form new groups. However, payment to animators is not consistent across all groups and communities and a drop in performance can be expected.

Vaccination services

Vaccination services are very unlikely to continue as access to vaccines will continue to be a challenge and bad experiences of those who had their chicken vaccinated without positive effect will make it more difficult to get chicken keepers attend vaccination campaigns. However, a desire for these services to continue was noted among both vaccinators and key informants as chicken remain to be an important element in the smallholder economy and once it is applied well chicken vaccination has demonstrated great successes.

Gender and nutrition

Gender and nutrition activities such as cooking demonstrations and gender training is not likely to continue. Gender and nutrition animators depend on the motivation of project staff to do their work and with the absence of regular visits they are also likely to reduce their activities to a minimum. However, the initial changes that were brought about by the project are promising and the process of change in gender relations will probably continue at a slow pace as some (few) individuals are genuinely convinced and active in promoting changes in gender relations.

5.6 Management

The project was implemented by a CARE project team and two partner organizations - AENA and Ophavela. The CARE staff were all based in Angoche with the exception of one technician who led the project office in Moma. Over the course of the project the management structure changed. The regional coordinator based in Nampula was managing the project until February 2016. When he left the organization the deputy project manager, based in Angoche, was promoted to manage the project. The new regional coordinator, now based in Angoche now formally supervises the NACC project. During the last year, support for the NACC project manager was limited with regards to technical oversight, strategic decisions and hands on management issues due to these changes and some further bottlenecks at national management level.

As mentioned in section 5.1 the level of staffing was insufficient for what was planned in some areas. CARE operated with one manager, one M&E officer, one Gender and Nutrition Officer, two Agricultural technicians and a third of a position for Agriculture and Savings group oversight. Agricultural activities have received most support and were implemented by six AENA extensionists who were supervised by AENA supervisors and supported by two CARE technicians. However, there was no supervisor nor CARE technician for Larde district which made quality control and supervision difficult. In Moma it appears that AENA staff did not spend a lot of time in the field as the two visited communities complained about the absence of the technicians. Cooperation with AENA was seen as problematic by CARE staff as implementation quality and flexibility to make changes to implementation plans were not satisfying. It has to be positively noted though that the project manager did spend time in the field to supervise and follow up on the implementation of FFS.

The Gender and Nutrition Officer depended on community based promoters and agriculture and SG partner staff to implement gender and nutrition trainings. With limited cooperation from field staff, particularly from AENA, it was mainly the community volunteers and her initiative and efforts that achieved the results in gender and nutrition. Considerable effort and resources were invested in developing a Gender and Nutrition training manual early in 2016 and concept that was supposed to be implemented by community animators and partner staff. Little evidence can be found that this training program was implemented in FFS and SG.

The M&E officer resigned in June 2017 and was not replaced which left the project with a temporarily hired data entry clerk to manage the project database. But even before the resignation of the M&E officer data were not entered into the database on time. From discussions it seems that there was a reluctance among partner staff to submit data to the M&E department. But it also appears that close follow up and quality control on data was insufficient. Little evidence could be found in progress reports that project management consulted the database for these reports and to take management decisions. This is

unfortunate as the development of the databases and the M&E plan took time and resources and was developed in close cooperation with the NACC project team.
Overall management of the project could have been more flexible in adapting to challenges such as the difficulty to supply chicken vaccines in time, more proactive in the provision of seeds before the end of the project and firmer in demanding better performance and cooperation from AENA.
Nevertheless, it has to be said that, given the circumstances, project management has made great efforts to achieve targets in a challenging environment with limited resources and time.

6 RECOMMENDATIONS

1. Agricultural projects and projects that expect behavior change should be provided with longer implementation periods.

Projects that introduce new agricultural practices, particularly practices that do not deliver instant results should have sufficient time to establish these practices and provide farmers the opportunity to test and implement them on their fields. Conservation Agriculture is highly appropriate to the project context and a sustainable approach but it requires a couple of agricultural seasons to demonstrate significant results. Behavioral change such as more equitable decision making at household level or a change of nutritional practices requires a multiyear approach that first develops a convincing behavior change strategy for the context, then works with the more progressive community members and leaders before it can broaden it's outreach and effect change among a larger part of the community.

2. Design, fund and implement an appropriate follow up project

Following the above argumentation the consultant recommends that a follow on project should be designed. The interventions were all highly relevant to the context of the three districts and some great achievements have been made that need to be strengthened and further expanded. However, it is important that in any future design interventions are matched with available resources to ensure significant scope and quality of interventions. In any future project design it will also be important to carefully evaluate potential risks that could prevent the project to succeed. Equally important is a careful evaluation of potential partners for their commitment and quality of work. A component that addresses *market access* for users of new agricultural practices should be considered in any new design.

3. Investigate gender messages used in the project and their effects

There are some developments, such as the loss of control of women over their income, that might be an indication of misunderstood or unclear gender messages. A close follow up on which messages were effective in initiating positive change and how messages were understood in the communities would be important for any future project design and gender interventions.

4. Develop clear sustainability strategies at design stage

Projects should have a clear and elaborate sustainability strategy right from the beginning and this strategy should also be implemented from year one onwards. Links with and building the capacity of local service providers takes time and so does the development of any supply and market chains.

5. Identify ways of addressing the water shortage in the target communities

As reported in section 5.3.3 the water shortages affect the target population significantly and may impact on the success of any project interventions. CARE should identify organizations, partners or funding opportunities that can improve the water supply in the most affected communities.

6. Review administration and management structures within CARE Mozambique

Inappropriate administrative structures and delays in financial reporting seem to affect the effective application of resources and cause delays in project implementation. A review of administrative and management structures with the aim of identifying bottlenecks and opportunities for improvement would be very important, particularly for future projects.

7. Prioritize sustainable seed supply

As discussed in the survey results seed supply will be critical to allow farmers to implement new agricultural practices beyond the project. Thus the project should give high priority to developing a sustainable supply of seeds beyond the project life. Enterprising farmers who are already multiplying seed for the project as well as partners and the private sector should be considered in establishing a seed supply service for farmers.

8. Strengthen local service providers in the last months of the project

The project should work closely with the community based service providers such as FFS facilitators, SG animators, gender and nutrition animators and where possible with vaccinators to ensure they continue providing their services beyond the project. This could include refresher trainings to ensure they master all technical aspects, linking them to relevant government (or nongovernmental) structures such as SDAE, research institutions, other NGO's or faith based organizations that can support them. Other CARE projects operating in the area should also be consider providing backup support to these service providers.

7 ANNEX 1: TARGET ACHIEVEMENT TABLE

	Objectives	OVIs					
	Hierarchy of Objectives	**Indicators**	**Targets at EOP**	**Baseline (BL) values**	**Achievement EOP**	**Source**	**Score**
PO	Small holder farmers in Nampula Province, especially women, have enhanced capacities and resilience to adapt to the impacts of climate change, leading to increased food and nutrition security.	% of HH with reported ability to recover from weather related shocks	60% of HH stating that they can recover from weather related shocks by EOP	BL 46%	77% (P 82%, NP 71% (p=0.056))	Endline survey	
		% of HH with capacity to adapt to climate change based on knowledge and access to resources	95% recognize need for change 60% know at least 2 CA techniques 40% or less report not having knowledge and resources to adopt CA 40% access agricultural extension services	BL 88% BL 40% BL 60% BL 23%	84% (P 87%, NP 82% (p=0.134)) 77% (P 96%, NP 59%, (p<0.01)) 31% (P 13%, NP 34% (p<0.05) 61% {(P 77%, NP 23% (p<0.01)}	Endline survey	

	Objectives	OVIs					
	Hierarchy of Objectives	**Indicators**	**Targets at EOP**	**Baseline (BL) values**	**Achievement EOP**	**Source**	**Score**
E 1	Improved adaptation capacity through climate smart conservation agriculture	% of HH that adopt at least two climate smart farming techniques	60% of FFS participants have adopted at least 2 CA techniques 25% of non participants have adopted at least 2 CA practices	BL 15%	P 88% NP 24% (p<0.01)	Endline survey	
		Water infiltration rate (liters /min)	Average water infiltration rate increases by 30% by EOP	0.35 l/min for CA 0.30 l/min for FP	0.51 l/min for CA (145% of BL level) 0.29 l/min for FP (97% of BL level)	Data provided by Project Officer and analyzed in "Analysis infiltration and yield.xlsx"	
		Cassava yield (t/ha)	Average cassava yield increases by 30% by EOP	15.01 t/ha for CA 10.51 t/ha for FP	10.88 t/ha for CA (72% of BL level) 5.69 t/ha for FP (54% of BL level)	Data provided by Project Officer and analyzed in "Analysis infiltration and yield.xlsx"	
E 2	Strengthened resilience through livelihood diversification	% of HH with access to savings	30% of participating households have access to savings	BL 24%	47% (P 69%, NP 26% (p<0.01))	Endline survey	
		Number of chickens per household	60% of chicken keepers report increase or same number of chicken 30% of participating households own 10 or more chicken	BL 15% BL 15%	15% (P 12%, NP 19% (not significant)) 14% (P 16%, NP 12% (not significant))	Endline survey	
		Perceived chicken mortality	80% report reduced mortality rate compared to status before project perceived chicken mortality of 12%	BL 58%	59% (P 60%, NP 58%, (not significant)) those who vaccinated 56% (p=0.07) those who did not	Endline survey	

	Objectives	OVIs					
	Hierarchy of Objectives	**Indicators**	**Targets at EOP**	**Baseline (BL) values**	**Achievement EOP**	**Source**	**Score**
					vaccinate 62%		
		% of HH reporting disease as greatest problem in chicken rearing	20% of chicken keepers report disease as greatest problem	BL 92%	86% (P88%, NP 84%) those who vaccinated 83% those who did not vaccinate 89%	Endline survey	
E 3	More gender equitable decision making in private and public sphere	Public decision making index (PDMI) - Men and women's perception about women's involvement in public decisions	PDMI of 2.5 2.75 for female respondents 2.35 for male respondents	BL 2.19 BL 2.44 BL 2.05	2.30 (P 2.43, NP 2.17, (p<0.01)) 2.38 (P 2.46, NP 2.26) 2.24 (P 2.39, NP 2.13), m/f (p<0.01)	Endline survey	
		Household decision making index (HDMI) - Participation of women in household decision-making	HDMI of 1.65 HDMI of 2.80 for FHH	BL 1.55 BL 2.75	1.55 (P 1.57, NP 1.54, (not significant)) 2.79 (P 2.84, NP 2.76)	Endline survey	
		Women's representation in group/association leadership positions (part of comité de gestão)	50% of group leadership are women	0%	56% of group leadership are women 51% of presidents are women	BASE DE DADOS REGISTO DE MEMBROS 11Dec17 (AP).xlsm	
E 4	Increased household food and nutrition security	% of households with Household Dietary Diversity Score (HDDS) > 4	50% of HH have a HDDS > 4	BL 36%	37% (P 44%, NP 31%, (p<0.01))	Endline survey	
		Months of Adequate Household Food Provisioning (MAHFP)	MAHFP of 9.40 MAHFP of 9.00 for FHH	BL 9.19 BL 8.55	10.61 (P 10.65, NP 10.57, (not significant)) 10.55 for FHH	Endline survey	

	Objectives	OVIs					
	Hierarchy of Objectives	**Indicators**	**Targets at EOP**	**Baseline (BL) values**	**Achievement EOP**	**Source**	**Score**
E 5	Increased capacity of partners from Government and civil society in community based climate change adaptation and resilience building	Number of civil society and government staff trained (output indicator)	674 government and civil society partners 's staff trained		718 persons trained (88% men, 12% women), average 1.2 trainings per person	BASE DE DADOS AUMENTO DE CAPACIDADES Novembro 2017(AP).xlsx	
		% of men and women farmers receiving at least one service from civil society and government partners	75% HH use at least one service 40% access agriculture extension service 30% access savings group services 56% access chicken vaccination services	BL 41%, 24% for FHH BL 23% BL 21% BL 10%	71% (P 98%, NP 43%, (p<0.01)) 60% (P 93%, NP 28%, (p<0.01)) 45% (P 68%, NP 23%, (p<0.01)) 46% (P 59%, NP 32%, (p<0.01))	Endline survey	

8 ANNEX 2: QUESTIONNAIRE

Endline Survey
Questionnaire in Englis

9 ANNEX 3: ENUMERATOR MANUAL

Manual do inquiridor endline.docx

10 ANNEX 4: KEY INFORMANT INTERVIEW GUIDE

Key informant interview guide EL.doc

11 ANNEX 5: PROMOTER INTERVIEW GUIDES


SG Gend interview guide EL.docx


FFS Vacc interview guide EL.docx