Village Savings and Loan Associations as Economic Drivers

Exploring impacts of Village Savings and Loan Association (VSLA) at micro level to understand their potential to contribute to the Tanzanian economy

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For

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Executive Summary

Savings-led microfinance innovation aims to improve access to financial services in remote areas, especially among women. CARE International has been the leading innovator in the field and has initiated Village Savings and Loan Association (VSLA) programmes across Tanzania. CARE aims to increase members in Tanzania to 8 million by 2025 with the vison to help improve the national economy. CARE thus commissioned SFTZ to carry out a study that investigates the potential of VSLA contributions to local and national economies.

The investigation started in 2018 with a literature review showing that no single study had directly measured whether VSLA efforts contribute to large-scale economic growth. The current report is the next phase in understanding whether there is potential for VSLAs to contribute to village-level economic growth.

Methods

The study was implemented in six villages in Mufindi district, Iringa region; four of which were assigned as treatment and two as control. CARE's records on VSLA membership and consultations with TACODA staff provided information on the number of VSLA groups in all six villages. The study design ensured that the villages had comparable weather conditions, economic activities, and population sizes. Treatment villages had 9 to 15 NGO-facilitated VSLAs, and control villages had only two comparable VSLAs. The treatment villages only included VSLAs facilitated by TACODA, CARE's partner. After completing the survey, however, we discovered that one of the control villages had a much higher penetration rate for VSLAS than predicted and exceeded all but one treatment village.

The quantitative methods included two survey questionnaires; one collected data on demographics, savings, credit, business outcomes, household shocks and coping strategies, and agricultural production. The second survey one asked about nutrition and food security. Both spouses answered the sections on savings, credit, and business, while all other sections were administered to the household head or to the spouse if the HH was not available. The female HHH or spouse answered questions about nutrition and food security.

Qualitative methods included structured interviews of village leaders, TACODA staff, and the District Community Development Officer (CDO). The village leader questionnaire focused on livelihoods, crop prices, services and institutions, village issues, and services provided by local and international NGOs. TACODA and CDO questions focused on understanding VSLA operations in the study area. The results were used to ensure accuracy by triangulating information from multiple sources.

Results

Analysis of the data at the village level did not provide evidence that VSLA initiatives have contributed to large-scale economic growth except for one risk mitigation sub-indicator. No statistically valid differences were observed between the control and treatment villages (Table 1), but, again, the "control" villages contained more VSLA activity than anticipated, which may have blurred any village-level effects. Moreover, the data does not include the baseline information, thus the results may be inconclusive.

Table 1: Micro-level indicator findings at village level

Micro-level indicator	Sub-indicator variables	Observed evidence[1]
Increased savings	Total savings	No
	Savings at VSLAs with respect to total savings	Yes
Increased nutrition and food security	Food Dietary Diversity (FDD)	No
	Food insecurity index score	No
Increased risk mitigation	Coping strategies against economic shocks	Yes
Improved agricultural outcomes	Crop yields	No
	Livestock holdings	No
	Value of farming-related assets owned	No
	Expenditures on agricultural inputs, equipment, and labor	No
	Income from farming-related activities	No
Improved business outcomes	Number of new businesses	No
	Value of business assets owned	No
	Business sales	No
Increased human capital accumulation	Enrollment rate of school-aged children	No
	Educational attainment	No
	Business knowledge and skills	No
Increased economic performance	Annual income	No
	Annual expenditures	No
	Wealth status index score	No
	Value of household assets	No

An analysis of differences at the household level between households with and without a VSLA member revealed statistically significant differences in the following micro-level indicators: higher savings; higher nutrition and food security; higher ability to mitigate risks; better agricultural outcomes; better business outcomes; and better economic status

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[1] Observed evidence is "yes" when the average value or percentage for the VSLA households is significantly larger compared to the value observed among non-VSLA household and "no" otherwise

(Table 2). However, there was no evidence that the VSLA programmes improved the measured variables related to human capital.

Factors that may have reduced the potential household-level impacts of VSLAs include the short tenure of the programme, as most groups had operated for no more than two years, and the low penetration rates in most treatment villages, which might have diluted any impacts in individual households.

Table 2: Micro-level indicator findings at household level

Micro-level indicator	Sub-indicator variables	Observed evidence[2]
Increased savings	Total savings	Yes
	Savings at VSLAs with respect to total savings	Yes
Increased nutrition and food security	Food Dietary Diversity (FDD)	Yes
	Food insecurity index score	No
Increased risk mitigation	Coping strategies against economic shocks	Yes
Improved agricultural outcomes	Crop yields	Yes
	Livestock holdings	No
	Value of farming-related assets owned	No
	Expenditures on agricultural inputs, equipment, and labor	Yes
	Income from farming-related activities	Yes
Improved business outcomes	Number of new businesses	No
	Value of business assets owned	No
	Business sales	Yes
Increased human capital accumulation	Enrollment rate of school-aged children	No
	Educational attainment	No
	Business knowledge and skills	No
Increased economic performance	Annual income	Yes
	Annual expenditures	Yes
	Wealth status index score	Yes
	Value of household assets	Yes

Summary of Key Findings

We compared micro-level economic indicators in four treatment villages with two control villages to determine if CARE's VSLA programme measurably increased in village-level economic growth. No meaningful differences, however, were observed between villages. A number of issues hindered the village-level comparison: First, microfinance savings groups

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[2] Observed evidence is "yes" when the average value or percentage for the VSLA households is significantly larger compared to the value observed among non-VSLA household and "no" otherwise.

were also present in control villages. These groups had not been formally registered with local and district leaders, and TACADO, Care's implementing partner, was unaware of them. Although these groups saved less than CARE's VSLA groups in the treatment villages, they still blurred the comparison between two groups, and there may also have been spill-over effects from other villages or programmes. We therefore combined VSLA households from both the control and treatment villages in comparing VSLA and non-VSLA households.

Secondly, the penetration of savings groups within all treatment villages was low (below 30%, except for one village). Prior studies that have shown measureable impacts of microfinance on economic growth were conducted in Bangladesh where the penetration rate of credit-led microfinance was almost 50% in rural areas (Raihan, Osmani, & Khalily, 2017).

Finally, TACADO launched the VSLAs in the treatment villages less than two years before the study began. Credit groups may take three years or longer to show sizeable impacts on business outcomes (Gash & Odell, 2013).

However, at the household level, VSLA membership showed significant impacts on a number of micro-level measures of economic growth. VSLA households had higher household savings, drew on VSLA savings to overcome negative impacts of household shocks, attained greater food security and more diverse diets, achieved better agricultural and business outcomes, and enjoyed greater economic status. Although these differences cannot be directly attributed to the VSLA programme without before-and-after comparisons with a meaningful control group, the positive household impacts suggest that a VSLA programme scaled to a high density within each village could have a positive impact on the local economy.

Micro-level Indicator differences between households versus VSLA membership include the following:

- o **Increased savings:** VSLA households accumulated significantly higher total savings (three times) than non-VSLA households.

- o **Increased ability to mitigate risks:** VSLA households were more likely to use savings or credit to overcome shocks whereas non-VSLA households relied primarily on friends and families. We could not confirm whether VSLA savings helped overcome shocks more effectively than other savings mechanisms, but VSLA households did have more savings available than their non-VSLA counterparts.

- o **Improved nutrition and food security:** Over the preceding 24-hour and seven-day periods, VSLA households scored significantly higher in Food Dietary Diversity (FDD) and experienced lower food insecurity compared to non-VSLA households over the past four weeks and twelve months.

- o **Increased agricultural outcomes:** VSLA households achieved better agricultural outcomes, including higher agricultural earnings, although we could not confirm whether VSLA savings allowed higher expenditures on labor or inputs. We found no differences in livestock holdings or agricultural asset ownership.

- o **Increased business outcomes:** VSLA households had better business outcomes, specifically in higher business sales compared to non-VSLA households. The programme did not have an obvious impact on the number of new businesses started or on business assets. Respondents from all villages most frequently mentioned high competition and declining national economic growth as the major obstacles to improving business outcomes. However, the business types owned by respondents fell into only a few categories and over 50% produced local brew (pombe). The majority of village leaders also mentioned poor transportation and road infrastructure. Thus new enterprises may only prosper with increased business diversification and better access to markets.

- o **Improved economic status:** VSLA households performed better on all economic status indicators including: income, expenditures, Wealth Index Score, and value of household assets. While we cannot confirm the mechanisms through which VSLAs contributed to these measures, literature on microfinance savings/credit programs in other countries have shown similar results (Ksoll et al., 2016).

- o **Human capital accumulation:** We found no significant differences on any of the sub-indicator variables of human capital accumulation—i.e., school enrollment rates, educational attainment, and business skills and knowledge for HHHs – perhaps because of the short-term nature of the VSLA programme. Gash and Odell (2013) recommend that educational improvement such as higher enrollment and educational spending require at least three cycles of VSLA operations.

Recommendations

1. VSLAs may have a positive impact on village economies in Tanzania; however, a larger and more rigorous study design would be required to attribute these impacts to the VSLAs. Moreover, VSLA participation by at least 50% of households may be necessary to determine if VSLAs can measurably improve village-level economic growth.

2. Because the study showed no difference in business knowledge and skills, the programme may benefit from improving business training and exposing participants to examples of successful investments in productive assets and microbusiness opportunities that contribute to business diversification.

3. As described in the theory of change of savings groups presented in Gash and Odell (2013), different impacts are observed at different stages of project implementation—some, such as increased savings, can be observed between the first and third cycles while others can only be observed after 3-5 or more cycles[3]. If funds allow, CARE should consider continued support of existing VSLAs as well as expanding the programmes to new villages.

   To better investigate the economic impact of VSLA programmes, consider designing the monitoring and evaluation system that includes key indicator variables to measure results from the beginning. Choose control and treatment villages with similar characteristics. Collect a sufficient sample size to conduct a sophisticated analysis of the indicators. Implement the VSLA programme for at least three years and conduct midline and endline studies to measure progress and results. Include macro-level variables to better understand how village markets and social dynamics influence the programme.

Introduction

Savings-led microfinance innovation aims to improve access to financial services in remote areas, especially among women. In the past decade, more and more researchers and practitioners have recognized and taken advantage of this informal financial service to help improve lives of the poor. A leading innovator in the field, CARE International, has initiated extensive Village Savings and Loan Association (VSLA) programmes whose benefits target household and communities at large. CARE currently has about 700,000 members in 28,000 groups in Tanzania and aims to increase the number of participants in Tanzania to 8 million by 2025, with a vision of improving the national economy. CARE seeks to better understand the potential contribution of VSLAs on the growth of the Tanzanian national economy and how to scale their program to increase local economies so as to collectively contribute to the national economy.

CARE commissioned SFTZ to conduct an investigation into how VSLAs contribute to local and national economies starting with a literature review in 2018. The review revealed that despite abundant evidence demonstrating numerous impacts of savings groups (SGs) on participating households, no single study had attempted to determine whether these efforts significantly contribute to the growth of national economies. Care contracted SFTZ to conduct this study as the next phase in understanding how VSLAs contribute to local (village) economic growth.

Based on the literature, impacts of savings-led microfinance groups can most clearly be linked to economic growth if profits from income-generating activities increase beyond

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[3] Gash, M., & Odell, K. (2013). The evidence-based story of savings groups: A synthesis of seven randomized control trials. *A publication of the Savings-led Financial Services Group at SEEP.*

basic-consumption levels. Furthermore, while savings from low performing groups can serve as *"quasi insurance"* by helping members become more resilient to economic shocks, they can also be indirectly linked to economic growth.

The following mechanisms were determined as ways through which savings-led microfinance might contribute to economic growth.

Contribution through increasing savings (direct). Saving allows accumulation of fixed capital which could potentially help improve technical innovation, consequently increasing output and long-term per capita income.

Contribution through increased food security. Savings-led microfinance may affect growth by improving food security in rural communities, thereby enhancing long-term productivity.

Contribution through improved agricultural outcomes. Savings–led microfinance can contribute to economic growth through investments in agricultural production. Ability to purchase agricultural inputs, equipment, and labor can lead to improved agricultural yield, and consequently earnings.

Contribution through improved economic status. Accumulated funds can ultimately increase spending on necessary and luxury goods and thus contribute positively to the country's economy.

Contribution through risk mitigation/coping strategies. Savings-group products protect members against shocks such as illness or the death of a household member thereby encouraging households to engage in higher risk but more profitable economic activities.

Contribution through creation of small to medium-size enterprises (SMEs) (direct). Savings-led microfinance may encourage SME growth in rural areas, which may in turn generate new jobs and poverty-reduction opportunities.

Contribution through human capital accumulation (direct). Savings-led microfinance increases the stock of human capital through training in financial and entrepreneurial issues or participants' ability to educate their children.

In testing whether *savings groups contribute to rural (village level) economic growth and development,* we focused on microlevel sub-indicators most likely to be translated into macro-economic growth. A full list of indicators and respective sub-indicators are provided in Table 6 of the results section.

To determine whether CARE's VSLA initiatives had village-level impacts on these indicators, we compared communities with higher numbers of NGO-trained VSLA participants (treatment villages) versus those with only a few (control villages). At a finer scale, we examined the impacts on VSLA participants to determine effect at the household

level across all survey villages. All survey data and qualitative interviews were collected in Mufindi District, Iringa region.

The study was implemented by Savannas Forever Tanzania (SFTZ), under the principal investigator, Dr. Majory Silisyene, with assistance from Jorge Vinseiro, an experienced financial economist. Field implementation was coordinated and supervised by Mr. Jovit Felix of SFTZ.

Methods

Design and study area

The study was conducted in Mufindi district and included six villages, three in Ihalimba ward and the other three in Ihanu ward (Figure 1). Initially, we aimed to include villages with high-performing VSLAs and others with low-performing VSLAs as treatment villages. We later modified this approach to include villages with the highest VSLA penetration rate as treatment villages. The main reason for the modification was that despite some VSLAs demonstrating very high savings rates, most villages across Iringa region had very low penetration rates[4]. Additionally, most VSLAs had only operated for a relatively short time[5].

The later study design objective was to select villages with high penetration of NGO-led microfinance groups that had operated for at least two years and contrast them with villages with low penetration of similar groups. In addition to the VSLA database, we interviewed the community development officer and field officers from TACODA, CARE Tanzania's partner organization to determine the number of registered groups in each village.

The new approach thus not only identified villages with the highest VSLA penetration rate for a treatment group, but also contained the most VSLAs that had operated for at least two years[6]. To ensure that control villages were comparable to the treatment villages, we included villages from the same wards that had the least number of VSLA participants according to CARE's records[7].

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[4] If a community has a very low penetration rate, impacts might be diluted, and thus the chances of observing differences between treatment and control villages may be diminished.

[5] While it is desired that VSLA programmes, like any other development programme, operate longer than three years to see changes in indicator variables, most VSLAs had operated for only two years or less.

[6] Based on interviews with the field officer of TACODA, some VSLA groups had started operating in 2015, but they had not yet been given proper training. All the VSLAs with proper training from TACODA started operating either in 2016 or 2017.

[7] TACODA's field officer reported that the two villages with the least number of participants had not received proper training in 2016 as funding had expired, and the initiatives had ended prematurely. CARE's data indicates that the villages had only two VSLA groups with a total of about 50 members each.
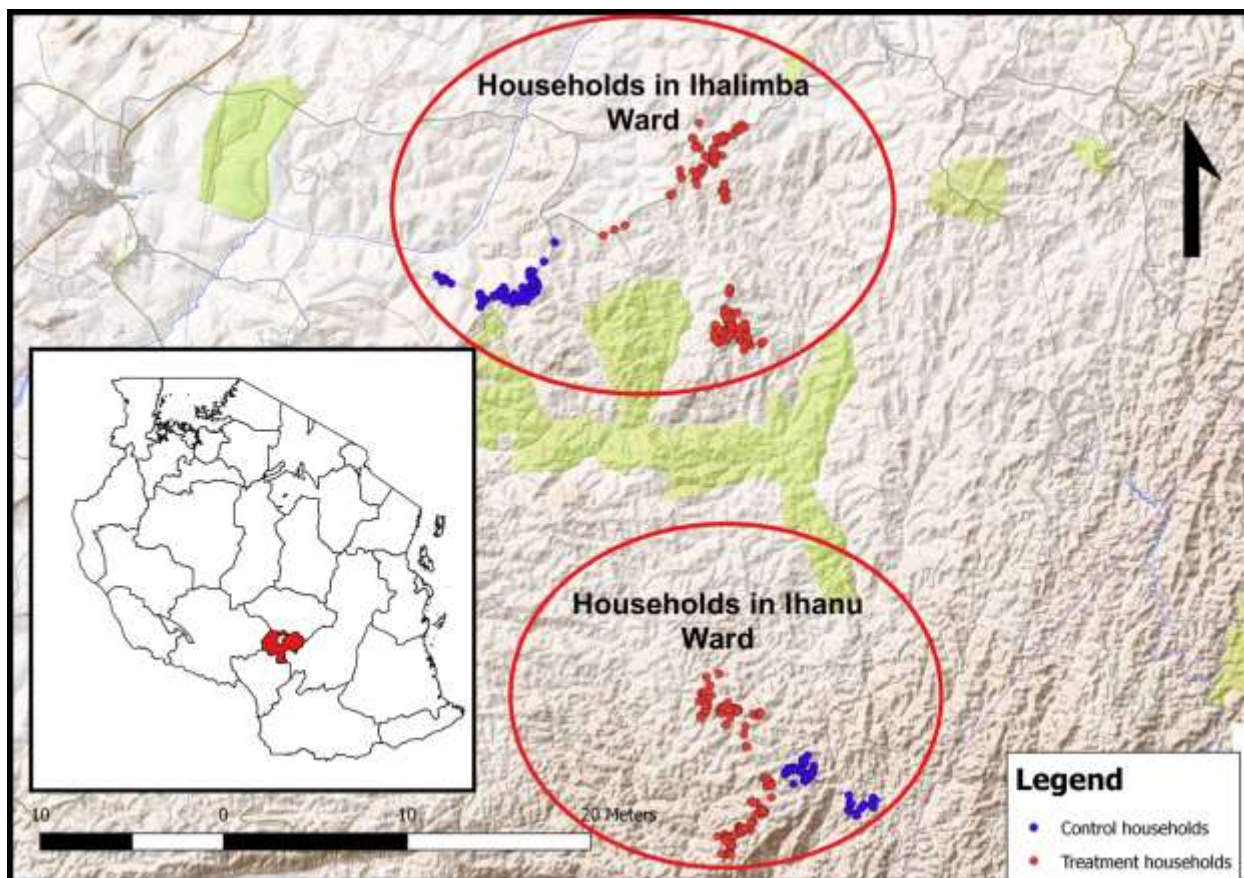
Figure 1: Study area showing control and treatment households by ward

Other areas with high penetration rates were avoided because of interference from other organizations. For example, TACODA, CARE's VSLA implementing organization, indicated that in Nyololo Ward a Private Forestry Programme (PFP) had initiated a programme similar to VSLAs.

With the exception of Lulanda which appeared to have the highest penetration rate of 22.6% (based on 2012 village's populations), the three other treatment villages all had about 10% penetration rate[8] (Table 3). When the penetration rate is calculated using number of households per village, it appeared to be much higher in all the treatment villages—Wami (47.9%), Ugesa (49.5%), Lulanda (89.1%), and Ibwanzi (34.2%)—but still smaller in control villages—Nundwe (4.1%) and Isipii (11.5%). However, these numbers are contradicted by respondents, which reveal much lower penetration rates in all but one treatment villages and much higher in one control village (see Table 5).

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[8] Note that this calculation was based on the whole population.

Table 3: Penetration rates based on HHHs and population by control and treatment village

Villages	HHH (2018)	Pop (2012)	# of registered VSLAs	NGO VSLA members[9]	Penetration rate based on pop. (%)	Penetration rate based on # of HHH
Control Villages						
Nundwe	607	2,475	1	25	1.01	4.12
Isipii	218	1,250	1	25	2.00	11.47
Treatment Villages						
Wami	628	2,418	15	301	12.45	47.93
Ugesa	641	2,918	12	317	10.86	49.45
Ibwanzi	503	1,849	9	172	9.30	34.19
Lulanda	293	1,156	14	261	22.58	89.08

All six villages were similar in terms of economic activities, with a few exceptions. For example, they all grow trees as woodlots and cultivate similar cash and subsistence crops. With respect to other cash crops, some are grown more in specific villages than others—e.g., villages in Ihalimba Ward cultivate more Irish potatoes. All six villages receive adequate rainfall, but villages in Ihalimba ward experience more rain compared to villages in Ihanu Ward (Source: TACODA field officer).

Sample size and sampling strategy

The sample size of 600 households was set at the beginning of the study and aimed to provide statistically robust results while controlling for various contextual factors between villages/wards. Since the analyses sought to explore village-level effects, we included an equal number of households from all selected villages.

Before drawing samples, the field team leaders worked with village leaders to update village household rosters. Due to expected varying distribution of wealth and population within each village, a representative number of households were drawn randomly from each sub-village to obtain a total of 100 households from each village.

The actual sample sizes for each questionnaire module are shown in Table 4. Both the household and the nutrition and food security modules were entered by one person in the household, the first by the household head and the second by the female head/spouse/partner. Both spouses/partners were expected to respond to the savings, credit, and business module. For most households, however, only one person was administered this module.

Table 4: Sample size by control and treatment villages

	Control	Treatment

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[9] These are the numbers of participants in TACODA-facilitated VSLAs.

Village	Nundwe	Isipii	Total	Wami	Ugesa	Ibwanzi	Lulanda	Total
Household survey [10]								
# of households	100	100	**200**	100	100	100	100	**400**
# Male headed HHH	58	75	**133**	59	57	60	57	**233**
# Female headed HHH	42	25	**67**	41	43	40	43	**167**
Nutrition and Food Security module[11]								
# of households	94	89	**183**	98	96	96	95	**385**
Savings, Credit, and Business module[12]								
# M only interviewed	27	30	**57**	24	32	33	28	**117**
# F only interviewed	34	25	**59**	31	30	34	26	**121**
# M+F interviewed from same households	39	45	**84**	45	38	33	46	**162**

Research instruments

SFTZ used both quantitative methods (household surveys) and qualitative methods (key informant Interviews (KII). The mixed method approach allowed the team to triangulate information from multiple sources for greater reliability.

Quantitative tools: The household survey included questions on demographics (e.g., age, sex, education and marital status of household members), economic activities, asset ownership, income and expenditures, savings, credit, and business ownership. Additional questions were asked about shocks and coping strategies, and agricultural production. Both spouses answered the sections on savings, credit, and business, while all other sections were administered to the household head or the spouse if the HH was not available. The nutrition and food security questionnaire covered questions on food varieties eaten within the past seven days and food availability in the past four weeks and the past twelve months.

Secondary data was used to determine VSLA penetration. From the SGs data provided by CARE, number of VSLA members from each village was used to calculate penetration rate in the population—number of VSLA members was divided by village population.

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[10] The general household survey was administered to either the male or female heads of households or spouses. Therefore, only one person per household was asked these questions.
[11] The N&FS module was administered to mostly female heads of households or spouses.
[12] The savings, credit, and business module was administered to both the male and female partners/spouses in cases where both exist. In many case, however, only one of them was found at home.

Qualitative tools: The team administered key informant surveys as the main qualitative tool, although the Community Development Officer (CDO) and TACODA staffs were also interviewed.

1. Village leader groups: The team interviewed the village chairperson and village executive officer (VEO), covering questions on livelihoods, crop prices, services and institutions, services provided by local/international NGOs and also asked them to identify major village issues.

2. TACODA staff: The team asked questions about VSLA programme operations in the study area.

3. CDO: The CDO described where CARE and other organizations facilitated VSLAs so that treatment and control villages could be correctly identified.

Data quality control

SFTZ used two methods to ensure high-quality data collection:

1. Team leaders re-interviewed 10% of households using selected questions. Team leaders used a mixed set of re-interview questions to ensure that all questions were understood by the enumerators.

2. The data analyst ran daily data checks using STATA, a statistical software. The team leaders synced all data from tablets to SurveyToGo's online database; the data analyst then checked for outliers, errors, and other suspicious data and communicated with team leaders each evening about data issues. The team leaders met with their enumerators daily to discuss any issues before starting the next day's activities.

Study Limitations

We experienced several challenges that may affect our findings.

1. Lack of longitudinal data: We only captured a single point in time data (December 2018). Unless data are collected from at least two different periods, differences between treatment and control villages cannot be conclusively attributed to the VSLA initiative. Instead, we can only report associations. Moreover, values might have differed before project implementation. For example, if the income levels in the control villages were higher compared to treatment villages prior to the VSLA programme, we may not have detected a significant increase in treatment villages.

2. Low VSLA penetration: The study assumed a relatively high penetration rate of VSLAs in the treatment villages based on Care's background information. However, all but one treatment village had much lower penetration rate than had been indicated by CARE's database. In Ihanu ward, the penetration rate was lower in one of the treatment villages than in the control village.

3. Sample size: Given the low penetration of the VSLAs in most villages, the sample size of 600 limited the statistical power of our analyses. Also, the study design anticipated higher numbers of study participants involved in business activities than was actually observed.

4. Respondent availability: Time constraints limited return visits to interview missing respondents. The study design included interviews of both male and female spouses about savings, credit and business but enumerators usually found only one spouse at home—waiting or returning to interview the second spouse would have required several more days in the field.

Finally, we also experienced field-related challenges, including the following:

5. Network coverage: Sampled villages were so remote that the cellphone networks were very weak. Limited network made it difficult for the teams to communicate with their team leaders leading to delays between interviews.

6. Seasonal issues: The survey coincided with the farming season. Some household members temporarily migrated to distant farms, which led to either replacement of sampled households or failure to interview the second spouse.

7. Alcohol consumption: There was a high incidence of alcohol use in the area. Some respondents had to be replaced because of drunkenness, especially on the final day. The high consumption may relate to the large number of households who make local brew which is the major micro-business in all study villages.

8. More females were interviewed than males: Most male spouses were away from home. A few were employed by tea/tree companies, some were camping at their farms, and others were travelling. Some male respondents who had camped on their farms were tracked and interviewed.

Results and Discussion

Before we discuss results on village-level differences of micro-economic indicators and the impacts of VSLAs at household level, we first describe the sample being analyzed.

Sample characteristics

Sex and age of household heads: In all six villages, the average age of household heads (HHH) ranges between 37.1 yrs. and 55.9 yrs. Female HHHs tend to be older (53.8 yrs treatment) and (50.3 yrs control) compared to male HHHs (40.4 yrs. treatment and 42.6 yrs. control). Women HHHs are often widowed or separated (64.7% treatment and 64.2% control) which may explain the higher average age of female HHHs. Most households are

headed by men who are married (Isipii village has the lowest percentage of female-headed households (25%) and has the largest proportion of monogamous marriages (73.0%)—see Table 5.

Marital status of household heads: The proportion of monogamous marriages of HHH is high across villages (61% control and 54% treatment), although it is highest in Isipii (73%) compared to other villages. When marital status is disaggregated by sex, the data shows that most (92.7% treatment and 91.7% control) of male HHHs are married while most female HHHs are widowed/separated or in polygynous marriages (64.7 treatment and 64.2% control)[13]. In Isipii village where there are few polygamous marriages (10%), there is only a small percentage of female-headed households (25%)[14].

Family size: Average family size across all villages ranges from 4.0 to 4.8 members which is consistent with the distribution of district and similar to the national average of 4.9 family members.

Education attainment: Male HHHs average just under 7 years of schooling across all villages. Average female-HHH education is considerably lower than males at 3 to 4 yrs.

Economic activities: When economic activities are analyzed at village level for HHHs only, we find that over 90% rely on farming and livestock as their main economic activity in all villages. The percentage of HHHs engaged in business activities range from a low of 15.1% in Isipii to a high 51.3% in Ugesa. Most of the HHHs engaged in business also farm.

Ethnicity, language spoken, and religion (not included in a table): The survey did not include questions on ethnicity, language fluency or religion, although enumerators interviewed village leaders about population characteristics. In Ilhambra ward, all three village populations included primarily Hehe and Bena; Nundwe village also included Kinga. In Ihanu Ward, Hehe is the main tribe in all three villages; Isipii and Ibwanzi villages included Bena and Kinga respectively. In five villages, at least 80% speak Swahili; 75% speak Swahili in Lulanda village. The predominant religion is Catholic in all villages.

VSLA penetration rate: The observed penetration rate of VSLAs is significantly lower than anticipated in all study villages except Lulanda (Table 5). In treatment villages, the average penetration rate is 31.3% while in control villages the average is 22.0%. CARE's database indicated higher VSLA membership penetration in all treatment villages than found in the study: Only Lulanda (53%) had over 25% VSLA penetration. Surprisingly, Isipii, a control

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[13] In polygynous marriages, women who are not the first wife are listed on village registers as female- headed households. Often, the male is listed as the household head in households that are monogamous.
[14] When we talk about female versus male-headed households, however, caution must be taken into account as this does not necessarily mean that the female spouse is not considered the head of the household whenever there are two spouses involved.

village, exhibited a higher VSLA penetration rate (33%) compared to all villages but Lulanda.

Results also show that most groups were facilitated by TACODA, CARE's partner organization, while a significant number were facilitated by individuals. It may be that most VSLA members found in control villages were either formed by untrained individuals or that some VSLA groups might have been created by VSLA trainees through the demand-driven model[15].

Table 5: Sample characteristics by control and treatment villages

VILLAGE	TREATMENT					CONTROL		
	Wami	Ugesa	Ibwanzi	Lulanda	Total/ AVG.	Nundwe	Isipii	Total
Avg. age male HHH	37.1	40.7	41.4	42.3	40.4	41.6	43.3	42.6
Avg. age female HHH	52.1	55.3	51.9	55.9	53.8	53.9	45.0	50.6
% Monogamous	54.0	54.0	54.0	54.0	54.0	49.0	73.0	61.0
% Polygynous	17.0	13.0	11.0	18.0	14.8	14.0	10.0	12.0
% Single (never married)	0.0	2.0	6.0	1.0	2.3	8.0	6.0	7.0
% Separated/widowed	29.0	31.0	29.0	27.0	29.0	29.0	11.0	20.0
Marital status (Male HHH)								
% Married	91.5	94.7	90.0	94.7	92.7	84.5	97.3	91.7
% Single/separated/widowed	8.5	5.3	10.0	5.3	7.3	15.5	2.7	8.3
Marital status (Female HHH)								
% Married	41.5	30.2	27.5	41.9	35.3	33.3	40.0	35.8
% Single/separated/widowed	58.5	69.8	72.5	58.1	64.7	66.7	60.0	64.2
Avg. family size	4.2	4.5	4.0	4.8	4.4	4.6	4.4	4.5
Avg. education (years/male)	6.9	6.9	6.7	7.3	6.9	6.6	6.9	6.8
Avg. education (years/females)	3.4	3.2	3.4	3.4	3.4	3.5	5.1	4.1
% Farmers/ livestock	95.0	93.0	93.0	94.0	93.8	96.0	96.0	96.0
% Business	45.7	51.3	43.6	35.2	43.3	37.3	15.3	25.5
VSLA Penetration (%)	25.0	25.0	22.0	53.00	31.25	11.0	33.0	22.0
# NGO VSLAs	6	9	16	49	80	5	16	21
# Non-NGO VSLAs	19	16	6	4	45	6	17	23
# VSLA TOTAL	25	25	22	53	125	11	33	44

[15] If this is the case, members might still recognize the NGO as the facilitator yet the records of members might not be included in the database.

Assessing Micro-level Indicators of Economic Growth

In this section we assess the micro-level economic indicators associated with economic growth. We focus on indicators which have in the literature been shown to be related to macro-level indicators. Table 6 below shows the micro-level indicators and how they relate to macroeconomic indicators. The final column shows the sub-indicator variables directly measured in this study. Each indicator and associated sub-indicators are assessed to determine whether there is indication of positive impact of the VSLA project at village and household level.

Table 6: Relationship between micro-level indicators and macro-level indicators

Micro-level Indicator	Relationship to Macro-level Indicators	Variables assessed
Increased savings	Savings allow accumulation of fixed capital and helps with technical innovation, which increases output and per capita income in the long-term.	- Total savings - Savings at VSLAs with respect to total savings
Increased nutrition and food security	Savings-led microfinance may affect growth by improving food security in rural communities, which can enhance long-term productivity.	- Food Dietary Diversity (FDD) - Food insecurity index score
Increased risk mitigation	Savings-group products protect members against shocks such as illness or the death of a household member. In the long term, insurance products may encourage households to start engaging in higher risk but more profitable economic activities rather than in low risk and less profitable activities.	- Coping strategies against economic shocks
Improved agricultural outcomes	Increased capital from savings can contribute to more capital investment in agricultural inputs, equipment, and labor. Income of a household is thus expected to increase due to improved agricultural yield (as a result of being able to afford inputs and labor).	- Crop yields - Livestock holdings - Value of farming-related assets owned - Expenditures on agricultural inputs, equipment, and labor - Income from farming-related activities
Improved business outcomes	With higher savings (as stated above), more investment in productive assets such as machinery can be made, which may in turn lead to increased efficiency of your business operations. Savings can also be used to purchase more inventories for	- Number of new businesses - Value of business assets owned - Business sales

	your business and thus expand your business. New MSE businesses may also be initiated as a result of capital available through VSLAs. Better performance of businesses can lead to generation of new jobs from businesses.		
Increased human capital accumulation	Savings-led microfinance increase the stock of human capital by offering additional forms of assistance, such as specific training in financial and entrepreneurial issues or through participants' ability to educate their children.	- Enrollment rate of school-aged children - Educational attainment	
Increased economic performance	With better economy, more households are likely to exhibit more wealth as well as higher income and expenditures.	- Annual income - Annual expenditures - Wealth status index score - Value of household assets	

Increased savings

Savings-led microfinance groups prompt members to save through group support and codes of conduct that reinforce saving behavior (Allen & Panetta, 2010). VSLAs provide a savings mechanism to poor rural residents who lack access to formal financial instruments. We analyzed total savings and savings at VSLAs as percentage of total savings to assess the impact of the VSLA membership on savings. We analyzed savings at the village level and household level.

General household savings patterns: Enumerators interviewed the household heads and/or their spouses about savings. Respondents reported on savings methods over the past twelve months and the estimated amounts they saved by each method. Results show that the majority (n=455, 75.8%) of the HHHs saved money either individually or jointly (Table 7). No differences were observed between control and treatment villages but there were significant differences between non-VSLA households (n=286, 66.4%) and VSLA household (n=169, 100.0%).

Most (46.0%) respondents reported saving individually, although a significant proportion (25.3%) said they saved jointly with their spouses (Table 29 in Appendix). Among the few (24.2%) respondents who \ had not saved anything in the past 12 months, the majority (92.5%) cited lack of money as the main constraint (Table 30 in Appendix).

Table 7: Household savings behavior by control and treatment villages and households

	Villages	Households	Total

Saved in the last	Control		Treatment		Non-VSLA		VSLA			
12 months	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
No	52	26.00	93	23.25	145	33.64	0	0.00	145	24.17
Yes	148	74.00	307	76.75	286	66.36	169	100.00	455	75.83
Total	200	100.00	400	100.00	431	100.00	169	100.00	600	100.00

Note: likelihood-ratio chi2(1) = 0.5458 Pr = 0.460

Savings mechanisms: Respondents most frequently said they used a "Kibubu" (a locked box kept at home) or generally saved at home (n=307, 67.5%). The second most frequently reported saving method was a VSLA (n=169, 37.1%). Other savings methods included ROSCAS (n=68, 14.9%), mobile phone savings accounts (n=65, 14.3%), and family/friends (n=41, 9.0%). Less commonly used methods included SACCOS, private banks, and formal microfinance organizations (Table 31 in Appendix). The results indicate that respondents are less likely to use formal savings methods than informal mechanisms. No differences were observed in the savings mechanism used for saving between control and treatment villages.

Total savings: Assessments of total savings reveal that the average household savings in treatment villages was higher than that of control villages but the difference was not statistically significant[16]. However, VSLA households saved three times more than non-VSLA households and the difference is statistically significant (Figure 2)
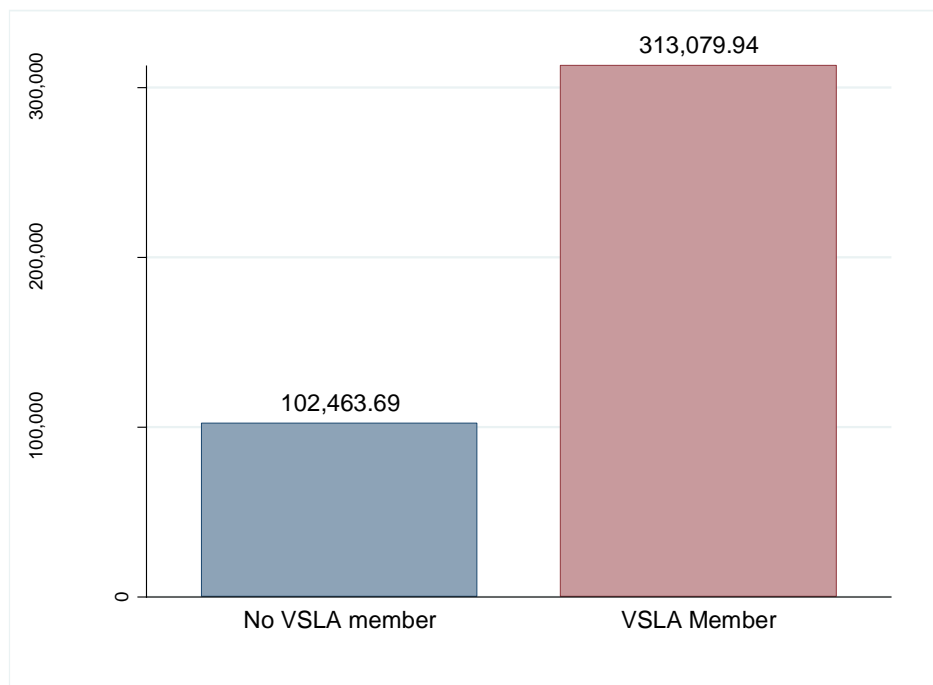
Figure 2: Average total savings per household by VSLA Membership (n = 600)

Contribution of VSLA savings to total savings: Savings in VSLA households in the treatment villages (TZS 52,456) are significantly higher than VSLA households in control villages (TZS 34,785) (Table 8). The VSLA savings in treatment villages make up a higher percentage of total household savings (33.7%) than VSLA savings in control village households (21%) (Table 8). These results suggest that despite the fact that control villages included VSLA households, it is likely that most of these groups were not facilitated by TACODA, CARE's implementing partner. Moreover, these VSLAs were not registered with the government. It is thus possible that most control-village VSLA groups had not been formally trained, resulting in lower savings.

Table 8: Savings at household and village level for treatment and control villages

	Villages				t - statistic
	Control		Treatment		
	Mean	Std. Dev	Mean	Std. Dev	
Avg. savings per HHH (TZS)	158,010.00	374,960.54	163,675.89	317,088.66	(0.18)
Avg. savings in VSLAs per HHH (TZS)	34,785.00	96,368.74	52,456.27	114,380.52	(1.99)**
% of HHH savings in VSLAs with respect to total savings	21.11	36.92	33.65	42.61	(3.02)***
Total households	200		400		

The analysis at the household level revealed an even larger difference between VSLA and non-VSLA households. Total savings of VSLA households were three times larger than that of non-VSLA households (Table 9). VSLA households saved 71.9% of their savings at their VSLA.

Table 9: Savings for VSLA and non–VSLA households

	VSLA Non-Member		VSLA Member		t - statistic
	Mean	Std. Dev	Mean	Std. Dev	
Avg. savings per HHH (TZS)	102,463.69	290,792.38	313,079.93	396,069.11	(6.28)***
Avg. savings in VSLAs per HHH (TZS)	0.00	0.00	165,322.53	150,234.17	(14.31)***
% of HHH savings in VSLAs with respect to total savings	0.00	0.00	71.90	32.94	(28.04)***
Observations	431		169		600

To confirm savings results, we performed additional analyses that include control variables. For this analysis, we used an ordered logit regression model. We first group savings into low (0-TZS 2,000), moderate (2000 – 100,000), and high (100,000 – 3,000,000) categories then regress household savings on VSLA membership and the

following control variables: sex of the HHH, educational attainment, marital status of the HHH, disposable income, age of household head, and size of the household.

The results show statistically significant differences in the total savings of VSLA households and non-VSLA households (Table 10). Households with higher income save more than lower-income households, female-headed households and polygynous families have significantly lower savings; whereas households with HHH who have completed at least eight years in school have significantly higher household savings than those with less educated HHHs.

Table 10: Impact of VSLA membership on household total savings

Variable	(1)	(2)
Disposable Income (in Log scale)	0.660***	0.756***
	(6.05)	(6.37)
Age	0.00390	0.00648
	(0.40)	(0.63)
Size of household	0.0230	0.0345
	(0.32)	(0.45)
Sex (Female)	-0.633*	-0.909**
	(-1.81)	(-2.41)
Marital Status:		
Partnered (Monogamous / Polygamous)	-0.964*	-1.016*
	(-1.81)	(-1.83)
Widow / Widower	0.0788	-0.00285
	(0.14)	(-0.00)
Level of Education:		
Primary school level	0.748*	0.804*
	(1.83)	(1.82)
Above Primary school level	1.361**	1.337**
	(2.21)	(2.06)
Treated	0.502*	
	(1.83)	
VSLA Member		2.058***
		(6.87)

Constant 1[17]	6.129***	7.516***
	(4.33)	(5.00)
Constant 2	7.862***	9.573***
	(5.41)	(6.14)
Observations	234	234
Pseudo R-squared	0.107	0.207
Chi-squared	54.69	105.6
Prob > chi2	1.40e-08	1.16e-18

Increased nutrition and food security (NFS)

According to the FAO, Improved food security and better nutritional status, are required for human resource development and the resulting gains in productivity and economic growth[18]. Savings-led microfinance, therefore, may indirectly affect economic growth by improving nutrition and food security in rural communities, which can enhance long-term productivity. Increased access to funds through informal financial services including VSLAs often increases consumption of food and non-food items as observed in many studies. In the analysis of food security, as with other micro-level indicators in this study, we measured the impact at both the village and household levels. We compared food dietary diversity and food security index scores between treatment and control villages, and between VSLA and non-VSLA households in all villages.

Nutrition

The analysis uses the Food Dietary Diversity (FDD)[19] index to assess household nutrition which counts the number of food groups eaten by most household members the day before the interview and in the past seven days. The index is created from a series of questions about a variety of food types set out in the Demographic and Health Survey (DHS) guidelines. The analysis found no statistical differences between the average FDD scores of households located in treatment and control villages.

The analysis revealed statistically significant differences between VSLA and non-VSLA households. The average FDD score of households with a VSLA member was significantly

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[17] The constants are the cut points or intercepts of the ordered logistic regression equation. Since we are measuring the odds of being in one of the three different groups of savings, we have two constants or cut-points. The first cut off point is associated with the maximum savings in the lowest savings category when the predictor (e.g., being in a VSLA household) is zero. The second constant is related to the maximum savings in the middle category when the predictor is zero.

[18] DD is usually measured using a simple count of foods or food groups over a given reference period. Ruel, M. T. (2003). Operationalizing dietary diversity: a review of measurement issues and research priorities. The Journal of nutrition, 133(11), 3911S-3926S

[19] DD is usually measured using a simple count of foods or food groups over a given reference period. Ruel, M. T. (2003). Operationalizing dietary diversity: a review of measurement issues and research priorities. *The Journal of nutrition*, *133*(11), 3911S-3926S.

higher than households with no VSLA member. These findings suggest that VSLA households are likely to eat a more diversified diet than their non-VSLA counterparts. Similar differences were observed in both daily and weekly dietary diversity scores (Figures 3&4)
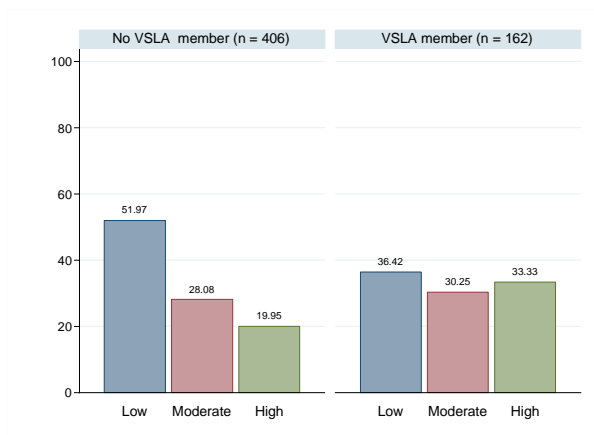
Figure 3: Food Diversity by Day: VSLA vs non-VSLA HH (n = 568)
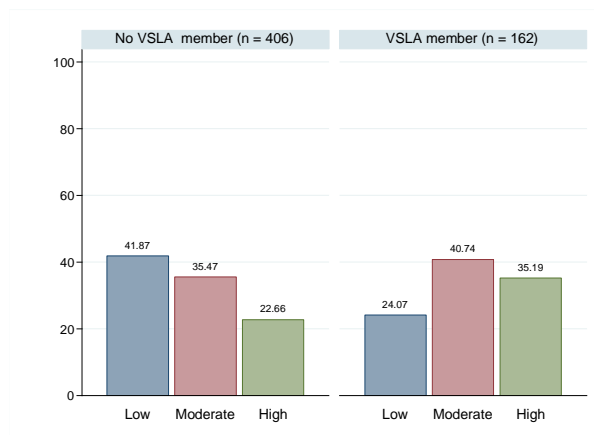
Figure 4: Food Diversity by Week: VSLA vs non-VSLA HH (n = 568)

Food insecurity

Food insecurity was assessed through a series of standard questions about the number of meals skipped due to lack of food and the frequency of missing meals within a specified period. The food insecurity indicator is calculated at two intervals: monthly (four-weeks) and annually[20]. There were no meaningful differences between treatment and control villages.

The differences in the average food insecurity scores between households with and without a VSLA member were statistically significant for both monthly and annually periods (Table 11). Figures 5 and 6 below show the proportion of households with different levels of food insecurities. Like with FDD, these findings suggest that food insecurity is likely to be lower when a household has at least one spouse who is a member in the VSLA compared to when none of the spouses is a member.

Table 11: Food Insecurity/ Diversity Score by Membership into VSLA

Scores	*No VSLA member*	*VSLA member*	*t - test*

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[20] The reason for assessing the 12 months (in addition to the four-weeks) period is that food security varies across seasons for most households, especially in rural areas where they largely rely on seasonal agricultural produce for food and income.

	Mean	SD	Mean	SD	
Avg. HH Food Insecurity Score (Monthly)	1.67	1.77	1.01	1.28	(4.95)***
Avg. HH Food Insecurity Score (Year)	0.61	0.93	0.31	0.67	(4.35)***
Avg. # of Food Types eaten (1 day)	4.39	1.44	5.12	1.6	(-5.05)***
Avg. # of Food Types eaten (7 days)	6.99	2.01	7.99	1.85	(-5.67)***
Observations	406		162		568

Notes: t - statistics in parenthesis. Significant at *** p < 0.01, ** p < 0.05, * p < 0.1
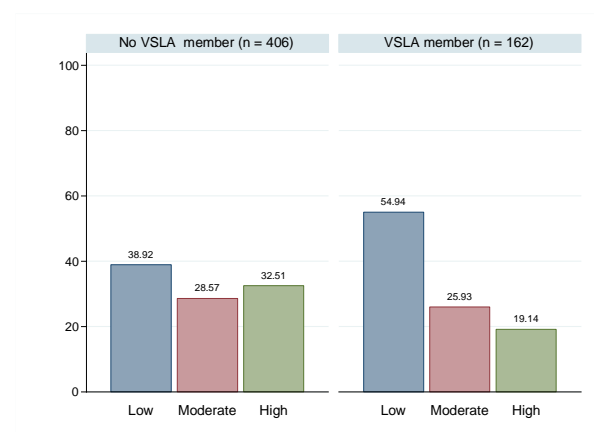
Figure 5: Food insecurity (Monthly): VSLA vs non–VSLA HH (n = 568)
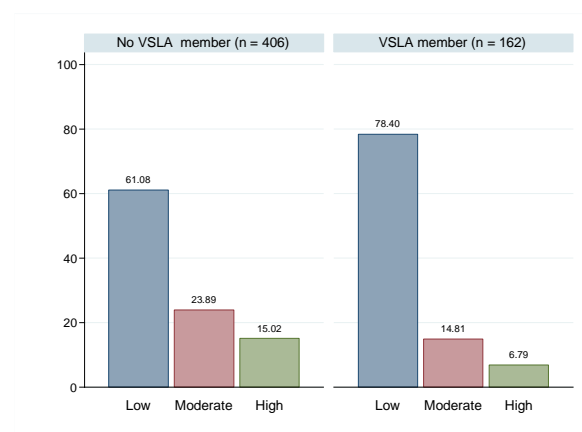
Figure 6: Figure 6: Food insecurity (Annual): VSLA vs non–VSLA HH (n = 568)

Risk mitigation

Savings can take the form of quasi-insurance in times of unforeseen economic shocks and adverse events (Steinert et al., 2017). Shocks such as illness or death of a household member may eliminate critical income and impose heavy expenses on medical or funeral costs. Thus savings "can facilitate consumption smoothing by providing a buffer against emergencies and reducing alternative coping mechanisms such as sales of high-return assets" (Steinert et al. 2017, p. 5). Availability of savings during shocks may thus prevent loss in food intake, thus ensuring increased resilience as well as reducing susceptibility to poverty (Klasen, Lechtenfeld & Povel, 2015). In the long term, insurance products may encourage households to initiate higher risk but more profitable economic activities. Care's VSLA programme had operated for about two years or less prior to the survey period. We thus analyzed the households in the treatment villages compared to control village households on their ability to reduce the impact of economic and other household shocks.

Many households (n=268, 44.7%) experienced at least one shock that negatively affected their households' welfare in the past 12 months (Table 12).

Table 12: Number of households that experienced household shocks in the past year

No. Events	Villages				Households				Total	
	Control		Treatment		Non-VSLA		VSLA			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
0	108	54.00	224	56.00	244	56.61	88	52.07	332	55.33
1	71	35.50	129	32.25	140	32.48	60	35.50	200	33.33
2	15	7.50	40	10.00	39	9.05	16	9.47	55	9.17
3	4	2.00	6	1.50	6	1.39	4	2.37	10	1.67
4	1	0.50	0	0.00	1	0.23	0	0.00	1	0.17
5	1	0.50	1	0.25	1	0.23	1	0.59	2	0.33
Total/AVG.	200	46.00	400	44.00	431	43.39	169	47.93	600	44.67

Across villages, the most experienced shock was a death or health-related event of a family member or close relative (n= 128, 21.3%) (Table 13). No statistically significant differences were observed between control and treatment villages or between VSLA and non-VSLA households.

Table 13: Bad experiences that affected household's welfare in the past 12 months

Household Shocks	Freq.	%
Separation or divorce	8	1.33
Dwelling damage or loss	3	0.50
Robbery or Theft	14	2.33
Rise of food prices	7	1.17
Large rise of business inputs and inventory's prices	1	0.17
Large fall in business sales prices	35	5.83
Large rise of input's prices for agriculture	32	5.33
Loss of crops or livestock	18	3.00
Severe water shortage	4	0.67
End of remittances from abroad	1	0.17
Failure of family business	1	0.17
Job loss or salary freeze	0	0.00
Property damage by fire	2	0.33
Loss or dispute over land	11	1.83
Death, illness or accident	128	21.33
Other	3	0.50
Total	268	44.67

Coping strategies: Households that experienced a shock took various actions to cope. Strategies included selling/leasing assets (e.g. livestock, crops, or land), using savings/insurance products, loans[21]; seeking labor assistance from relatives or friends, avoiding expenditures[22], and taking up additional work[23]. A few individuals sought external aid from churches, NGOs or government. No differences were observed between control and treatment villages. However, we found highly statistically significant differences in the percentage of households that used loans as a coping strategy: non-VSLA (n=33, 17.7%) vs. VSLA (n=32, 39.5%) households (Table 14).

Table 14: Coping strategies by VSLA membership

Main mechanism used to deal with bad events and shocks	Households				Total		Likelihood ratio Chi2 test
	Non-VSLA		VSLA				
	Freq.	%	Freq.	%	Freq.	%	
Sale assets	35	18.72	20	24.69	55	20.52	(1.21)
Use savings or insurance	44	23.53	26	32.10	70	26.12	(2.10)
Use loans	33	17.65	32	39.51	65	24.25	(13.95)***
Use labor assistance from family / friends	44	23.53	14	17.28	58	21.64	(1.34)
Spending reduction	30	16.04	11	13.58	41	15.30	0.27)
Additional work	32	17.11	17	20.99	49	18.28	(0.55)
Aid from NGOs, Govt and Church	19	10.16	8	9.88	27	10.07	(0.01)
HHs with at least one bad event in the past year or past year and before	187	43.39	81	47.93	268	44.67	

Note: likelihood-ratio chi2(6) = 10.5145   Pr = 0.105

VSLA savings and credit use to cope with shocks: As shown in Table 15, the highest percentage of households that used savings to cope with bad events used money saved at home. No statistically significant differences were observed between control and treatment villages. However, over 14.8% (n=12) of VSLA members used savings from VSLAs to overcome shocks, an option that was unavailable to their non-VSLA counterparts.

Table 15: Sources of savings used to deal with household shocks by VSLA membership

Savings	Number of Households	

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[21] Like with savings, most households which used loans got them from family/relatives or friends.
[22] Most households who reduced their expenditure changed their eating pattern while a few avoided expensive foods such as meats.
[23] Additional work mainly included farm work labor and a few included off-farm work.

	Non-VSLA		VSLA		Total		Likelihood ratio Chi2 test
	Freq.	%	Freq.	%	Freq.	%	
Home/Kibubu	34	18.18	9	11.11	43	16.04	(1.26)
SACCOs	3	1.60	1	1.23	4	1.49	(0.02)
VICOBA	0	0.00	12	14.81	12	4.48	(31.04)***
ROSCAs	1	0.53	1	1.23	2	0.75	(0.42)
Private Bank	1	0.53	2	2.47	3	1.12	(1.92)
Microfinance Org.	0	0.00	0	0.00	0	0.00	(0.00)
Mobile Money Account	6	3.21	1	1.23	7	2.61	(0.77)
Friends or relatives	0	0.00	0	0.00	0	0.00	(0.00)
Group Insurance	0	0.00	0	0.00	0	0.00	(0.00)
Private Insurance	1	0.53	2	2.47	3	1.12	(1.92)
Other	2	1.07	1	1.23	3	1.12	(0.04)
HHs with at least one bad event the past year or past year and before	187	43.39.00	81	47.93	268	44.67	-

Note: likelihood-ratio chi2(7) = 33.4168 Pr = 0.000

Similarly, for those who used credit to deal with a shock, a significantly higher percentage of households in treatment villages used VSLA credit (n=20, 11.36%) compared to control villages (n=3, 3.26%) (Table 16). This is one of the few significant contrasts between treatment and control villages.

Table 16: Sources of loans used to deal with bad events by control and treatment villages

Credit Sources	Number of Households				Total		Likelihood ratio Chi2 test
	Control		Treatment				
	Freq.	%	Freq.	%	Freq.	%	
Family and relatives	12	13.04	21	11.93	33	12.31	(0.14)
Friends	3	3.26	8	4.55	11	4.10	(0.19)
Private Moneylender	0	0.00	0	0.00	0	0.00	(0.00)
Cooperative or Village Fund	0	0.00	0	0.00	0	0.00	(0.00)
Private Bank	0	0.00	0	0.00	0	0.00	(0.00)
SACCO	0	0.00	2	1.14	2	0.75	(1.62)
VSLA	3	3.26	20	11.36	23	8.58	(5.16)**
ROSCA	1	1.09	1	0.57	2	0.75	(0.23)
NGO	0	0.00	1	0.57	1	0.37	(0.81)
Mobile Money Account	0	0.00	0	0.00	0	0.00	(0.00)
Other	0	0.00	0	0.00	0	0.00	(0.00)
HHs with at least one bad event the past year or past year and before	92	46.00	176	44.00	268	44.67	-

Note: likelihood-ratio chi2(5) = 6.3632 Pr = 0.272

VSLA households relied on VSLA credit to overcome shocks (n=20, 24.7%) whereas non-members relied mainly on family and friends (n=3, 1.6%) (Table 17).

Table 17: Sources of loans used to deal with household shocks by VSLA membership

| Credit Sources | Number of Households | | | | Total | | Likelihood ratio Chi2 test |
| | Non-VSLA | | VSLA | | | | |
	Freq.	%	Freq.	%	Freq.	%	
Family and relatives	23	12.30	10	12.35	33	12.31	(0.07)
Friends	10	5.35	1	1.23	11	4.10	(2.48)
Private Moneylender	0	0.00	0	0.00	0	0.00	(0.00)
Cooperative or Village Fund	0	0.00	0	0.00	0	0.00	(0.00)
Private Bank	0	0.00	0	0.00	0	0.00	(0.00)
SACCO	1	0.53	1	1.23	2	0.75	(0.42)
VSLA	3	1.60	20	24.69	23	8.58	(36.44)***
ROSCA	1	0.53	1	1.23	2	0.75	(0.42)
NGO	1	0.53	0	0.00	1	0.37	(0.66)
Mobile Money Account	0	0.00	0	0.00	0	0.00	(0.00)
Other	0	0.00	0	0.00	0	0.00	(0.00)
HHs with at least one bad event the past year or past year and before	187	43.39	81	47.93	268	44.67	-

Note: likelihood-ratio chi2(5) = 28.7686 Pr = 0.000

Improved agricultural outcomes

A number of studies have shown that VSLA groups often schedule their groups to end during critical times of cash needs such as farming activities, which enables the group members to use annual share-outs on agricultural inputs, equipment, and labor (Beaman, Karlan, & Thuysbaert, 2014)[24]. Meeting agricultural needs in a timely manner can lead to higher crop yields, for example, and higher incomes. Other studies have found that money from savings-led microfinance groups can be used to purchase livestock, which contribute to household income through the sale of derivative products (Beaman et al., 2014. To measure impacts of VSLAs on agricultural outcomes, we assessed crop yields, livestock holdings, agricultural-related expenditures, the value of farming tools/machinery, and earnings from these activities[25].

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[24] Beaman, L., Karlan, D., & Thuysbaert, B. (2014). *Saving for a (not so) rainy day: A randomized evaluation of savings groups in Mali* (No. w20600). National Bureau of Economic Research.
[25] While the measurement of employment arising from agricultural activities is important, most households are yet to realize such outcomes, possibly due to small-scale nature of most farms.

Crop yields

Respondents reported yields for all the crops harvested in the past twelve months. Households in both control and treatment villages cultivated maize and beans most frequently (Table 18). Over 90% of households harvested maize (n=193, 96.5% control; (n=371, 92.6% treatment). Beans were the second most common crop (n=150, 75.0% control; n=312, 78.0% treatment). Other crops were only grown in a few villages, including Irish potatoes (n=70, 11.7%), trees (n=58, 9.7%), peas (53=8.8%), and sweet potatoes (39=, 6.5%).

Table 18: Crops harvested in the past 12 months

| Crops | Number of households | | | | Total | | Likelihood ratio Chi2 test |
| | Control | | Treatment | | | | |
	Freq.	%	Freq.	%	Freq.	%	
Maize	193	96.50	371	92.75	564	94.00	(3.62)*
Rice	0	0.00	2	0.50	2	0.33	(1.62)
Finger Millet	6	3.00	12	3.00	18	3.00	(0.00)
Wheat	1	0.50	5	1.25	6	1.00	(0.85)
Cassava	0	0.00	2	0.50	2	0.33	(1.66)
Sweet Potatoes	7	3.50	32	8.00	39	6.50	(4.90)**
Irish Potatoes	23	11.50	47	11.75	70	11.67	(0.01)
Tomatoes	1	0.50	1	0.25	2	0.33	(0.63)
Onions	1	0.50	1	0.25	2	0.33	-
Beans	150	75.00	312	78.00	462	77.00	(0.67)
Peas	11	5.50	42	10.50	53	8.83	(4.45)**
Bambaranuts	0	0.00	1	0.25	1	0.17	(0.81)
Sunflower	0	0.00	4	1.00	4	0.67	(3.25)*
Simsim	0	0.00	0	0.00	0	0.00	-
Tress/ Forest	20	10.00	38	9.50	58	9.67	(0.04)
Groundnuts	0	0.00	1	0.25	1	0.17	-0.81

Notes: t - statistics in parenthesis. Significant at *** p < 0.01, ** p < 0.05, * p < 0.1

The analysis of crop yields compares between control and treatment and between VSLA and non-VSLA households for the most commonly grown crops (maize and beans) (Table 18). Results show that the average yields for maize and beans in control-village households were significantly higher than in treatment villages. The median yield for maize is also higher in the control villages. While the median bean yield was slightly lower in the control villages compared to treatment villages, the yield remains significantly higher when land cultivated in the past 12 months is controlled for. The lower median for beans resulted from the poor yields experienced by most households even though others had much higher yields.

The comparison of crop yields further indicates that average maize yields were significantly higher in VSLA households (5.6 sacks; SD=3.5) compared to non-VSLA

households (4.5 sacks; SD=3.5) (Table 19). Median yields of both maize and beans are much higher in VSLA households than in non-VSLA household. However, after controlling for the size of land cultivated, the differences were not statistically significant.

Table 19: Maize and beans harvests in the past 12 months by control and treatment villages

Average units	Villages						t - test
	Control			Treatment			
	Mean	Median	SD	Mean	Median	SD	
Maize (6 cans sacks)	5.24	4.10	3.44	4.60	3.30	3.58	(2.05)**
Beans (20k sacks)	8.37	6.00	8.42	6.26	6.26	6.81	(2.64)***
Total	200			400			600
	Households						
	Non-VSLA HHH			VSLA HHH			
Maize (6 cans sacks)	4.53	3.30	3.51	5.55	5.00	3.54	(-3.03)***
Beans (20k sacks)	6.50	4.00	6.93	7.95	5.00	8.39	(-1.77)*
Total	431			169			600

Notes: t - statistics in parenthesis. Significant at *** p < 0.01, ** p < 0.05, * p < 0.1

Livestock holdings

Across all villages, the most commonly reported animals included chickens/chicks/ducks (n=296, 56.6%) and pigs (n=130, 24.8%). Very few households reported owning cattle (n=29, 5.5%) or sheep/goats (n=17, 3.3%) (Table 20). There were no statistically significant differences in animal ownership between the control and the treatment villages, although the median number of sheep/goats and chickens/chicks/ducks per household were higher in the control villages than in the treatment villages (5 vs 3 goats and 7 vs 6 chickens/chicks/ducks). No significant differences in the average number of animals owned were observed between VSLA and non-VSLA households (Table 21).

Table 20: Percentage of households that own livestock

	All households	
Animals	Freq.	Percentage
Cattle	29	5.54
Sheep and Goats	17	3.25
Pigs	130	24.86
Chickens, Chicks and Ducks	296	56.60
Donkeys, horses, mules, camels and oxen	1	0.19
Other (Mostly rabbits)	50	9.56

Table 21: Livestock owned by households in control and treatment villages and by VSLA membership

| Average units | Villages | | | | | | t - test |
| | **Control** | | | **Treatment** | | | |
	Mean	Median	SD	Mean	Median	SD	
Cattle	5.80	3.5	5.90	4.42	4.00	3.70	(0.67)
Sheep and Goats	4.80	5.00	2.38	5.18	3.00	5.56	(-0.19)
Pigs	1.65	1.00	0.87	1.43	1.00	0.74	(1.33)
Chickens, Chicks and Ducks	8.38	7.00	5.96	8.02	6.00	5.92	(0.47)
Donkeys, Horses, Mules and Oxen	0.00	0.00	0.00	0.00	0.00	0.00	-
Observations	200			400			600

| | VSLA membership | | | | | | |
| | **Non-VSLA** | | | **VSLA** | | | |
	Mean	Median	SD	Mean	Median	SD	
Cattle	4.40	4.00	3.50	6.00	3.00	6.36	(-0.70)
Sheep and Goats	5.30	4.00	5.18	4.00	3.00	1.73	(0.74)
Pigs	1.50	1.00	0.80	1.49	1.00	0.76	(0.07)
Chickens, Chicks and Ducks	8.38	6.00	5.96	8.02	7.00	5.92	(0.47)
Donkeys, Horses, Mules and Oxen	0.00	0.00	0.00	0.00	0.00	0.00	-
Observations	431			169			600

Notes: t - statistics in parenthesis. Significant at *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Value of farming-related assets

Respondents were asked to identify the types of farming-related assets they own and then to estimate their value. Over 85% of households own hand tools, and only a negligible percentage own machinery and other equipment.

Most households estimated the value of their farming tools and machinery in the lowest category (TZS 0-50,000). No significant differences were observed between the control and treatment villages or between VSLA and non-VSLA households.

Agricultural-related expenses

Increased savings might result in higher expenditures on fertilizer or manure, pesticides, herbicides, and labor. Households in the control and treatment villages spent about the same amount on agricultural inputs, but VSLA households spent significantly more than non-VSLA households: 42.4% VSLA households spent at least TZS 100,000/= vs. 29.4% non-VSLA households (Figure 7).

Figure 7: Agricultural expenses by VSLA membership (n= 519)

Earnings from farming activities (crops and livestock)

The analysis compared households' annual sales of crops and livestock /derivatives (eggs, milk, meat, manure, etc.). Results show no differences between control and treatment villages, but did reveal highly significant differences in farm earnings between VSLA and non-VSLA households: 43.2% of VSLA households compared to 28.6% of non-VSLA household earned above TZS 162,000 (Figure 8).

A regression analysis confirms that annual VSLA household farm earnings are greater than non-VSLA households after controlling for various other factors (Table 32 in the appendix). Other control factors that had a positive impact on farm income included total costs used in agricultural production; size of land cultivated and value of tools used for agriculture. These results indicate that although the VSLA programme had no impact on income at the village level, VSLA membership had a statistically significant impact on the treated households.
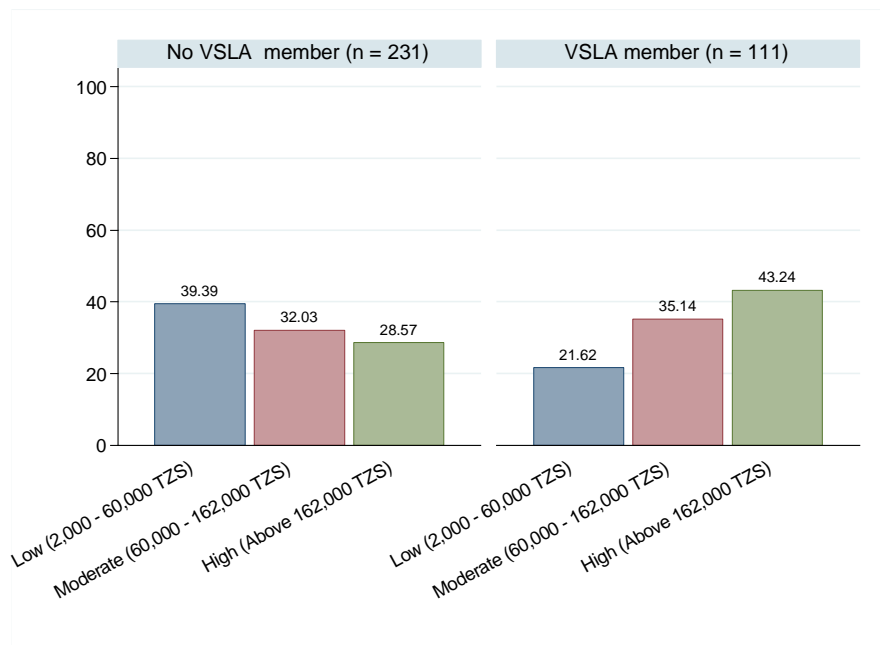
Figure 8: Earnings from agriculture by VSLA membership (n = 342)

Improved business outcomes

According to economic models, savings-led microfinance can help expand the economy by supporting the growth of micro- and small-scale enterprises (MSEs) in rural areas. Economic growth requires funds acquired from increased savings, annual share-outs or loans to exceed consumption needs and for the resources invested in MSES to generate new jobs and other poverty-reduction opportunities. We assessed the impact of VSLA membership on business outcomes by measuring: 1) the number of new businesses initiated during the VSLA programme-implementation phase; 2) business sales; and, 3) the value of business-related assets owned[26]. Our business-outcome analysis compares the differences in these three indicators between control and treatment villages and between households with and without VSLA members.

Enumerators interviewed male and female respondents to determine the number of businesses owned individually or jointly with their spouses. Respondents who owned at least one business were asked to report business sales, value of assets, and employment from any of the businesses they owned or co-owned with their spouse or other household members. If the household owned two or more businesses, both spouses responded to the two main businesses and responses were summed to provide household totals[27].

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[26] Like with agricultural outcomes, we do not attempt to measure employment from businesses because of the rare nature of this practice.

[27] In reality, household owned only up to two businesses and most of them only owned one.

There are 253 businesses distributed among 228 households, which indicates that a number of households owned more than one business[28]. No differences were observed between control and treatment villages, although business ownership differs by sex: Male-headed households owned significantly more businesses than female-headed households (Table 22). Over half (n=129, 51.0%) make local brew, (n=27, 10.7%) operate mini-restaurants, and (n=27, 10. 7%) own general/grocery stores (Table 23).

Table 22: Distribution of businesses by gender of HHH[29]

Distribution of Business by Sex of the HHH	Total Villages	
	Freq.	%
Male	103	62.1
Female	85	37.9
Total	253	100

Note: likelihood-ratio chi2(1) = 0.7049 Pr = 0.401

Table 23: Types of businesses

Type of business	All households	
	Freq.	%
Vegetable and Fruit Seller	6	2.4
Street food vendor or mini-restaurant	27	10.7
Sewing and Tailoring	4	1.6
Hair/Beauty Salon	1	0.4
Charcoal Seller	5	2.0
Small Grocery/General	27	10.7
Clothes/Shoes Seller	6	2.4
Fish Seller	4	1.6
Rice/Beans/Maize Seller	2	0.8
Photocopy/Stationary	1	0.4
Boda-boda/Taxi	1	0.4
Local Brew	129	51.0
Timber Business	14	5.5
Other	26	10.3
Total	253	100

Number of businesses

Fewer than 40% of households in either control or treatment villages own one or more businesses (Table 24). The comparison between households with and without VSLA members, however, shows a statistically significant difference in the number of households with businesses. Households with a VSLA member were more likely to own at least one

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[28] Out of 228 businesses, 136 are owned by the main respondent and 49 by the spouse, 35 jointly by both spouses, 7 are owned by spouse with another family member, and only 1 is owned with a male relative.
[29] Note that the total number of businesses is used here instead of number of households with businesses

business (n=91 53.9%) compared to households without a VSLA membership (n= 137, 31.8%).

Table 24: Business ownership by households with VSLA vs non-VSLA membership

| Business Ownership | VSLA Membership | | | | | |
| | No VSLA | | VSLA | | Total | |
	Freq.	%	Freq.	%	Freq.	%
No	294	68.21	78	46.15	372	62.00
Yes	137	31.79	91	53.85	228	38.00
Total	431	100.00	169	100.00	600	100.00

Note: likelihood-ratio chi2(1) = 24.6287 Pr = 0.000

We also assessed the proportion of households with new businesses (businesses that were 0-3 years old) to determine whether the VSLA programme may have stimulated additional business investment. Analyses at both the village and household level suggest no difference between groups. Both VSLA and non-VSLA households invested equally in new microbusinesses, which implies that the higher number of businesses observed in VSLA households may have existed prior to programme implementation.

Business sales

Enumerators asked respondents who owned at least one business to provide a range of total annual sales for 2018. Business sales include total revenue before deducting operating costs, thus, sales do not equal business profits. Respondents also provided a range of estimated sales for 2017 so we could determine whether sales increased or declined over the past year[30].

There was no statistically significant difference between control and treatment villages in 2018 business sales. The analysis, however, showed that business sales in VSLA-member households were significantly higher than in non-VSLA member households (Figure 9)

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[30] We did not account for inflation between the two years because we used a range of values rather than actual values.
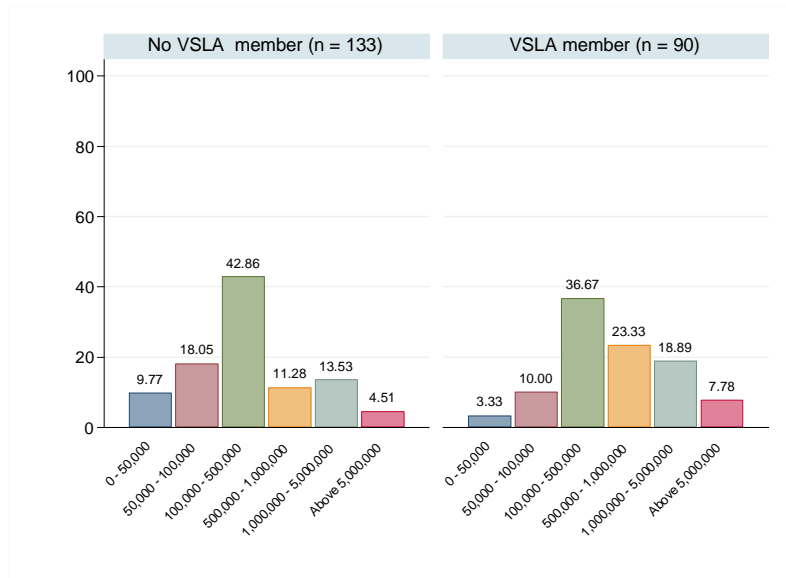
Figure 9: Annual business sales by VSLA and non–VSLA households (n = 223)

Additionally, we performed a sensivity analysis by regressing total business sales against a number of control variables to discern what factors most contributed to business sales growth. The analysis confirmed that households with a VSLA member were more likely to have higher business sales than non-member households, and that business sales were higher whether the respondents lived in a control or treatment village. The analysis also controlled for other variables (Table 25). Control variables that had a positive impact on business sales include: 1) experience (number of years) managing a business; 2) higher cumulative value of business assets; and more business knowledge and skills such as the ability to maintain business records and perform some accounting.

Table 25: Effect of VSLA on business total sales

Variables	(1)	(2)
Experience managing business (years)[31]	0.798**	0.726**
	(2.22)	(2.01)
Value of assets (TZS)[32]		
100,000 - 500,000	0.504	0.525
	(1.33)	(1.37)
Above 500,000	1.743***	1.624***
	(3.84)	(3.56)
New products last three years	0.112	-0.0863
	(0.18)	(-0.14)
New processes last three years	-0.493	-0.329
	(-0.66)	(-0.43)
Discounts and offers to attract customers	-0.634*	-0.563
	(-1.86)	(-1.64)
Usage of advertisement	-0.0248	-0.140
	(-0.07)	(-0.37)
Negotiation of prices with suppliers	0.497	0.509
	(1.49)	(1.51)
Maintenance of business records and accounting	1.075***	1.065***
	(3.00)	(2.92)
Credit sales	0.248	0.242
	(0.60)	(0.58)
Sales level targeting	0.440	0.436
	(1.33)	(1.31)
Income and expenses budget maintenance	-0.314	-0.303
	(-0.71)	(-0.68)
Treated	0.312	
	(0.88)	
Membership into VSLA		0.773**
		(2.39)
Constant 1	2.032***	2.114***
	(3.87)	(4.31)
Constant 2	3.025***	3.127***
	(5.46)	(6.00)
Observations	193	193
Pseudo R-squared	0.131	0.145
Chi-squared	47.62	52.58
Prob > chi2	0.000	0.000

t statistics in parentheses * p<0.10, ** p<0.05, *** p<0.01

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[31] This variable was constructed as a dichotomous variable—1 is assigned if the number of years in business (experience) was above average.
[32] This variable was constructed by breaking the variable of total sales into three groups (0-100,000, 100.000 - 500.000 and above 500,000).

Comparison of 2018 and 2017 sales revealed that business sales declined in both treatment and control villages and in businesses owned by VSLA and non-VSLA member households (Table 26). Moreover, another question that asked about how the business has changed over the past year revealed similar answers—about 50% of all respondents with businesses directly reported a decrease in sales (Table 35 in the Appendix). Among respondents who reported decreased sales, the main reasons for the business decline included: slow national/local economic growth (23.7%), competition (22.8%), and lack of capital (17.9%) (Table 36 in the Appendix). Respondents who experienced sales growth (17.8%) attributed access to capital as the main factor for the increase (Table 37 in the Appendix).

Table 26: The matrices for the business sales of 2018 and 2017 by control and treatment villages[33]

Estimated total sales from main business last year	Estimated total sales from main business for this year					
	0 - 50,000	50,000 - 100,000	100,000 - 500,000	500,000 - 1,000,000	1,000,000 - 5,000,000	Above 5,000,000
0 - 50,000	9	3	3	1	0	0
50,000 - 100,000	1	16	5	0	0	0
100,000 - 500,000	2	12	58	3	0	0
500,000 - 1,000,000	0	0	17	26	4	0
1,000,000 - 5,000,000	0	0	0	2	28	1
Above 5,000,000	0	0	0	0	1	11
Total	12	31	83	32	33	12

Note: likelihood-ratio chi2(25) = 348.5984   Pr = 0.000

Movility Indexes

No. of Business	Treatment
Increasing sales	20
Decreasing sales	35
No change in sales	148
Total Business	203
Index	-10.14

Obstacles to business: The most frequently mentioned obstacles businesses faced include: high competition (n=71, 31.1%) and limited access to finance (n=33, 14.47%). The barriers posed by high competition are not surprising given the low diversity of village businesses: as indicated in previous sections, over half (n=129, 51%) of the 253 businesses produce local brew (Table 23. Another obstacle, limited transport (5.7%) results from poor road infrastructures. Although transportation was not mentioned frequently by respondents, village leaders listed poor roads as a major business obstacle in four of six villages. Some

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[33] The matrix Table shows number of businesses which moved from one sales category to another between 2017 and 2018. In the first row, for example, for the business with sales between 0 -50,000 last year, 9 of them remained in the same range in 2018, and 2 moved to the 100,000 – 500, 000 range while one moved to the 50,000-100,000 category. The green area quantifies businesses which showed improvement in their sales, while the peach area shows business which experienced a reduction in their sales. The grey diagonal shows business which maintained the same level of sales.20 businesses showed better sales this year compared with last year, while 35 had reduced sales, and 148 kept the same level of sales. Then, 100 * (20-35)/143 = -10.14. The negative sign means more businesses experienced decreased sales than an increase.

respondents (n=27, 11.8%) could not identify the obstacles to the success of their businesses which may indicate a lack of business skills and knowledge.

Table 27: Biggest obstacles to business growth and development (n=228)

Business Obstacles	Freq.	Percentage
Access to finance	33	14.47
Access to land	2	0.88
Business permits	4	1.75
Corruption	1	0.44
Customs/trade regulations	8	3.51
Electricity	4	1.75
Inadequately educated	3	1.32
Labor regulations	1	0.44
Bad rumors	7	3.07
Competition	71	31.14
Tax rates	5	2.19
Transport	13	5.70
Don't know	27	11.84
Other	49	21.49

Note: likelihood-ratio chi2(13) = 10.5904 Pr = 0.645

Business assets

Almost all businesses owned at least one asset (84.6%). The most commonly reported assets included tools and utensils (n=163, 71.5%). Less often owned assets included: furniture (n=64, 28.1%), building/land (n=43, 18.9%), and machinery (n=30, 13.2%) (Table 28). We observed no significant differences in the types of assets owned between control and treatment villages.

Table 28: Types of assets owned by business (n = 337)

Types of assets	Total assets owned	
	Freq.	% (*)
Tools/Utensils[34]	163	71.49
Machinery/Equipment	30	13.16
Furniture	64	28.07
Building/Land	43	18.86
Do not own any	35	15.35

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[34] While respondents were not asked to specify the types of business tools/utensils owned, one can infer from the types of businesses reported that these are simple and affordable tools used to run their micro businesses.

| *Other* | 2 | 0.88 |

Note: likelihood-ratio chi2(5) = 1.9812 Pr = 0.85
(*) Percentages are computed over total number of business in each group.

Each active business owner estimated the value of their assets. Enumerators asked two separate questions to improve accuracy: 1) what is the value of the asset under normal circumstances; and 2) what is the value if there was an urgent need to sell the assets. Both questions revealed similar answers. The value of most business assets ranged between 0 and TZS 50,000 (31.8%), and between TZS 50,000 and TZS 100,000 (31.3%) (Table 29). Some respondents (20.5 %) reported values between TZS 100,000 and 500,000, and fewer individuals (16.4%) reported value ranges beyond TZS 500,000. These ranges indicate that most businesses operate at microscale and reflect the typical businesses observed in the study area.

No significant differences were observed between the value ranges reported by businesses in the treatment and control groups. Similarly, no significant differences in asset values were observed between VSLA and non-VSLA households. These findings suggest that the VSLA programme had no meaningful impact on investment in business assets at village and household level.

Table 29: Value of business assets owned by all household

Value pf assets owned	All households	
	Freq.	%
0 - 50,000	62	31.79
50,000 - 100,000	61	31.28
100,000 - 500,000	40	20.51
500,000 - 1,000,000	9	4.62
1,000,000 - 5,000,000	15	7.69
Above 5,000,000	8	4.10
Total	195	100.00

Employment from businesses

Out of 253 businesses, only 10% of them employed one or more people in the past 12 and only six businesses employed any full-time employees. Owners and family members performed most business-related work.

Increased human capital accumulation

Savings-led microfinance can increase the value of human capital at two levels: 1) specific training in financial and entrepreneurial skills; or 2) Increasing VSLA participants' ability to educate their children. Other studies have shown that Savings-led microfinance group members often use loans or share-outs, to pay for school fees, uniforms, and supplies. We

measure school enrollment and educational attainment rates for school-aged children as well as business knowledge and skills of VSLA group members to determine if VSLA membership is correlated with human capital development. We focus on the school-aged category because the programme has only been implemented for a few years. Thus, we expected that impact on human capital accumulation would mainly affect school-aged children[35].

School enrollment rate

For the 7-13 age group, an equal percentage of children were enrolled in school in the control and treatment villages and similar proportions of children were enrolled from VSLA and non-VSLA households.

School enrollment declines for youth aged 14 to 24 yrs: in control villages (n= 66, 35.5%) and in treatment villages (n= 145, 37.6%). At the household level, n=143, (35.7%) of youth in non-VSLA households are enrolled in school compared to n=68 (39.8%) from VSLA households. None of the differences in school enrollment are statistically significant.

School attainment rates

We focused on individuals aged 14-24 (Secondary school or higher education-aged individuals) to determine whether the VSLA programme had any impact on educational attainment. Like with enrollment rates, the analysis showed no difference between control and treatment villages or between VSLA and non-VSLA households.

Disaggregating the data by sex reveal that female students achieved significantly higher education at the household level (Figure 10).

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[35] Since both primary and secondary schools in Tanzania are free, any difference in enrollment rates between VSLA and non-VSLA villages would result from households' ability to buy school supplies, uniforms and provide adequate food for their children. We thus expected that more children from VSLA households would be enrolled, especially in secondary schools as these tend to be located further from most households compared to primary schools. Also, education costs for secondary school and higher education are significantly higher compared to primary school.
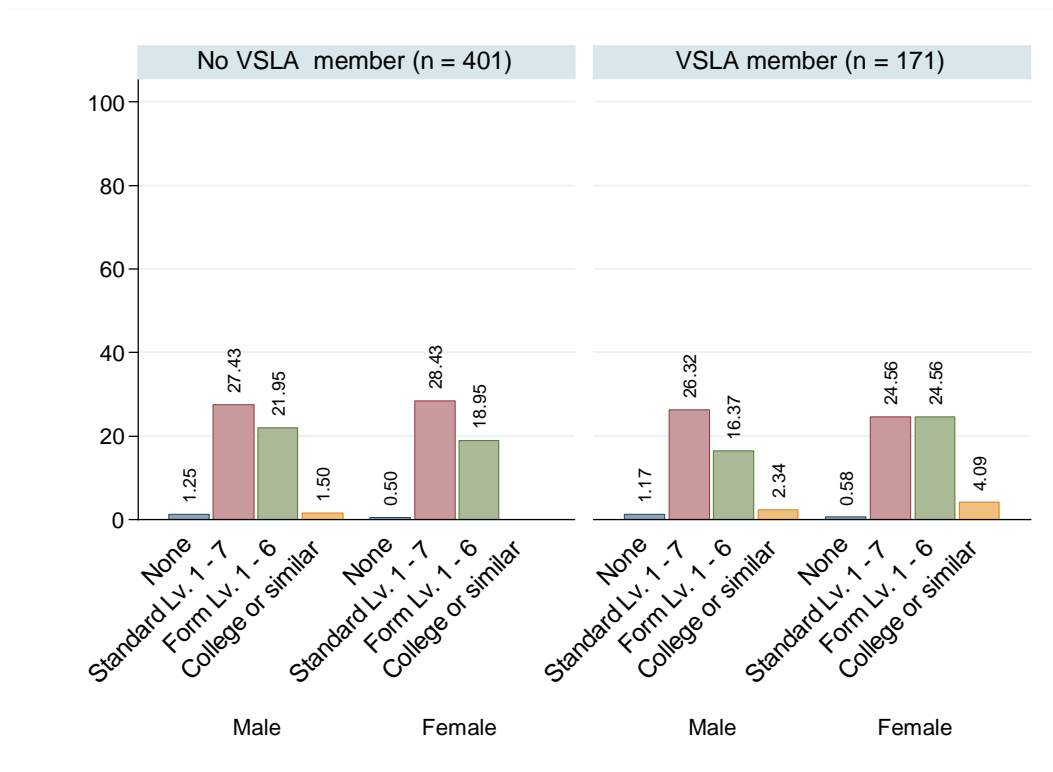
Figure 10: Level of education reached by VSLA and non–VSLA membership and by sex (n = 572)

Business Knowledge and skills

Some VSLA programmes offer training to members, so we analyzed differences in HHH's business knowledge and skills. We did not find any meaningful differences at the village or household levels.

Increased economic performance

Increased savings from VSLA membership leads to investment in businesses and agricultural activities, which, if successful, could improve household economic status. Increased savings and/or additional income could also increase purchases of household assets such as furniture or investments in housing quality. To determine whether there is a correlation between VSLAs and economic performance, we assessed income, expenditure, and household assets (using a Wealth Index Score and monetary value). For all the sub-indicators, we performed the analyses at the village level by comparing statistics between control and treatment villages as well as at the household level by comparing statistics between VSLA and non-VSLA households.

Annual income

To assess the income sub-indicator, we asked male and female spouses (if married or partnered) separately and summed the values. An additional question was asked to determine the spouse's income so that the total income for the household could be

estimated in cases where the spouse was not interviewed[36]. The income earned was based on the month prior to the study; annual income was computed by multiplying this number by twelve[37].

The income analysis categorized average household income into three categories: high (> 1.2 million Tsh/year); medium (480k -1.2 million/year) and low (36k-480k/year). We then compared the percentage of households that fell into each category at the village level (treatment vs. control) and by household level (VSLA and non-VSLA). Although the comparison revealed no difference in average income between treatment and control villages, we detected a statistically significant difference between VSLA and non-VSLA households. A higher percentage of VSLA households was in the highest income category (54 of 160, 33.8%) compared to non-VSLA households (94 of 370, 25.4%) (Figure 11). An ordered logistic regression results in Table 40 (in the appendix) confirms that the VSLA programme had a statistically significant impact at household level.
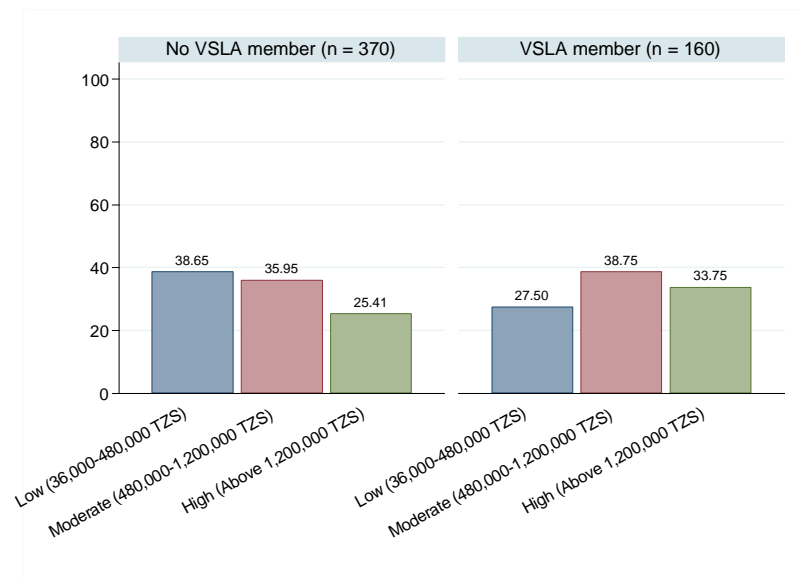
Figure 11: HHH annual income by VSLA and non–VSLA households (n = 530)

Annual expenditures

Respondents also reported their expenditures for one month prior to the survey. A significantly higher percentage of control-village households had annual expenditures above TZS 960,000 (n=72, 38.5%) than in treatment village households (n=107, 27.8%)

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[36] This was done to avoid missing values since we expected to miss some household heads or their spouses.
[37] While we understand there are seasonal differences in income earned by households, we believe the one month reference helped increase accuracy in respondent estimates. Moreover, since the study was conducted during rainy season when income flow is generally lower among most households, we believe that this study captured more conservative estimates than if the study was conducted during dry season, during which most people sell their agricultural produce. Furthermore, the economic activities are similar for all study villages, thus the season should have a similar effect on income for all households.

(Figure 12). A comparison of expenditures at household level revealed a significantly higher proportion of VSLA households with expenditures above TZS 960,000 (n=62, 37.1%) than non-VSLA households (n=117, 28.9%) (Figure 13).
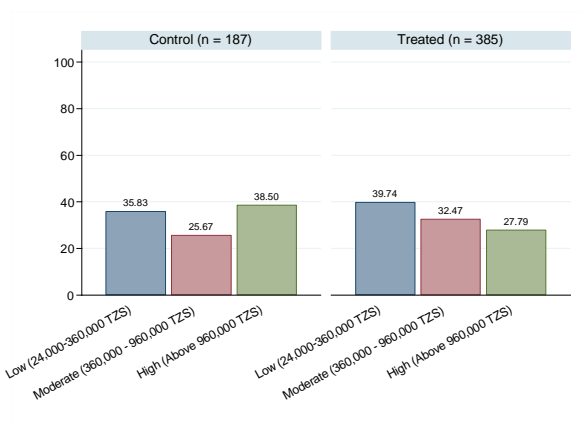
Figure 12: HHH annual expenses by control and treatment (n = 572)
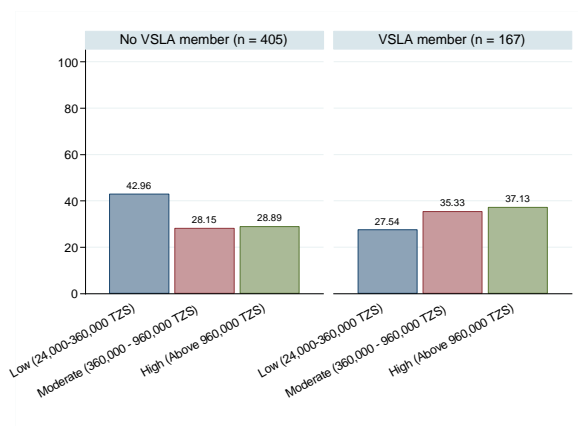
Figure 13: HHH annual expenses by control and treatment (n = 572)

Wealth Index score

We also determined economic performance with a wealth index that evaluates the number and value of household assets such as housing materials, power sources, radios, bicycles, etc. (Table 41 in the Appendix shows the full list). These assets are combined to create a standard wealth variable by applying principal component method (PCA) to identify the assets that are potential determinants of wealth in the study area. We compared the wealth index scores between control and treatment villages and between VSLA and non-VSLA households[38].

No village-level differences were found in the wealth-index scores between control and treatment villages, but the VSLA households scored significantly higher than non-VSLA households (Figure 14).

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[38] Guidelines by Dr. Joseph Ritter were followed and Cronbach's methodology was used to compute weights of the principal components. The following items were omitted from the analysis due to lack of sufficient observations: electric fans, refrigerator, power tiller, tractor and motor boat.
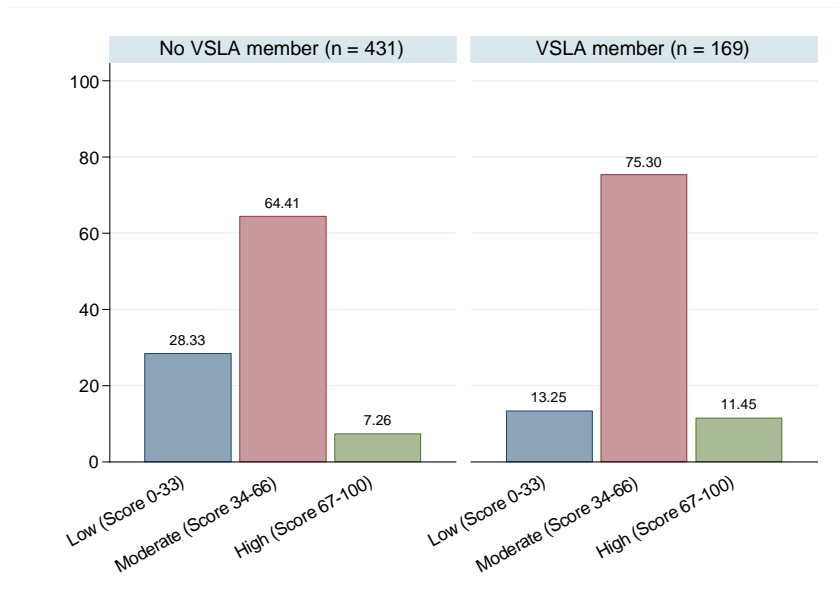
Figure 14: Wealth Index score by VSLA and non-VSLA membership (n = 600)

Value of household assets

We also asked respondents to estimate the value of the assets owned by the household in the respondent's residency. There was again no difference between control and treatment villages whereas household asset values were again significantly higher in VSLA households: The percentage of VSLA households with assets valued above TZS 1,000,000 was much higher than in non-VSLA households (Figure 15).
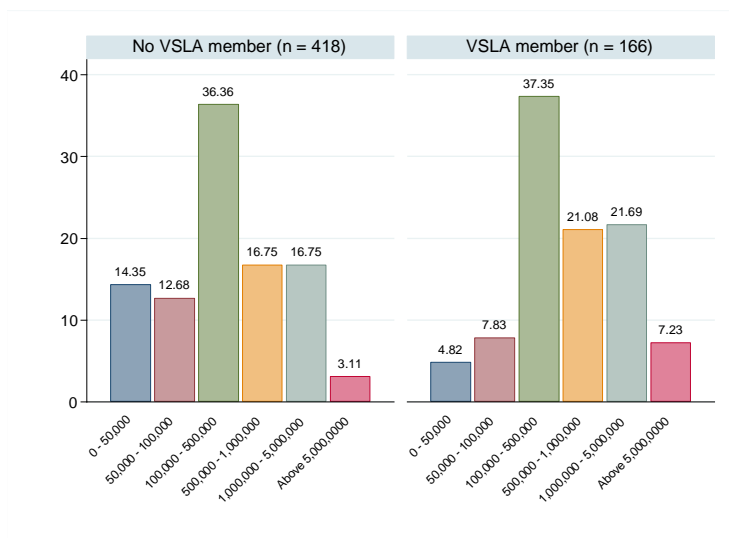
Figure 15: Value of household assets (TZS) by VSLA and non–VSLA households (n = 584)

Appendix

Table 30: Savings behavior of the spouses by control and treatment villages

	All households	
Saved in the last 12 months	*Freq.*	*%*
Main respondent	276	46.00
Spouse	27	4.50
Both	152	25.33
None	145	24.17
Total	600	100.00

Table 31: Reasons for not saving among households

	All households	
Reasons	*Freq.*	*%*
No money to save	221	92.47
No safe place to save	5	2.09
My spouse prevents me from saving	4	1.67
My spouse uses up savings	4	1.67
Does not answer	1	0.42
Other	4	1.67
Total	239	100

Table 32: Saving mechanisms used during the past 12 months by either spouse (n=455)

Savings	**Treatment**		**Control**		Total	
	Frequency	Percent	Frequency	Percent	Freq	Percentage
Home(Kibubu)	203	43.01	104	45.02	307	67.47
Friends or family	25	5.30	16	6.93	41	9.01
SACCOS	16	3.39	3	1.30	19	4.18
VSLAs	125	26.48	44	19.05	169	37.14
ROSCAS	41	8.69	27	11.69	68	14.95
Private Bank	21	4.45	12	5.19	33	7.25
Microfinance Org.	1	0.21	0	0.00	1	0.22
Mobile Money Acc.	40	8.47	25	10.82	65	14.29

Table 33: Impact of VSLA on household total savings

Variable	(1)	(2)
Deposable Income (in Log scale)	0.660***	0.756***
	(6.05)	(6.37)
Age	0.00390	0.00648
	(0.40)	(0.63)
Size of household	0.0230	0.0345
	(0.32)	(0.45)
Sex (Female)	-0.633*	-0.909**
	(-1.81)	(-2.41)
Marital Status:		
Partnered (Monogamous / Polygamous)	-0.964*	-1.016*
	(-1.81)	(-1.83)
Widow / Widower	0.0788	-0.00285
	(0.14)	(-0.00)
Level of Education:		
Standard	0.748*	0.804*
	(1.83)	(1.82)
Form and Adult	1.361**	1.337**
	(2.21)	(2.06)
Treated	0.502*	
	(1.83)	
VSLA Member		2.058***
		(6.87)
Constant 1	6.129***	7.516***
	(4.33)	(5.00)
Constant 2	7.862***	9.573***
	(5.41)	(6.14)
Observations	234	234
Pseudo R-squared	0.107	0.207
Chi-squared	54.69	105.6
Prob > chi2	1.40e-08	1.16e-18

Table 34: Effect of VSLA on income from agricultural earnings

Variables	(1)	(2)
Total Costs (TZS, in Log scale)	0.262***	0.257***
	(2.98)	(2.89)
Area of land cultivated (Acres, in Log scale)	0.659***	0.669***
	(3.36)	(3.43)
Value of tools and equipment (TZS)		
50,000 - 100,000	1.091***	1.033***
	(3.50)	(3.31)
100,000 - 500,000	1.426**	1.463**
	(2.52)	(2.55)
500,000 - 1,000,000	1.318	1.306
	(1.02)	(1.02)
1,000,000 - 5,000,000	12.91	12.21
	(0.03)	(0.03)
Treated	-0.170	
	(-0.67)	
VSLA Member		0.588**
		(2.36)
Constant 1[39]	-0.837**	-0.519
	(-2.08)	(-1.42)
Constant 2	0.729*	1.071***
	(1.82)	(2.90)
Observations	274	274
Pseudo R-squared	0.100	0.109
Chi-squared	60.11	65.30
Prob > chi2	1.44e-10	1.31e-11

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[39] The constants are the cut points or intercepts of the ordered logistic regression equation. Since we are measuring the odds of being in one of the three different groups of agricultural earnings, we have two constants or cut-points. The first cut off point is equivalent to the average for the lowest income category when the predictor (e.g., being a VSLA household) is zero. The second constant is equivalent to the average for the moderate earnings category when the predictor (e.g., being a VSLA household) is zero.

Table 35: Effect of VSLA on business total sales

Variables	(1)	(2)
Experience managing business (years)[40]	0.798**	0.726**
	(2.22)	(2.01)
Value of assets (TZS)[41]		
100,000 - 500,000	0.504	0.525
	(1.33)	(1.37)
Above 500,000	1.743***	1.624***
	(3.84)	(3.56)
New products last three years	0.112	-0.0863
	(0.18)	(-0.14)
New processes last three years	-0.493	-0.329
	(-0.66)	(-0.43)
Discounts and offers to attract customers	-0.634*	-0.563
	(-1.86)	(-1.64)
Usage of advertisement	-0.0248	-0.140
	(-0.07)	(-0.37)
Negotiation of prices with suppliers	0.497	0.509
	(1.49)	(1.51)
Maintenance of business records and accounting	1.075***	1.065***
	(3.00)	(2.92)
Credit sales	0.248	0.242
	(0.60)	(0.58)
Sales level targeting	0.440	0.436
	(1.33)	(1.31)
Income and expenses budget maintenance	-0.314	-0.303
	(-0.71)	(-0.68)
Treated	0.312	
	(0.88)	
Membership into VSLA		0.773**
		(2.39)
Constant 1	2.032***	2.114***
	(3.87)	(4.31)
Constant 2	3.025***	3.127***
	(5.46)	(6.00)
Observations	193	193
Pseudo R-squared	0.131	0.145
Chi-squared	47.62	52.58
Prob > chi2	0.000	0.000

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[40] This variable was constructed as a dichotomous variable—1 is assigned if the number of years in business (experience) was above average.

[41] This variable was constructed by breaking the variable of total sales into three groups (0-100,000, 100.000 - 500.000 and above 500,000).

t statistics in parentheses * p<0.10, ** p<0.05, *** p<0.01

Table 36: Perceived evolution of business sales last 3 years

Evolution	Control		Treatment		Total	
	Freq.	%	Freq.	%	Freq.	%
Stable	10	14.49	32	20.51	42	18.67
Decline	33	47.83	81	51.92	114	50.67
Growth	13	18.84	27	17.31	40	17.78
New Business	13	18.84	16	10.26	29	12.89
Total	69	100.00	156	100.00	225	100.00

Table 37: Factors that explain business decline in the last 3 years (n = 174)

Reasons	Number of business				Total	
	Control		Treatment			
	Freq.	% (*)	Freq.	% (*)	Freq.	% (*)
Lack of Capital	12	17.39	29	18.24	41	17.98
Limited Experience	2	2.90	3	1.89	5	2.19
Poor Financial Manage	1	1.45	2	1.26	3	1.32
Local/National Economy	17	24.64	37	23.27	54	23.68
Migration of People	0	0.00	1	0.63	1	0.44
Lack of time	3	4.35	0	0.00	3	1.32
Competition	10	14.49	42	26.42	52	22.81
Tax rates	0	0.00	4	2.52	4	1.75
Other	4	5.80	7	4.40	11	4.82

Note: likelihood-ratio chi2 (8) = 14.1461 Pr = 0.078
(*) Percentages are computed over total number of business in each group.

Table 38: Factors that explain business growth in the last 3 years (n = 51)

Reasons	Number of business				Total	
	Control		Treatment			
	Freq.	% (*)	Freq.	% (*)	Freq.	% (*)
Access to Capital	9	13.04	14	8.81	23	10.09
Financial Management	2	2.90	4	2.52	6	2.63
Experience in Business	3	4.35	6	3.77	9	3.95
Local/National Economy	1	1.45	1	0.63	2	0.88
Abundance of time	0	0.00	4	2.52	4	1.75
Other	2	2.90	5	3.14	7	3.07

Note: likelihood-ratio chi2(5) = 3.8916 Pr = 0.565

(*) Percentages are computed over total number of businesses in each group.

Table 39: Biggest obstacles to business growth and development (n = 228)

Obstacles	Control Freq.	Control % (*)	Treatment Freq.	Treatment % (*)	Total Freq.	Total % (*)
Access to finance	7	10.14	26	16.35	33	14.47
Access to land	2	2.90	0	0.00	2	0.88
Business permits	1	1.45	3	1.89	4	1.75
Corruption	0	0.00	1	0.63	1	0.44
Customs/trade regulations	3	4.35	5	3.14	8	3.51
Electricity	1	1.45	3	1.89	4	1.75
Inadequately educated	1	1.45	2	1.26	3	1.32
Labor regulations	0	0.00	1	0.63	1	0.44
Bad rumors	1	1.45	6	3.77	7	3.07
Competition	22	31.88	49	30.82	71	31.14
Tax rates	1	1.45	4	2.52	5	2.19
Transport	4	5.80	9	5.66	13	5.70
Don't know	10	14.49	17	10.69	27	11.84
Other	18	26.09	31	19.50	49	21.49

Note: likelihood-ratio chi2(13) = 10.5904   Pr = 0.645

(*) Percentages are computed over total number of business in each group are reported in Table 1.

Table 40: Effect of VSLA on income, expenses, and wealth

Variable	Income	Expenses	Wealth
Membership into VSLA	0.455***	0.522***	0.625***
	(-2.61)	(-3.10)	(-3.73)
Constant 1[42]	-0.475***	-0.319***	-0.525***
	(-4.57)	(-3.23)	(-5.39)
Constant 2	1.096***	0.955***	0.888***
	(-9.67)	(-8.98)	(-8.69)

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[42] The constants are the cut points or intercepts of the ordered logistic regression equation. Since we are measuring the odds of being in one of the three different groups of income, expenses or wealth, we have two constants or cut-points. With respect to income, for example, the first cut off point is associated with the maximum income in the lowest income category when the predictor (e.g., being a VSLA household) is zero. The second constant in turn, is related to the maximum income from households in the medium income category when the predictor is zero.

Observations	530	572	600
Pseudo R-squared	0.006	0.008	0.011
Chi-squared	6.816	9.663	14.11
Prob > chi2	0.00903	0.00188	0.000172

t statistics in parentheses * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table 41: Wealth Index weights

Variable	Weight	Variable	Weight
Water		**Assets owned:**	
Access to piped water in the house	0.004	Bed	0.133
Access to[43] pipe water outside the house	(0.019)	Chair	0.119
No need to pay for drinking water	0.010	Sofa	0.260
Walls		Table	0.173
Cement or similar	0.062	Hoes	0.011
Baked bricks	0.208	Plough	0.059
Mud bricks and mud	(0.170)	Lanterns (fueled with kerosene, ethanol or spirits)	(0.076)
Poles, branches and mud	(0.110)	Radio	0.204
Roof		Mobile phone	0.234
Metallic	0.196	Clock	0.110
Branches and similar	(0.178)	Bicycle	0.099
Floor		Cupboards, drawers or similar	0.189
Cement or concrete , tiles, baked bricks	0.257	TV set	0.207
	(0.263)	Sewing machine	0.095
Light		Iron heater (fueled with charcoal or electricity)	0.185
Electricity	0.301	Stoves (electric or gas)	0.018
Non-electrical (liquid fuel and candle)	(0.254)	Electric generator	0.107
None	(0.129)	Computer (PC or laptop)	0.082
Fuel used for cooking		Motorbike or scooter	0.205
Wood fire	(0.008)	Animal-drawn cart	0.076
Other types of fuels	0.032	Motor vehicles	0.128
Toilet		Solar panel	0.211
Flush toilet facility	0.101		
Closed pit	0.045		
House ownership	0.027		
Farming land	0.007		
Large farming land (farmland size above the average)	0.123		

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[43] Note: Weights were computed using Principal Component Analysis (PCA). The Cronbach's alpha used to measure the validity of the results was 0.8186, slightly above the expected 0.80 mark, and thus suggesting reasonable results. The following items were omitted from the analysis due to lack of sufficient observations: electric fans, refrigerator, power tiller, tractor and motor boat.