



THE UNITED REPUBLIC OF TANZANIA

VICE PRESIDENT'S OFFICE

**HOUSEHOLD SOCIO-ECONOMIC ENDLINE SURVEY
REPORT
FOR
REVERSING LAND DEGRADATION TRENDS AND
INCREASING FOOD SECURITY IN DEGRADED
ECOSYSTEMS OF SEMI-ARID AREAS OF TANZANIA
(LDFS) PROJECT**

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LIST OF ACRONYMS

CAPI	Computer Aided Personel Interview
CSC	Check Score Code
DC	District Council
DED	District Executive Director
FFS	Farmers Field School
FGD	Focus Group Discussion
FSP	Financial Service Provider
GDP	Gross Domestic Product
GEF	Global Environment Facility
Ha(s)	Hectare(s)
HL	Hamlet Leaders
IFAD	International Fund for Agricultural Development
IRDP	Institute of Rural Development Planning
JV/SLUP	Joint Village/Shehia Land Use Plan
LDFS	Reversing Land-Degradation Trends and Increasing Food Security in Degraded Ecosystems of Semi-Arid Areas of Tanzania Project
M&A	Monitoring and Assessment
MPAT	Multi-dimensional Poverty Assessment Tool
MoW	Ministry of Water
NAO	National Audit Office
NBS	National Bureau of Statistics
NRM	Natural Resource Management

PCU	Project Coordination Unit
PG	Producer Groups
PO-RALG	President's Office - Regional Administration and Local Government
RAS	Regional Administrative Secretary
SLM	Sustainable Land Management
SSC	Stories for Significant Change
TFS	Tanzania Forest Services Agency
ToRs	Terms of Reference
URT	United Republic of Tanzania
VC	Village Chairpersons
VEO	Village Executive Officer
VPO	Vice President's Office

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EXECUTIVE SUMMARY

This report comprehensively analyses the 2024 Endline Survey for the Reversing Land-Degradation Trends and Increasing Food Security in Degraded Ecosystems of Semi-Arid Areas of Tanzania (LDFS) Project. The survey was conducted across 23 Villages/Shehias in five District Councils of the United Republic of Tanzania: Nzega DC, Magu DC, Mkalama DC, Kondoa DC on the mainland, and Micheweni DC in Zanzibar (Pemba Island). The survey captured data on 11 dimensions of household well-being as outlined in the Multi-dimensional Poverty Assessment Tool (MPAT), including food and nutrition security, domestic water supply, health and healthcare, sanitation and hygiene, housing, clothing and energy, education, farm assets, non-farm assets, exposure and resilience to shocks, and gender and social equality. Additional questions addressed specific issues related to crop cultivation, livestock, fruit trees, and natural resource conflicts in Tanzania.

During the Endline socio-economic survey, both primary and secondary data of a quantitative and qualitative nature were simultaneously collected. Primary data were gathered from households, Village/Shehia, ward, and District-level project beneficiaries, as well as Key Informants Interviews (KII), Focus Group Discussions (FGDs) and Project Coordination Unit (PCU). In contrast, secondary data were obtained from previous reports and surveys to complement the primary data. The main data collection methods included documentary reviews, key informant interviews, and an MPAT household questionnaire survey. The survey was conducted in 778 households, ensuring a robust and reliable data set.

Data collection was enhanced through Computer-Aided Personal Interviews (CAPI), ensuring accuracy and efficiency. Daily cross-checks and corrections were performed to maintain data quality. The data were then analyzed using advanced tools like Excel and SPSS, ensuring the highest reliability standards. The MPAT Excel file automatically analysed household and Village profiles and presented results across the surveyed areas.

The endline survey findings reveal that school attendance among children aged 5 to 14 has remained high at 98.1%, consistent with baseline figures. However, the average commute time to school remains challenging, particularly in Micheweni DC, where children still walk for about three-quarters of an hour (43.7 minutes). Affordability of school expenses is a concern, with nearly one in five households (19%) unable to afford supplies, and Micheweni DC has the highest incidence at 30.2%. Literacy levels show a mixed picture, with more than half (51.7%) of respondents able to read quickly, but Micheweni DC and Mkalama DC exhibit the highest illiteracy rates at 37.5%. Gender disparities in educational expectations persist, with higher aspirations for boys than girls, indicating the need for targeted interventions in Districts like Micheweni DC to improve access to education and literacy.

Further, health outcomes have improved, with nearly half (48.8%) of households rarely experiencing non-serious illnesses, up from the baseline. Serious illnesses have also decreased, with more than half (54.8%) of households reporting no serious illness in the past year. Access to healthcare remains challenging, with an average travel time of more than three-quarters of one hour (47.5 minutes) to the nearest health facility and Mkalama DC showing the longest travel time of nearly two hours (103.3 minutes). Medical supply shortages persist, with only 7.3% of respondents reporting consistently sufficient supplies. Affordability of professional treatment is a concern, particularly in Micheweni, DC, where over half (56.2%)

of households cannot afford treatment. While gender disparities in healthcare access are minimal, facilities in Nzega DC and Magu DC still face challenges in adequately treating women, underscoring the need for continued investment in healthcare infrastructure.

Moreover, the survey reveals shifts in housing materials and energy usage. There has been a slight increase in the use of diverse construction materials, with cement blocks becoming more common, particularly in Magu, DC. Traditional materials like fired bricks remain dominant in Kondoa, DC. In Micheweni, DC, stone and mortar continue to be widely used. Energy sources are shifting towards renewables, with solar power becoming the primary lighting source for nearly four in ten (38.3%) of households. This trend is especially pronounced in Nzega, DC, and Magu, DC, though traditional fuel sources are still heavily relied upon in Micheweni, DC.

Progress in sanitation and waste management is evident, with a reduction in open defecation from 19.9% at baseline to 12.6% overall. However, Micheweni DC still has a high rate of open defecation at 15.5%, although this is a significant improvement from the baseline. Enclosed pit latrines have increased, but the transition to fully improved facilities has been slow. Waste management practices have improved, with decreased disposal close to homes and increased waste burning, although sustainable practices like composting remain low. These findings highlight ongoing challenges that require further attention.

Over half (53.7%) of households maintain daily teeth brushing, with Micheweni DC leading at 72.5%, although 21.1% in Mkalama DC rarely do so. Handwashing before meals has improved in nearly half of the households (48.3%), but inconsistent soap use remains an issue, with only 11.4% using soap after defecating and before meals. Water access shows mixed results: piped chlorinated water use has increased to 13.1% during the rainy season, but many still rely on insecure sources like streams. Water collection times have increased during the dry season, particularly in Mkalama, DC, where accessibility is a concern. Water sufficiency and quality challenges persist, necessitating continued interventions.

Additionally, the survey provides significant insights into farming, livestock, and aquaculture practices. Access to farming land has decreased, with Micheweni, DC, experiencing the most significant decline. Landholdings are shrinking, and land ownership remains predominantly under common-law arrangements, although there is a slight increase in formalized land arrangements. Livestock ownership has increased, particularly in Nzega, DC, but water access for livestock during the dry season remains challenging. Agricultural practices show continuity and change, with reduced ploughing still prevalent and an increase in zero tillage practices. Despite progress in adopting Climate Smart Agriculture, challenges persist in accessing sufficient seeds and manure.

The survey further reveals an overall improvement in business ownership, skilled service provision, and access to credit. Business ownership has increased slightly, with Micheweni DC seeing the most significant growth. Skilled service provision has also risen, reflecting enhanced livelihood diversification. However, access to formal credit remains challenging, with most households relying on informal sources like relatives and friends. Material well-being shows mixed results, with some households reporting adequate footwear while others still lack it. The most significant concern has shifted from drought to epidemic diseases, affecting many families, particularly in Nzega, DC and Kondoa, DC.

The survey also highlights improvements in food security, nutrition quality, and diet diversity. Good food consumption has increased, particularly in Micheweni DC and Kondoa DC, although food sufficiency remains challenging, especially in Micheweni DC. Nutrition quality has improved modestly, with significant gains in Kondoa, DC. However, it has declined in Micheweni, DC, indicating the need for targeted nutritional interventions. Dietary habits have improved in some areas, with an increased intake of nuts and legumes, although challenges remain in diet diversity.

Climate change awareness has increased significantly, with more households being familiar with the term. Radio, government officials, and community groups are the primary sources of climate information. There is a shift towards relying on long-term climate change projections rather than short-term weather forecasts, indicating a growing recognition of climate adaptation. Access to weather-related information has improved, but many households still lack access. Observations of changing weather patterns have led to shifts in agricultural practices, particularly in Micheweni, DC and Kondoa, DC.

Moreover, the survey indicates a significant increase in natural resource use conflicts, particularly concerning land access and use, with Nzega DC and Magu DC being the most affected. Participation in land use planning has improved slightly, reflecting growing community engagement. Agricultural productivity has shown mixed results, with increased yields in some crops but limited market engagement. Livestock farming remains primarily subsistence-oriented, although some areas have a modest shift towards commercialization.

The endline survey further established key shifts in non-farm assets, with stable employment and skill levels, but a notable decline in households with fixed assets and remittances. Access to financial services has improved, reflecting success in financial inclusion efforts. However, the decline in fixed assets and remittances indicates underlying economic challenges that must be addressed. Adaptation to climate change has shown progress, with increased adoption of climate-resilient agricultural practices and technologies, particularly in Micheweni, DC and Nzega, DC. However, water availability for agriculture remains a significant concern, and human capacity to cope with climate change is mixed, with some Districts lagging.

Moreover, the survey highlights progress and challenges in gender and social security. Access to education and healthcare has declined, particularly in Mkalama, DC, Nzega, DC and Magu, DC. However, there are positive trends in gender and social equality, with high levels of reported equality across Districts, although access to essential services needs improvement.

Lastly, but equally important, is the issue of project sustainability. The endline survey highlights that the project successfully implemented several sustainability measures crucial for the long-term continuity of its achievements. Efforts such as capacity building, strengthening networks and collaboration, establishing market linkages, developing water and livestock infrastructures, and value-addition initiatives have positioned the project for sustained impact. However, to ensure the feasibility of these sustainability elements, challenges related to operational and maintenance costs and group dynamics must be effectively addressed to safeguard the project's enduring success.

COMPARISON MPAT ENDLINE AND BASELINE SURVEY RESULTS SUMMARY

The MPAT automatic analysis report shows that 778 households were involved in the endline survey compared to 850 in the baseline survey. The average time of the endline survey was 28 minutes compared to 32 minutes in the baseline survey. The average respondent's age was 50 for the endline and baseline survey. On gender statistics and heads of household's marital status, data for endline (baseline) are married, single, divorced and widower 82 (79), 2(3), 3(4) and 12(11) per cent, respectively.

	Endline (2024)		Baseline (2019)	
General Information	Count	[min, max]	Count	[min, max]
Number of households surveyed	778		850	
Average survey time (minutes)	28	[11, 102]	32	[10, 124]
Average respondent's age (years)	51	[18, 98]	50	[18, 98]
Average head of HH age (years)	55	[23, 98]	50	[18, 98]
Gender Statistics		%		%
Male respondents	504	65	647	76
Female respondents	271	35	203	24
Male headed HHs	622	80	647	76
Female-headed HHs	156	20	203	24
Female & male headed HHs	0	0	0	0
Head of Household's Marital Status		%		%
Married	637	82	674	79
Single	12	2	27	3
Divorced	22	3	37	4
Widowed	94	12	94	11

Concerning MPAT's (2014) endline results data on 11 components, the average for gender and social equality has increased to 82.6% compared to 74.6% in the baseline survey, followed by food and nutrition security 74.2% compared to baseline, which was 68.6%. The lowest for the endline survey is still the possession of farm assets, which is 42.7%, compared to the baseline survey, which was 48.4%.

MPAT (2019) Components Scores across households	Endline (2024)		Baseline (2019)	
	Average	[min, max]	Average	[min, max]
Food & Nutrition Security	74.2	[14.3, 98.1]	68.6	[12.4, 100.0]
Domestic Water Supply	60.1	[20.9, 94.6]	56.8	[13.9, 93.3]
Health & Health Care	59.1	[20.8, 100.0]	55.0	[18.2, 96.5]
Sanitation & Hygiene	51.2	[12.0, 87.8]	52.7	[13.9, 88.0]
Housing, Clothing & Energy	52.4	[20.0, 86.9]	50.3	[13.9, 87.5]

MPAT (2019) Components Scores across households	Endline (2024)		Baseline (2019)	
	Average	[min, max]	Average	[min, max]
Education	52.9	[10.0, 100.0]	54.4	[10.0, 100.0]
Farm Assets	42.7	[10.0, 100.0]	48.4	[10.0, 86.5]
Non-Farm Assets	45.6	[26.9, 81.4]	50.0	[28.7, 81.1]
Exposure and Resilience to Shocks	67.1	[14.1, 100.0]	54.6	[10.0, 100.0]
Gender & Social Equality	82.6	[25.6, 100.0]	74.6	[18.0, 100.0]
Adaptation to climate change	53.3	[10.0, 100.0]	54.4	[27.4, 100.0]

The data collection status shows that 1 component and seven subcomponents in the endline survey scored above 80%, compared to none in the baseline survey. In both surveys, none scored less than 30%. Only one subcomponent out of 31 had missing data in the baseline survey.

	Endline (2024)		Baseline (2019)	
	10 Components	31 Subcomponents	10 Components	31 Subcomponents
Above 80 points	1	7	0	0
Between 60 and 80	3	7	2	16
Between 30 and 60	7	17	9	14
Below 30 points	0	0	0	0
Missing data	0	0	0	1

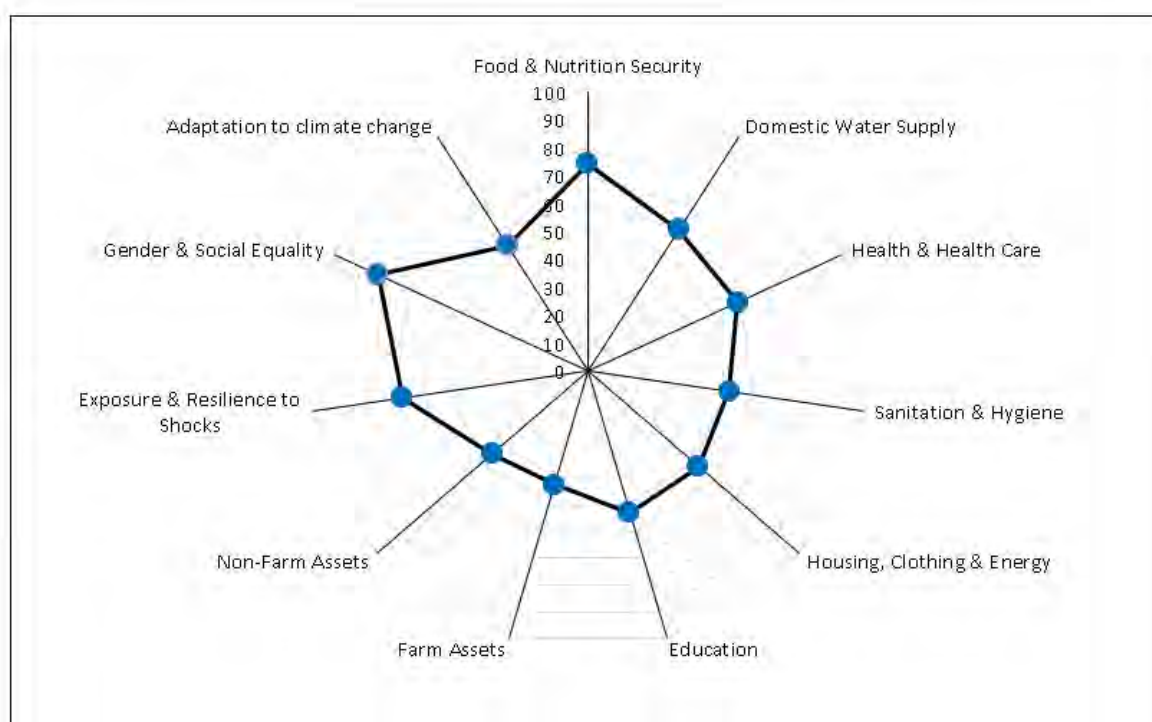
The scores across all Villages show the subcomponents score for each component, where there is no missing data in the endline survey compared to the baseline survey, where there is missing data on social equality.

Scores across all Villages			Endline (2024)		Baseline (2019)	
			Average	[min, max]	Average	[min, max]
1.	Food & Nutrition Security	Consumption	83.3	[10.0, 100.0]	77.0	[10.0, 100.0]
		Access Stability	82.5	[10.0, 100.0]	74.2	[10.0, 100.0]
		Nutrition Quality	58.0	[10.0, 93.8]	57.1	[10.0, 100.0]
2.	Domestic Water Supply	Quality	56.9	[13.5, 91.0]	57.7	[10.0, 98.0]
		Availability	72.2	[14.5, 100.0]	61.1	[10.0, 100.0]
		Access	58.4	[10.0, 100.0]	58.4	[10.0, 100.0]

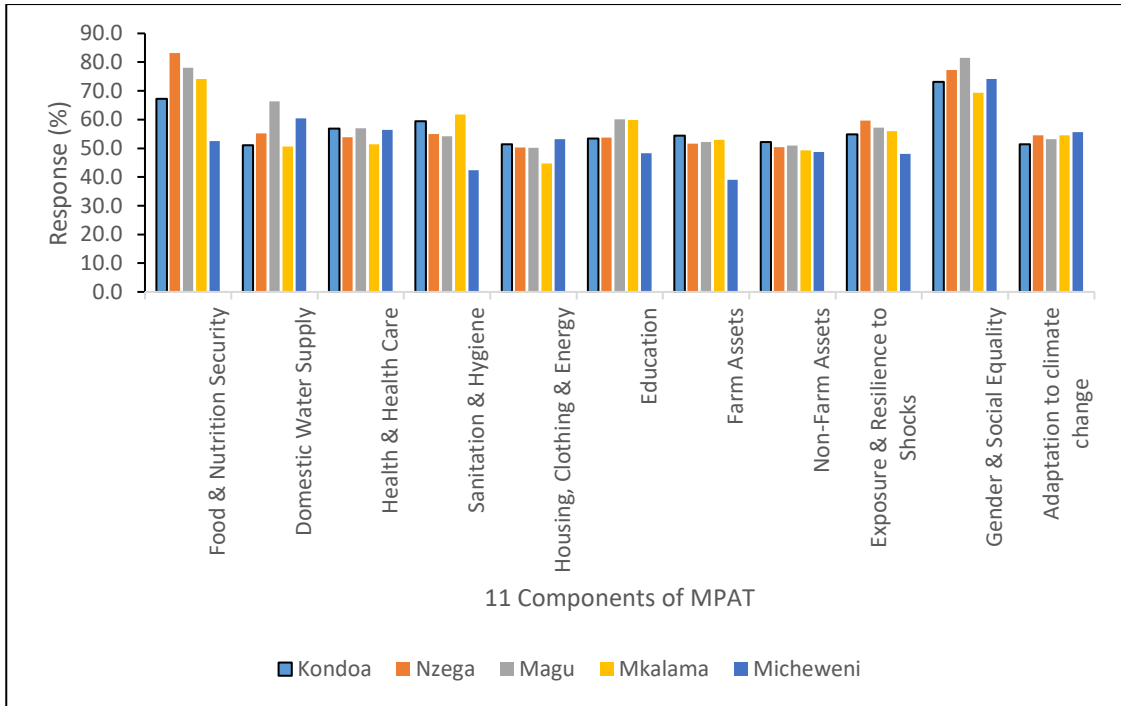
Scores across all Villages			Endline (2024)		Baseline (2019)	
			Average	[min, max]	Average	[min, max]
3.	Health & Health Care	Health Status	84.3	[24.0, 100.0]	75.5	[10.0, 100.0]
		Access & Affordability	54.7	[10.0, 87.0]	50.6	[10.0, 96.2]
		Quality	45.3	[10.0, 100.0]	46.5	[10.0, 100.0]
4.	Sanitation & Hygiene	Toilet Facility	64.8	[10.0, 100.0]	60.1	[10.0, 100.0]
		Household Waste Management	37.5	[20.0, 73.0]	34.9	[16.0, 89.5]
		Hygiene Practices	58.3	[10.0, 96.0]	73.5	[10.0, 100.0]
5.	Housing, Clothing & Energy	Housing Structure Quality	69.6	[24.0, 100.0]	62.5	[10.0, 100.0]
		Clothing	48.6	[10.0, 100.0]	54.1	[10.0, 100.0]
		Energy	49.7	[24.3, 97.0]	45.9	[10.0, 84.0]
6.	Education	Quality	47.1	[31.3, 79.5]	41.7	[17.5, 57.5]
		Availability	60.7	[20.0, 75.0]	64.4	[32.5, 100.0]
		Access	54.4	[10.0, 100.0]	64.0	[10.0, 100.0]
7.	Farm Assets	Land Tenure	52.8	[10.0, 100.0]	59.4	[10.0, 100.0]
		Land Quality	83.1	[25.0, 100.0]	79.0	[17.5, 100.0]
		Crop Inputs	35.3	[11.4, 83.0]	40.3	[10.0, 85.7]
		Livestock/Aquaculture Inputs	41.7	[12.0, 100.0]	46.6	[11.0, 100.0]
8.	Non-Farm Assets	Employment & Skills	39.6	[21.3, 87.5]	37.2	[21.3, 87.5]
		Financial Services	61.5	[42.5, 100.0]	60.0	[20.0, 100.0]
		Fixed Assets & Remittances	42.3	[22.0, 54.0]	65.8	[23.3, 86.7]
9.	Exposure & Resilience to Shocks	Degree of Exposure	54.9	[10.0, 100.0]	42.0	[10.0, 100.0]
		Coping Ability	68.0	[28.3, 89.7]	65.0	[15.0, 95.0]
		Recovery Ability	73.3	[10.0, 98.0]	61.1	[10.0, 98.0]
10		Access to Education	80.2	[10.0, 100.0]	73.0	[10.0, 100.0]

Scores across all Villages			Endline (2024)		Baseline (2019)	
			Average	[min, max]	Average	[min, max]
	Gender & Social Equality	Access to Health Care	82.6	[22.5, 100.0]	77.1	[22.5, 100.0]
		Social Equality	89.1	[10.0, 100.0]	MD	
11	Adaptation to climate change	Climate-resilient agricultural practices	52.0	[30.0, 90.0]	49.4	[20.0, 90.0]
		Water for agriculture	45.5	[16.0, 100.0]	44.6	[14.0, 100.0]
		Human capacity	52.7	[10.0, 100.0]	50.5	[10.0, 100.0]
		Climate-resilient technologies	73.6	[22.0, 100.0]	84.0	[75.0, 100.0]

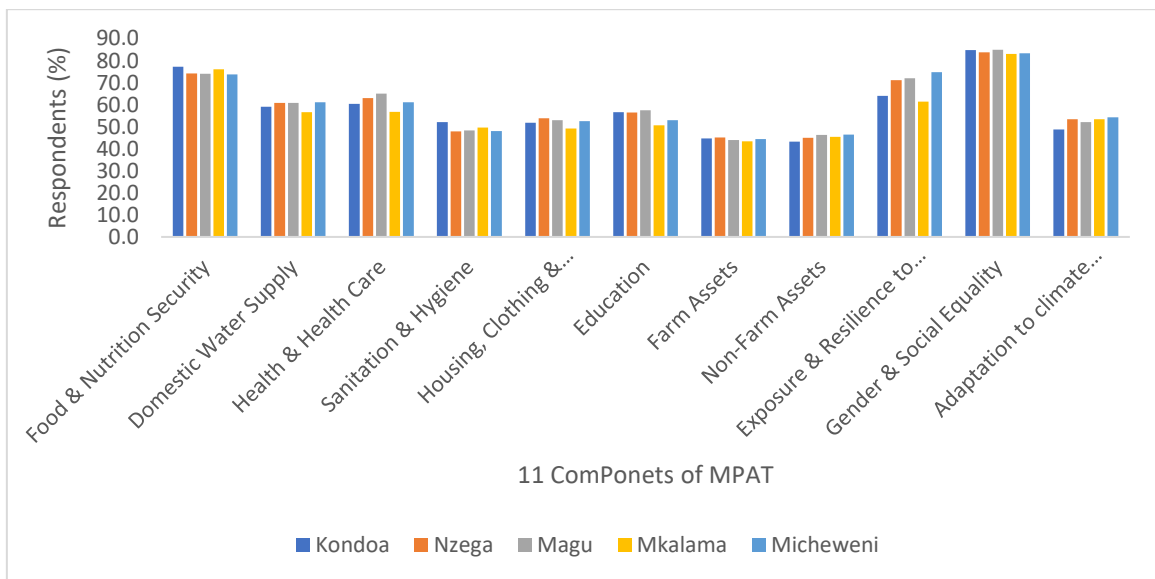
Spider charts show the spread of all 11 components of MPAT for all Villages, where the largest is gender and social equality (82.6 %), and the lowest is farm assets (42.4%)



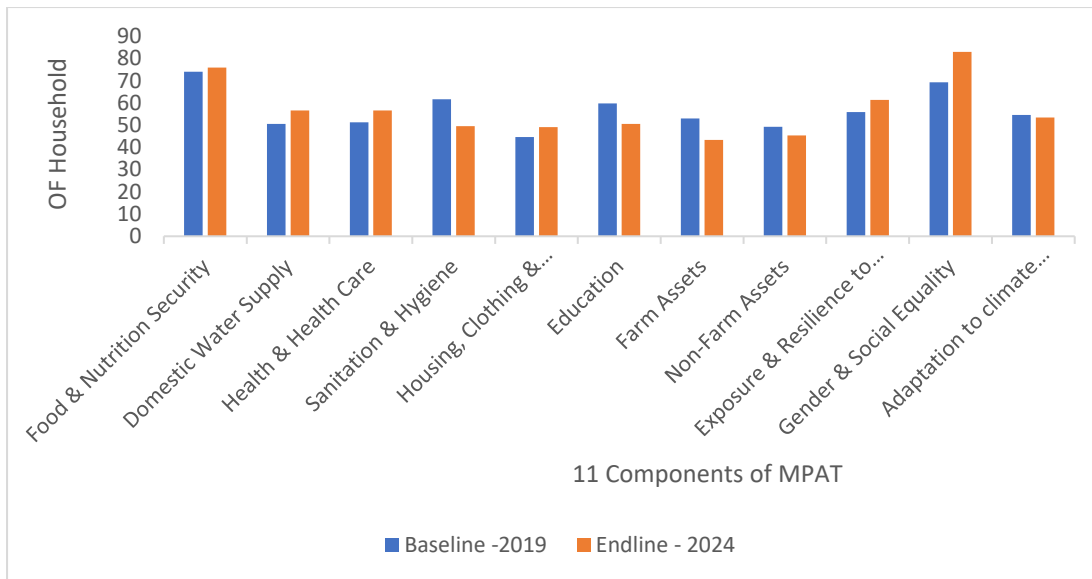
MPAT (2014) Subcomponents



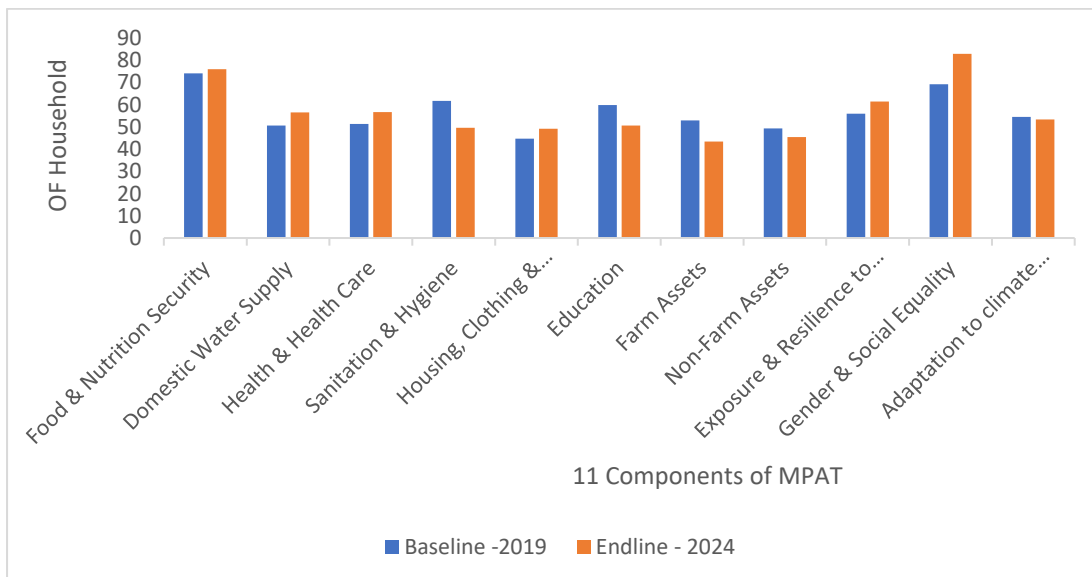
Scoring for 11 components of MPAT scoring in % during Baseline



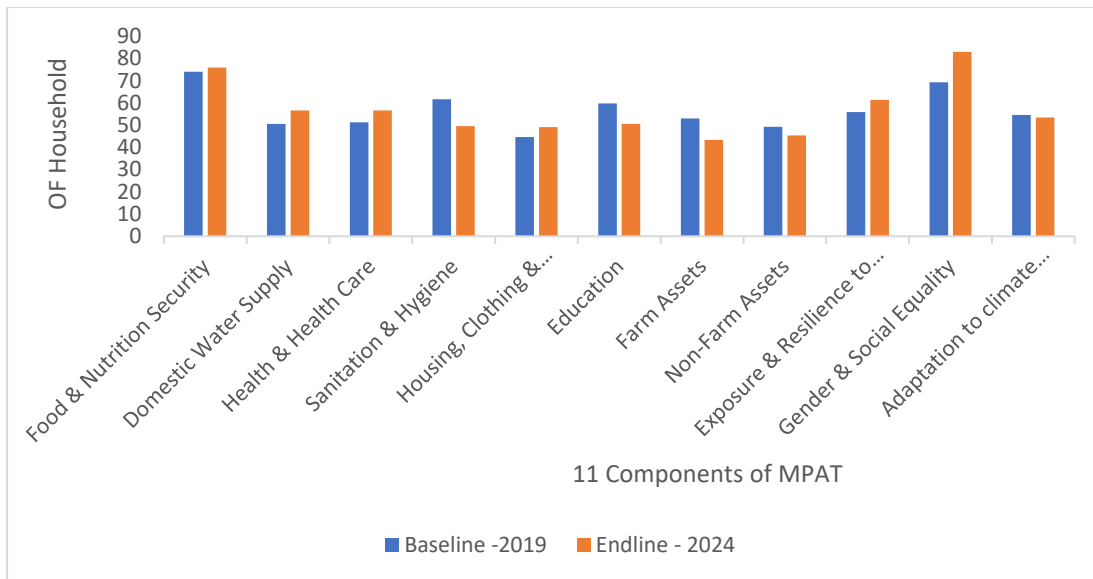
Scoring for 11 components of MPAT scoring in % during Endline



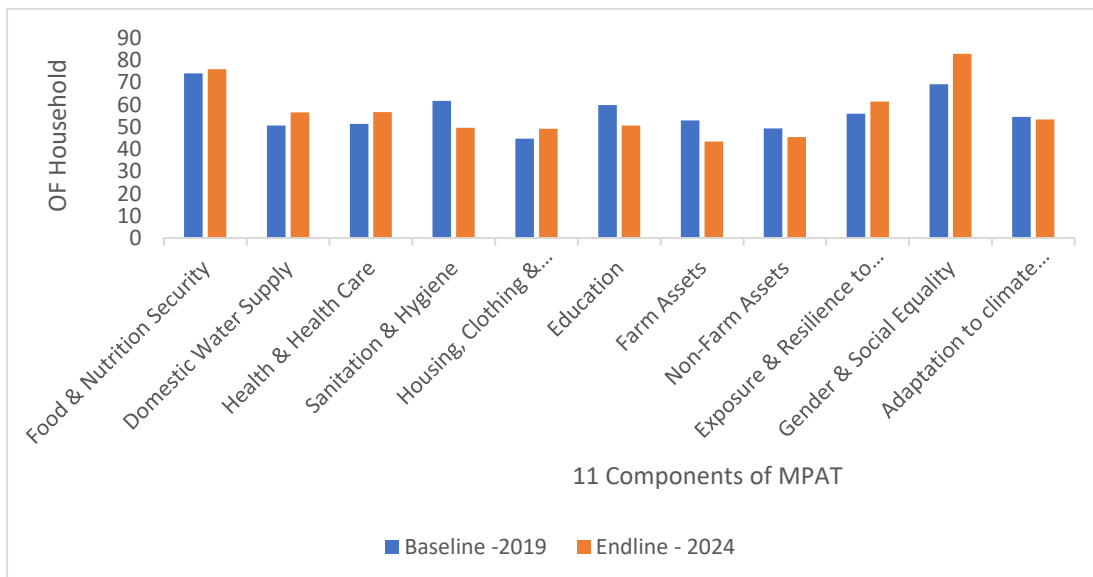
Compassion for 11 components of MPAT scoring in % in Kondoa DC



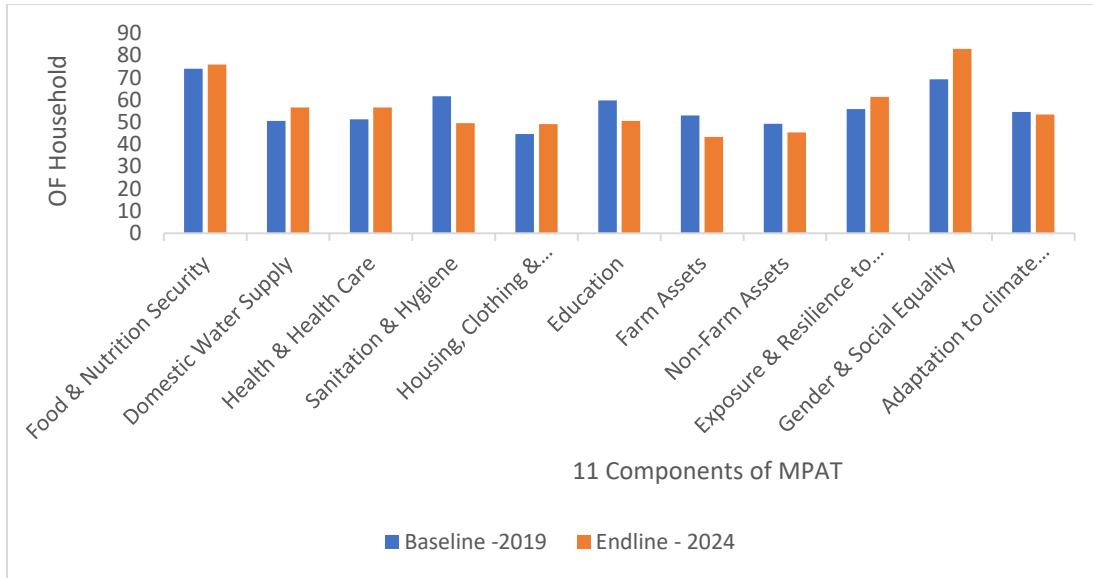
Compassion for 11 components of MPAT scoring in % in Nzega DC



Compassion for 11 components of MPAT scoring in % in Magu DC



Compassion for 11 components of MPAT scoring in % in Mkalama DC



Compassion for 11 components of MPAT scoring in % in Micheweni DC

1.0 INTRODUCTION

1.1 Background Information

Agriculture is a critical pillar of Tanzania's economy. As of 2024, agriculture's contribution to the GDP has increased to approximately 30%, with the sector now supporting 75% of the national workforce. Despite its importance, the sector remains challenged by low productivity, largely due to reliance on rainfed agriculture and traditional farming methods. Tanzania has 95.5 million hectares of land, of which 44 million hectares are arable, with 42.11% under cultivation. About 80% of production still comes from smallholder farmers cultivating less than three hectares and relying on hand tools and rainfed systems (World Bank, 2023).

The primary strategy for increasing agricultural output has historically focused on expanding the area under cultivation rather than improving yields. However, this approach has contributed to significant environmental issues, including deforestation, land degradation, and biodiversity loss. These persistent challenges, along with unreliable rainfall, limited irrigation infrastructure, poor market access, and the slow adoption of modern agricultural technologies, highlight the urgent need for change. If not addressed, these challenges could indeed hinder the sector's growth and sustainability (URT, 2022).

The livestock and fisheries subsectors remain significant contributors, providing about 5.5% of household income and accounting for 30% of the agricultural GDP. Fisheries contribute 2% to the national GDP, and the crop subsector remains dominant, contributing up to 71% of the agricultural GDP with a 4.6% annual growth rate (CGIAR, 2023).

While progress has been made in addressing some of the sector's challenges, it's clear that much work remains to ensure sustainable growth and modernization of agriculture in Tanzania. The end-line survey of August 2024 underscores the continued importance of targeted interventions and investments. These are not just beneficial, but crucial to enhance productivity, sustainability, and resilience in Tanzania's agriculture sector. Their absence could indeed hinder the sector's growth and development.

1.2 The LDFS Project

1.2.1 Overview of LDFS Project

In collaboration with the esteemed stakeholders, the Vice President's Office (VPO) are jointly implementing the Reversing Land Degradation Trends and Increasing Food Security (LDFS) Project in Tanzania's degraded ecosystems of semi-arid areas. The project, funded by the Global Environmental Facility (GEF) through the International Fund for Agricultural Development (IFAD), is a testament to the collective efforts and commitment of all involved. The goal and development objective of the project is to

improve food and nutrition security in targeted Villages and reverse land degradation trends in semi-arid areas through sustainable land and water management (SLM) and ecosystem-based adaptation.

The project area covers semi-arid agroecosystems and has been implemented in five Districts: Kondo DC, Mkalama DC, Nzega DC, and Magu DC in Mainland Tanzania and Micheweni DC in Zanzibar (Pemba Island). Each District's project area covers one or two wards with two or more Villages (23 Villages/Shehias) sharing the same resources in a landscape. The estimated population in the five Districts is 1.9 million people, distributed in about 247,000 households. The total population of the selected Villages is over 69,000 individuals. The project's interventions were expected to reach 30,000 direct beneficiaries and turn 9,000 hectares into conservation, climate-smart farming, sustainable management, and 500 hectares of degraded land into a reforested area. Against this background, the VPO has contracted IRDP to conduct an endline survey for the LDFS project.

1.2.2 LDFS Project Components

The LDFS project is structured into three interrelated components to achieve its objective. Component 1 sets the enabling conditions for sustainable land and water management at the landscape level, sustaining ecosystem services and enhancing food security. It will strengthen institutional capacity at the Village, inter-Village, and District levels. It will also establish inter-Village committees to develop landscape-level inter-Village participatory resources, livelihood diagnostics, and land use planning processes to foster integrated and holistic management of natural resources. Component 1 has one outcome, namely institutional capacity in place at District and local Village levels to support SLM practices and conservation of ecosystem services at the landscape level with Output 1.1 of local and District level institutional capacity strengthened in participatory joint land-use mapping, planning, and access and use regulation in support of SLM, forest conservation and sustainable agro-pastoralism and output 1.2 Governance instruments in place to support integrated landscape management and SLM practices.

Component 2 supports the implementation of sustainable land and water management priorities, conservation of habitats for biodiversity, conservation farming practices, and income-generating activities agreed upon within said plans. Component 2 has two outcomes and three outputs. The outcomes are outcome 2, reduced land degradation, improved soil health, and increased productivity; outcome 3, income generation from agro-pastoral ecosystems and diversified and climate resilient production systems that increase all-season income generation through producer groups and better market linkages. In the case of outputs, there are three that is output 2.1, farmer's capacities strengthened in experimental learning and adoption of conservation and climate-smart farming and SLM practices; output 2.2 improved management of dry land agro-pastoral and woodlands landscapes; and output 3.1, households adding value and accessing markets with a diversified basket of produce.

Component 3 focuses on monitoring and assessing the progress in sustaining ecosystem services, household resilience, and food security. Based on assessment results, Component 3 also supports incorporating lessons learned in local and District-level natural resources governance systems and contributing to the continuous improvement of the landscape-level approach to natural resources management, supporting the integration of best practices in policymaking at the District, regional, and national levels. Component 3 has one outcome and four outputs. Outcome 4 is an improved evidence base for joint Village land-use planning and improvement of ecosystem services and up-scaling at the District, Regional, and National levels. Output 4.1 strengthens District and National M&A capacities to document ecosystem services and household resilience progress and report on strengthened GEBs. Output 4.2 is monitoring and assessment results and knowledge management products available for policy development and decision support for landscape-level resources management. Output 4.3 is the project linked to the regional program.

1.3 The Endline Survey

1.3.1 Overview

The Endline Survey for the project 'Reversing Land Degradation Trends and Increasing Food Security in Degraded Ecosystems of Semi-Arid Areas of Tanzania' was conducted as the project approached its conclusion. This survey was crucial in evaluating the project's overall impact and determining the extent to which the intended outcomes and impacts were achieved. The survey focused on crucial Output Indicators, Outcome Indicators, and Impact Indicators, defined at the project's outset.

The Endline Survey was built upon previous assessments, including the baseline survey conducted in 2019 and the outcome survey conducted in 2023. The baseline survey provided essential benchmarks across 11 well-being dimensions, highlighting significant challenges such as poor access to education, health services, clean water, and financial resources. It also noted the reliance on traditional farming methods and the prevalence of land use conflicts. The outcome survey 2023 showed marked improvements in several areas, including increased participation by women and youth, enhanced household incomes, and higher satisfaction with project interventions like Farmers' Field Schools.

The Endline Survey aimed to measure the final project impact, analysing successes and ongoing challenges. This analysis provides crucial insights into the sustainability of the project's outcomes and offers valuable lessons for future initiatives in similar contexts.

1.3.2 Objectives of the Endline Survey

The primary objective of the endline survey was to assess the project's effectiveness in achieving its stated goals as outlined in the logical framework. This endline survey

also aimed to document best practices, lessons learned, challenges encountered, and factors contributing to the project's success. Specifically, the endline survey focused on the following areas:

- i) Conducting a comparative analysis of endline data against baseline and midline data on key output and outcome indicators.
- ii) Assessing the project's relevance, efficiency, effectiveness, coherence, impact, and sustainability.
- iii) Critically evaluate the project design and implementation, identifying key challenges and successes.
- iv) Evaluating the performance of service providers based on service delivery and stakeholder satisfaction, with an emphasis on identifying and compiling best practices and recommendations for future projects.

1.3.3 Key Indicators

The critical indicators assessed during the endline survey were derived from the IFAD Core Outcome Indicators (COI) and the project's logical framework. These indicators are essential for evaluating the project's impact and include the following:

- i) **Institutional capacity building** includes the functionality and effectiveness of landscape-level Inter-Village Natural Resource Management (NRM) committees, staff and community training, and the adoption of joint Village land use plans.
- ii) **Agricultural productivity and climate impact:** Indicators in this category measured increases in household yield per hectare, reductions in greenhouse gas emissions, adoption of conservation practices, and improvements in land management.
- iii) **Household income:** This involved assessing changes in household income, participation in rural organizations, and youth engagement in income-generating activities.
- iv) **Adoption of environmental and resilience tools:** Indicators here focused on adopting global environmental and resilience assessment tools, the number of assessments conducted, and developing knowledge management products for policy support.

The Endline Survey utilized an improved sampling strategy, addressing limitations observed during the baseline survey, such as Village leaders' reluctance to participate. The enhanced approach ensured comprehensive data collection, allowing for a more accurate assessment of the project's impact across all implementation areas.

1.4 The Survey Area

The survey was conducted in the project area, covering the semi-arid agro-ecosystems which have been selected in four regions of Dodoma, Singida, Mwanza and Tabora in Tanzania Mainland and one, Kaskazini Pemba in Zanzibar as shown in Figure 1. Specifically, the Districts involved in the survey were Mkalama DC (Figure 2), Kondoa DC (Figure 3), Magu DC (Figure 4), Nzega DC (Figure 5) and Micheweni DC (Figure 5). In the Kondoa DC District, the survey was conducted in the Haubi ward covering Mafai and Haubi Villages and Loo Village, which was used as a control

Village. In Mkalama District, the project area covers five Villages Mkiko, Lugongo, Mpambala and Nyahaa in Mpambala ward and Munguli Village in Mwangeza ward. Igonia Village in Ibaga ward was used as the control Village in this district. In Nzega DC, the survey was conducted in five Villages of Lyamalagwa, Sigili, Bulambuka, Bulende and Iboja in Sigili ward, whereas Ilalo Village was used as the control Village. In Magu DC, the project covers three Villages in the Sukuma ward, namely Lumeji, Izeni, and Nyang'hanga. Kitongo Village in the Buhumbi ward was used as the control Village in this district. In Micheweni DC, the project covers nine Shehias, namely, Micheweni DC Mjini, Micheweni DC, Chamboni, Kwale/Majenzi, Shumbamjini and Mjini Wingwi in Micheweni DC ward and Kiuyu, Mbuyuni, Maziwa Ng'ombe and Shanake Shehia in Maziwa Ng'ombe ward. Wingwi Mapofu Shehia was used as a control.

The estimated population in the five districts is 1.9 million people, distributed in about 247,000 households. The total population of the selected Villages/Shehia is over 69,000 individuals; the project's interventions were expected to reach 30,000 direct beneficiaries (URT and IFAD, 2017). The five districts cover about 16,500 ha of land, of which 55 per cent is highly degraded. The project targets 9000 ha of these degraded areas to be converted into land under sustainable management practices, including 3,000 ha for conservation, climate-smart and agroforestry agricultural practices. In addition, the project targets 4,000 ha to develop improved management and biodiversity conservation in pastureland and 2,000 ha for biodiversity conservation and sustainable woodland management (URT and IFAD, 2017).

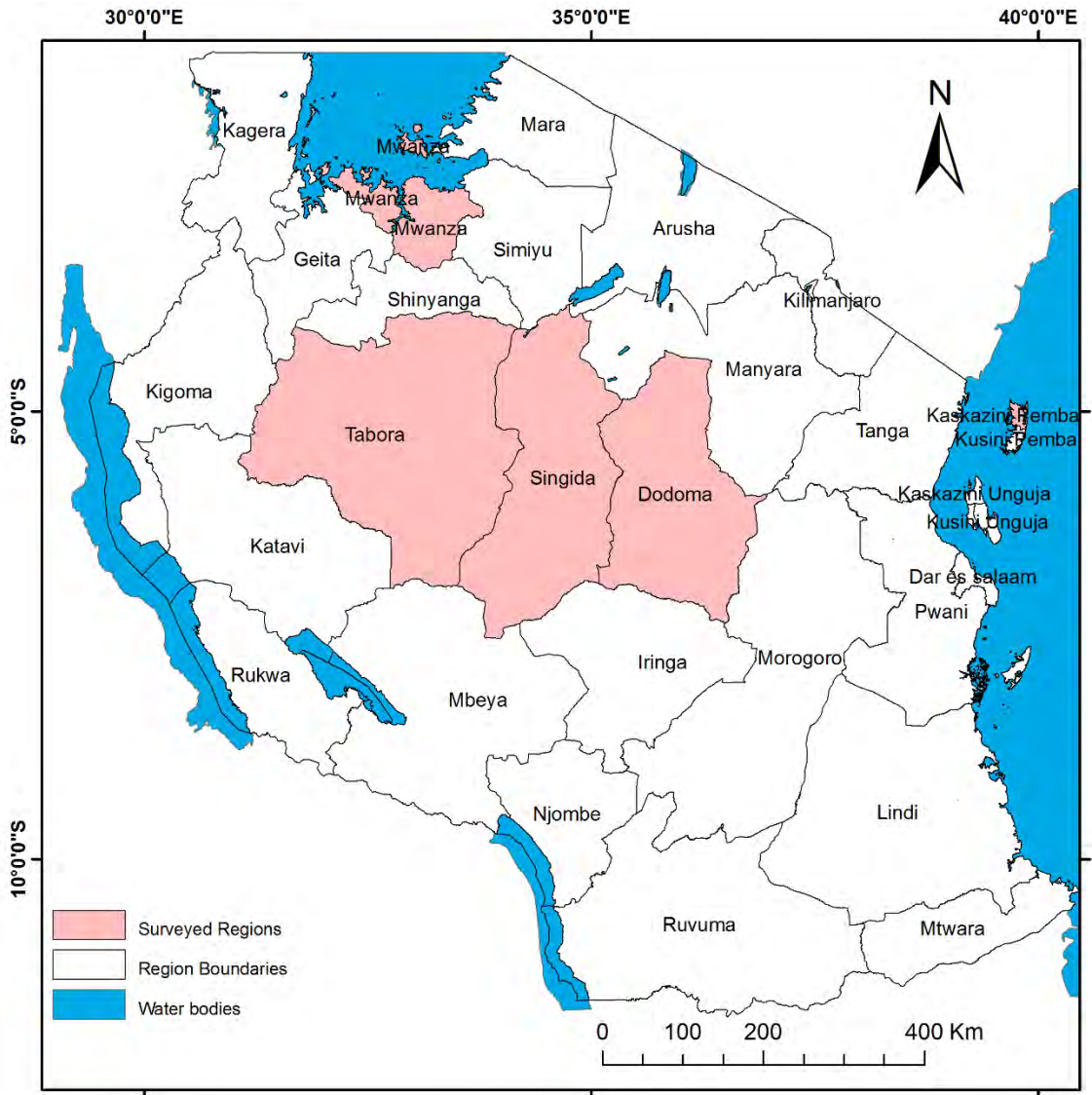


Figure 1. Map of Tanzania showing the surveyed regions

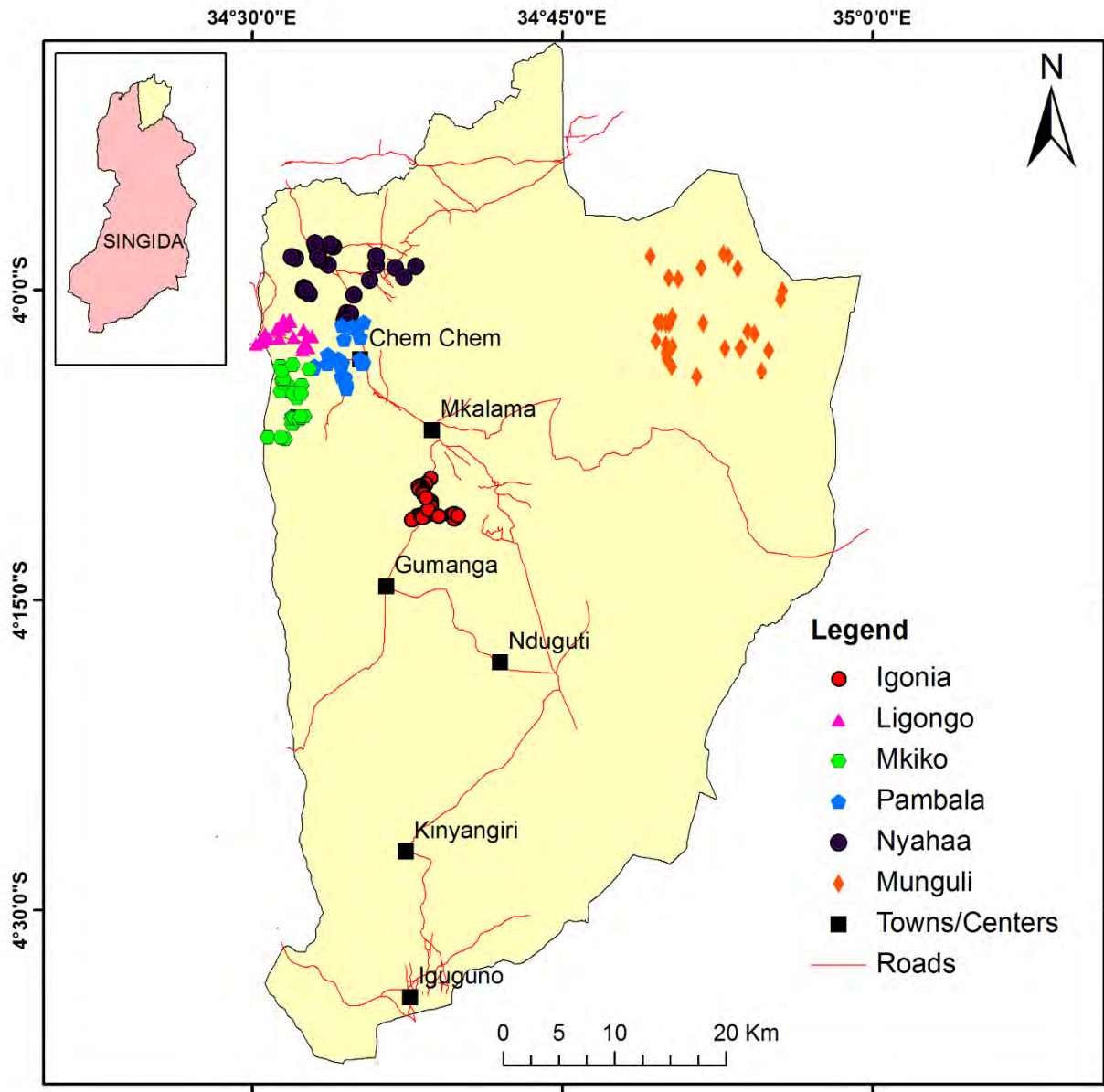


Figure 2. Map of Mkalama District showing surveyed households in different Villages

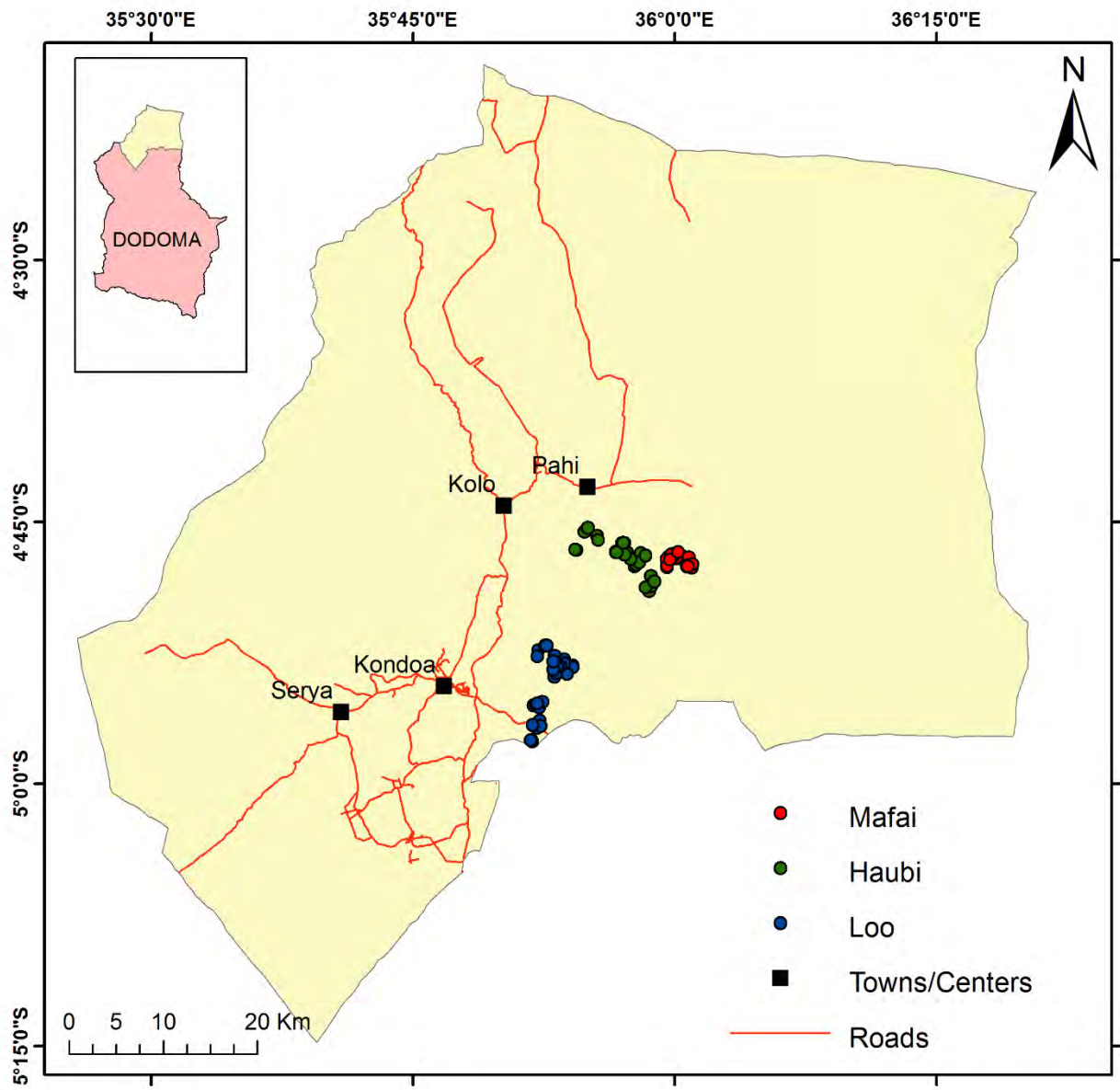


Figure 3. Map of Kondo District showing surveyed households in different Villages

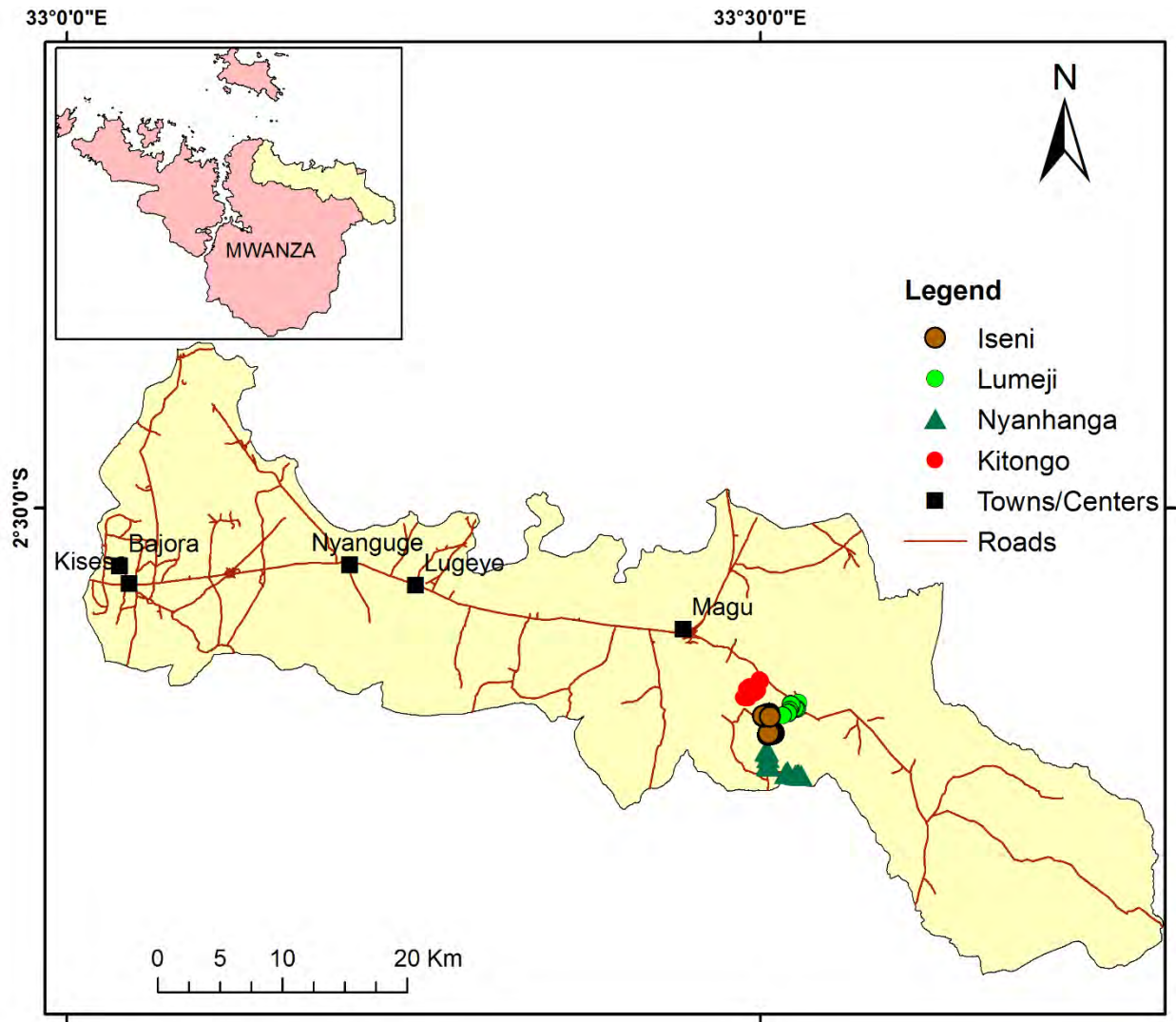


Figure 4; Map of Magu District showing surveyed households in different Villages

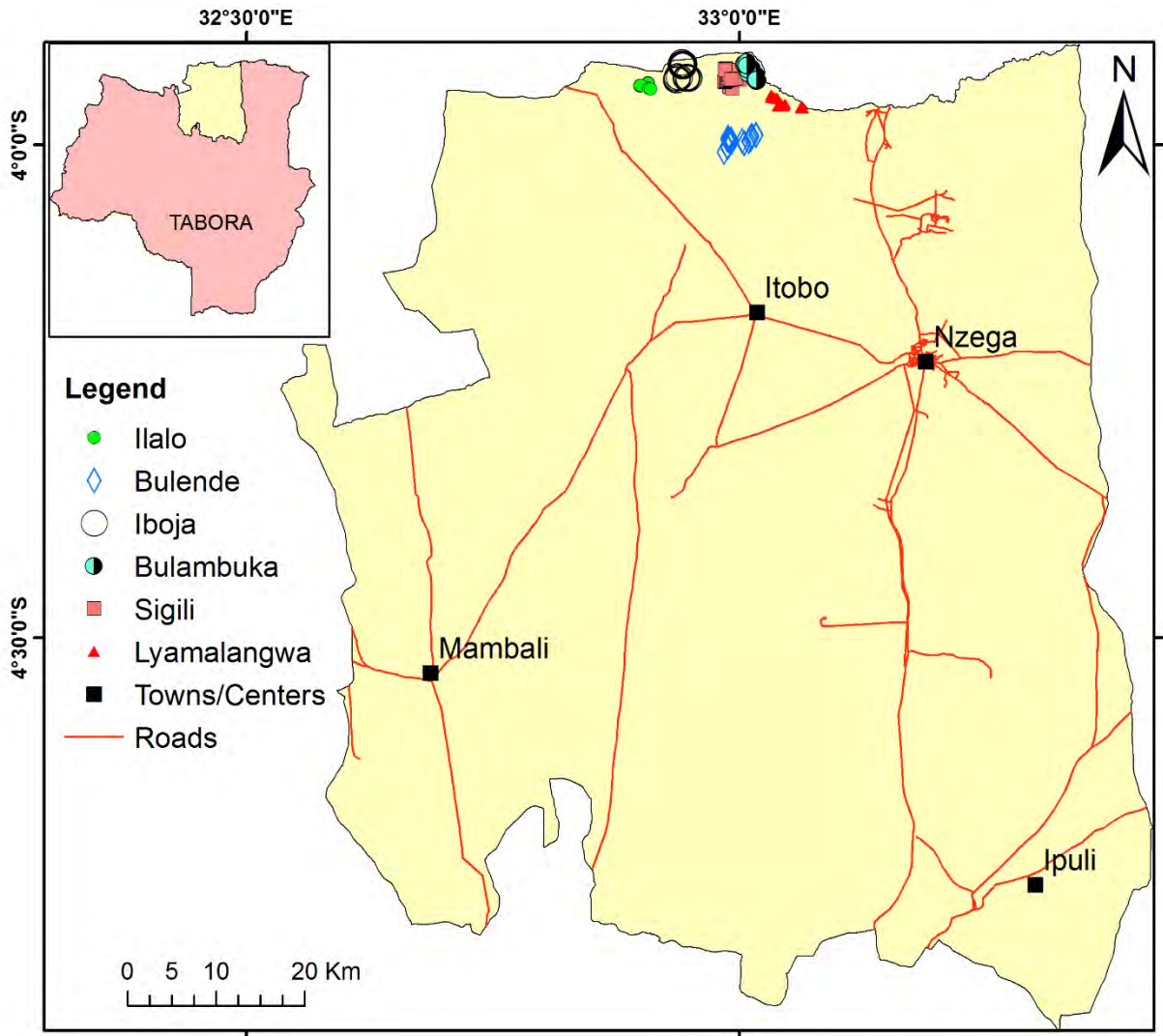


Figure 5: Map of Nzega District showing surveyed households in different Villages

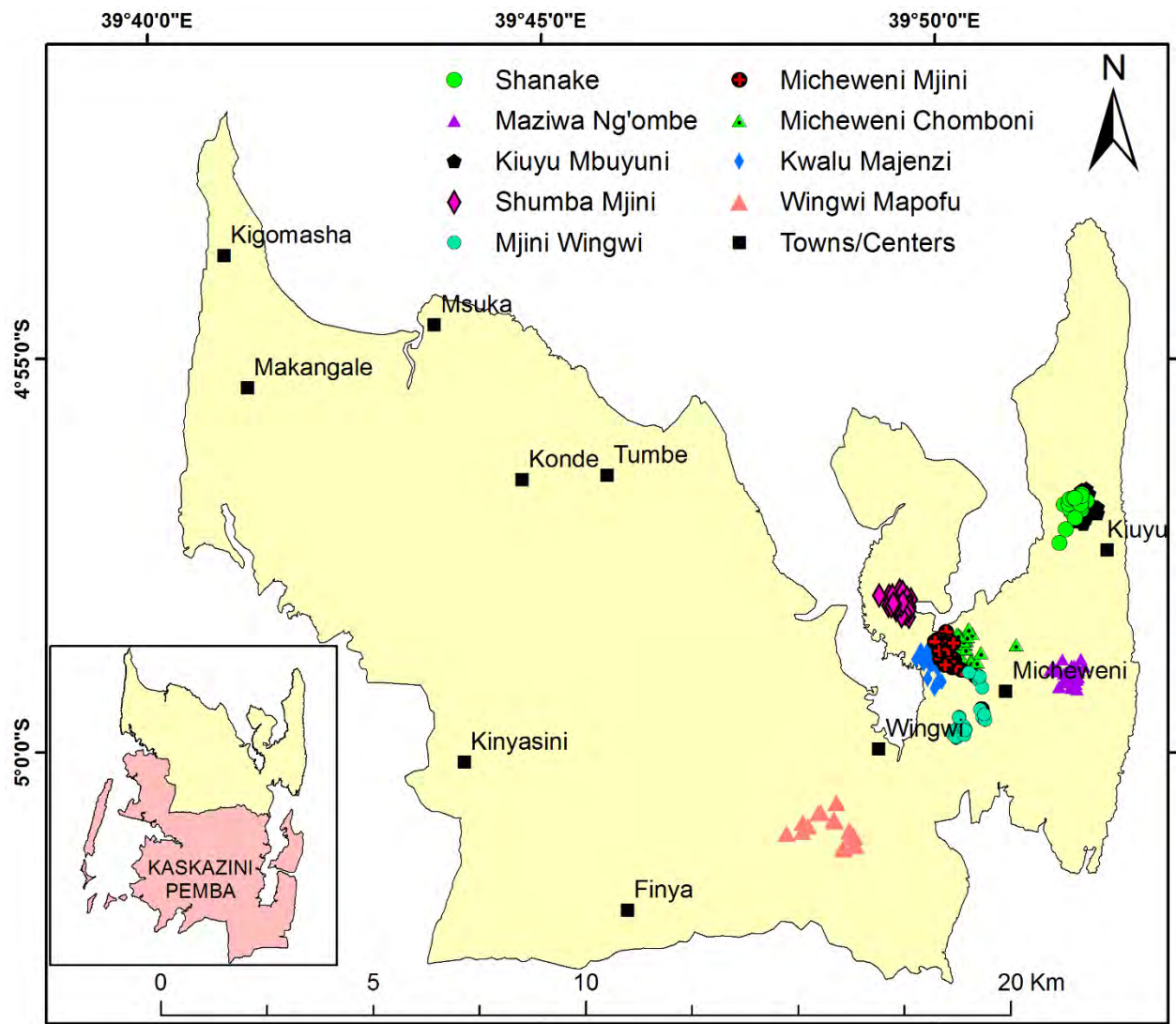


Figure 6: Map of Micheweni District showing surveyed households in different Shehia

2.0 METHODOLOGY

2.1 Technical Approach

The technical approach for the endline socio-economic survey was designed following the LDFS project objectives, endline study objectives, scope of work and expected outputs. Collectively, the methodology involved a wide range of stakeholders to enhance the quality, validity and reliability of the findings. The interviews were conducted on tablets using computer-aided personal interviews (CAPI) and the World Bank Survey Solution Software v19.04. The English questionnaire was designed using Survey Solutions Designer Platform and was translated into Swahili language to enable the two languages to be used interchangeably by enumerators during data collection. The MPAT questionnaire was uploaded to the Survey Solutions Interviewer App on tablets.

The use of MPAT Tool (as elaborated under section 2.10) was of great advantage in this survey as it allowed users to add tailored questions to the core MPAT questionnaire applicable globally (comparable across countries and continents) and in the local context. The tool was, therefore, adapted to this survey. Another advantage of this tool is that IFAD still provides direct technical assistance; the tool was programmed and digitized and had the option to implement MPAT on tablets with Android version 5. This allowed for real-time data quality control and the location of all interviewed households, which were automatically geotagged by the survey solutions software. The MPAT was also a quick and easy means to obtain an extensive dataset that can be used for multiple purposes. A general overview of the steps and the outputs from each step involved in implementing the endline socio-economic survey is indicated in Figure 7.

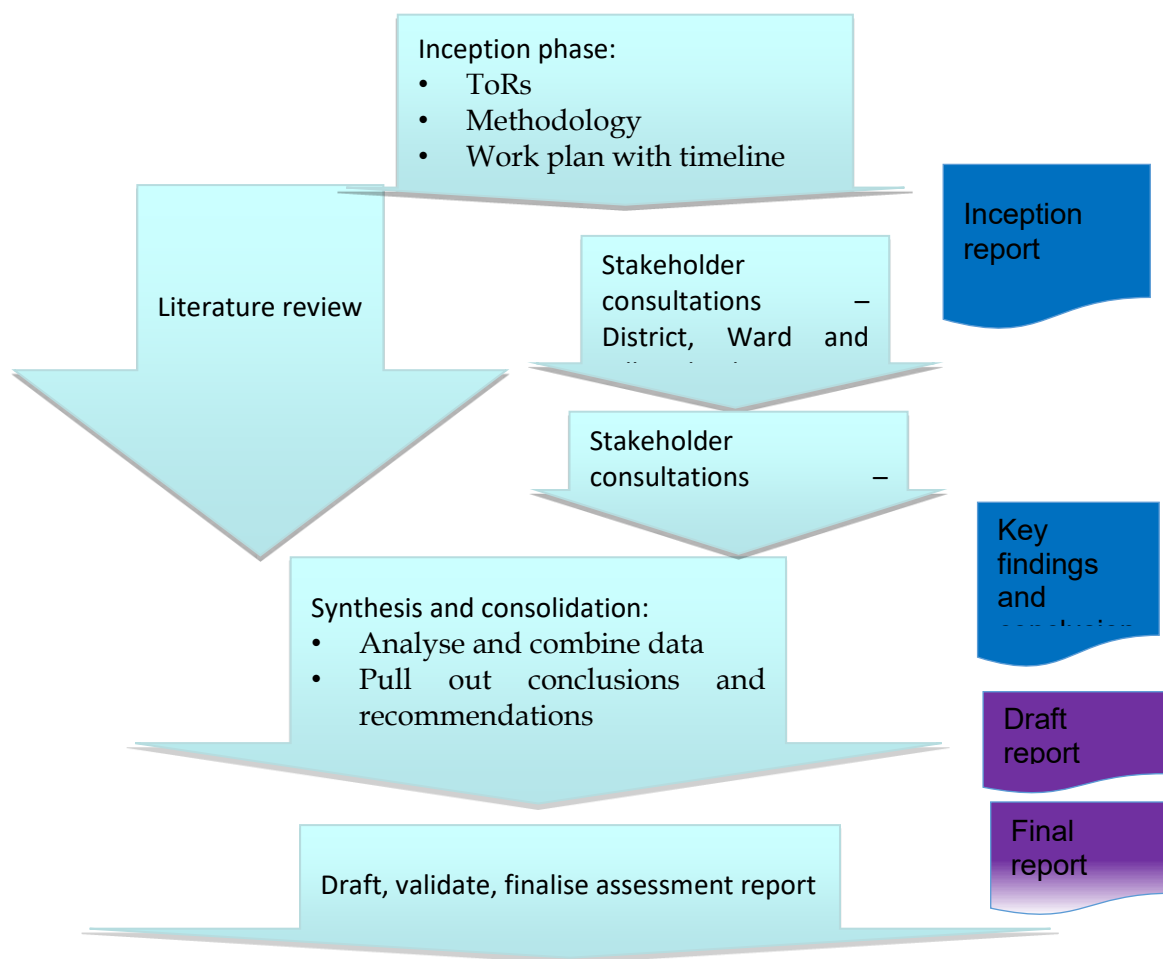


Figure 7. Implementation stages of endline survey

2.2 Endline Design

The endline evaluation was designed to be participatory, emphasising maximizing stakeholder involvement throughout the process. The survey was conducted across all 25 project Villages/Shehias, ensuring comprehensive coverage of the project areas. The control Villages in each District were designed during a baseline survey to support confirmation that the outcomes in the endline survey of the project Villages were brought by the project itself and not by other variables.

Before the commencement of the main fieldwork, a two-day training session was held for the team members and enumerators involved in the survey. This training was crucial in aligning the team with the survey objectives and methodologies. Notably, the team members and enumerators who participated in the baseline and outcome survey were also engaged in the endline survey. This approach leveraged the skills and experience gained during the baseline and outcome surveys, thereby expediting the data collection process and enhancing the overall quality of the data gathered.

Given that the methodology and tools used in the endline survey were consistent with those employed during the baseline and outcome surveys, there was no need for additional pretesting. The pretesting conducted during the baseline and outcome survey was deemed sufficient. Consequently, 16 enumerators were recruited. Six from IRDP, two for each team, and ten District project staff, i.e. two for each District. All (IRDP and District Staff) had prior experience with the baseline and outcome surveys. This continuity ensured that the data collection process was both efficient and reliable.

In each District, two IRDP enumerators and two project staff from the project Districts administered the MPAT household questionnaire. Computer-Assisted Personal Interviewing (CAPI) was preferred for this survey as it significantly reduced data collection time and was well-suited for the study's descriptive nature. The data were regularly validated and cross-checked throughout the assignment to ensure accuracy and relevance.

To facilitate the smooth operationalization of the survey, the five project Districts were organized into three clusters:

- **Group 1:** Magu DC and Nzega DC Districts
- **Group 2:** Kondoa DC and Mkalama DC Districts
- **Group 3:** Micheweni DC District

This clustering approach streamlined the survey's logistics and management, ensuring the data collection process was efficient and effective across the different regions.

2.3 Data Types and Sources

2.3.1 Data types

To comprehensively address the study objectives, both primary and secondary data were collected, encompassing quantitative and qualitative aspects. The primary data focused on the MPAT framework, including MPAT Household and Village data and additional data related to project-specific indicators.

The household data collected included basic demographic information such as gender, marital status, and education level. Additionally, data were gathered on household participation in the project, including the year of involvement, specific project activities, satisfaction levels, and the frequency of visits by District and ministry staff. Information was also collected on engagement in project-supported NRM committees, production trends, and greenhouse gas emissions. The survey captured data on food and nutrition security, domestic water supply, health and healthcare, sanitation, hygiene, housing, clothing, and energy sources. Furthermore, education levels, farm and non-farm assets, and exposure to and resilience against shocks were assessed. The survey also addressed gender, social equality, and specific agricultural activities such as crop farming, livestock rearing, fruit cultivation, and fisheries, as

agreed upon during the baseline survey. Additionally, household resilience indicators were measured, including participation in joint land use planning, involvement in the producer groups (Farmer Field Schools - FFS and Income Generating Groups IGGs), adoption of climate-smart production systems, access to secure water sources, use of weather forecast information, and access to renewable energy sources.

Village-level data included comprehensive information about the population and the number of households. Education data encompassed the number of schools, students, and teachers, all disaggregated by gender and the availability of teaching and learning facilities. Health services data included the number of health facilities and the staffing levels in these facilities. Additional Village data were collected on the functioning of inter-Village NRM committees, the number of households reporting increased production (disaggregated by the sex of the household head), and the number of households reporting an increase in income per season from produce supported by the project. Data were also gathered on adopting global environmental and resilience benefit assessment tools (such as EX-ACT, LDSF, and the Resilience Scorecard) by various Districts and using this information for policy and program design.

2.3.2 Source of data

Primary data were gathered from diverse sources, including beneficiary households in the project Villages/Shehias involved in the baseline survey, ensuring consistency and accurate comparison over time. In addition, data were collected from non-beneficiary households in control Villages that had been interviewed during the baseline survey, providing a valuable control group for comparison. Data collection was also extended to Village leaders and key informants at the Village/Shehia levels, capturing community-level impacts. Further, ward, District and PCU officials were interviewed to provide additional context and information on the broader regional impacts of the project.

Secondary data were sourced from relevant documents such as the Project Final Report (VPO, 2024), the Outcome Survey Report (VPO, 2023), and the Assessment of Land Degradation and Soil Health in Semi-arid Areas Report (2023), Report on the Preliminary Assessment and Identification of the Possible Water Sources and Grazing Land Technology Used and Appropriate Protection and Land Conservation Measures in the Project Districts (MoW, 2019); Project Baseline Report (VPO, 2019), Controller and Audit General Financial and Compliance Reports for 2018, 2019, 2019, 2020, 2021, 2022, and 2023 (NAO, 2018, 2019, 2019, 2020, 2021, 2022, and 2023). Also, different project reports were collected at various levels, including the Project Coordination Unit (PCU), District offices, ward offices, and Village/Shehia administrations. These documents provided additional insights and helped to complement the primary data collected during the survey. This approach ensured a comprehensive and multi-faceted data collection process, capturing a wide range of

perspectives and allowing for a thorough evaluation of the project's outcomes and impacts.

2.4 Data Collection Methods and Tools

Mixed methods of data collection from multiple sources of evidence were adopted to get deeper insights and contribute to the reliability and validity of the findings. Mixed methods are data collection strategies combining quantitative techniques such as surveys and qualitative methods such as key informant interviews. This study used the following data collection methods: MPAT Household Questionnaire Survey, MPAT Village Questionnaire Survey, documentary review, key informant interviews, Stories of Significant Change (SSC), observation and photographs.

2.4.1 MPAT Household Questionnaire Survey

The endline socio-economic survey team adopted the MPAT household questionnaire in 11 dimensions (Appendix 1). The Endline Household Survey Tools (Appendix 1) is structured into three main sections with 197 questions. The first section, **Survey Identification Information**, provides metadata about the survey without any specific questions. The second section, **Introduction**, includes 11 questions and three static texts to gather basic household information and consent for participation. The third section, **Interview**, is the most extensive, containing 186 questions across 14 sub-sections and includes five rosters. This section covers various topics, such as household composition, education, health, housing, water, sanitation, farming, and the impact of negative events. The survey is designed to collect comprehensive data on various aspects of household life to evaluate the outcomes of project activities.

2.4.2 MPAT Village Questionnaire Survey

The Endline Village Survey Tools, referred to as the Village questionnaire (Appendix 2), comprises six sections with 74 questions, covering metadata, Village characteristics, social and environmental factors, weather-related issues, and infrastructure. It also gathers detailed information on education and healthcare services, including facilities, resources, and overall Village health. Which were translated into Kiswahili.

2.4.3 Documentary review

Desk review of relevant land degradation and food security documents in the five project Districts will be conducted. These documents include the project design report, updated project log frame, baseline survey report, annual work plans, outcome survey report, financial reports, and other documentation prepared in the project framework and, overall, the IAP programme. Appendix 1 presents a checklist for documentary review.

2.4.4 Key Informant Interviews

Key informant interviews were held with relevant stakeholders, including District, ward

and Village officials in the five District Councils. During the interviews, the emphasis was on understanding the current status of the 11 MPAT dimensions, which are food and nutrition security; domestic water supply, health and health care; sanitation and hygiene; housing, clothing and energy; education; farm assets; non-farm assets; exposure and experience to shocks; gender and social equality and adaptation to climate. Efforts were made to solicit information on the challenges associated with the 11 MPAT dimensions. Appendix 5 presents guiding questions for key informant interviews.

2.4.5 Observation and photographing

Observation and photography served as vital methods for documenting project achievements. Project activities and outcomes were visually documented through observation in real-time, providing a dynamic perspective on progress. Photography was utilised to capture key project features that are noteworthy and impactful. These images were visual evidence of the project's success and complemented the qualitative data gathered through other methods. This visual documentation enhanced communication efforts and facilitated sharing project outcomes with stakeholders and the broader community.

2.4.6 Focus Group Discussions

Focus group discussions, each with 6 to 10 participants, ensured diversity and inclusivity. Groups were formed based on gender, comprising adult men, adult women, and youth (both boys and girls). This structure allowed for a comprehensive exploration of project achievements, challenges, and lessons learned from diverse perspectives within the community.

By engaging multiple groups, a wide range of viewpoints were gathered, providing valuable insights into the project's implementation. This inclusive approach fostered a holistic understanding of the project's impact and facilitated the identification of key areas for improvement and future planning. Appendix 4 presents guiding questions for FGDs.

2.4.7 Stories of Significant Change (SSC)

This method was used as it provides qualitative depth and context to quantitative data. By capturing beneficiaries' narratives and experiences, SSC illustrates the impact and transformation brought about by project interventions. These stories complemented numerical findings by explaining underlying reasons for outcomes, highlighting unintended consequences, and engaging stakeholders in a participatory evaluation process. SSC data generally enhanced understanding of project effectiveness, informed future strategies, and served as compelling communication tools for advocacy, emphasizing the human aspects of development outcomes. Appendix 4 presents guiding questions for SSC discussion.

2.5 Sampling Procedures and Sample Size

According to Kothari (2009), sampling design is a plan for obtaining a sample from a sampling frame. Generally, it refers to the techniques or procedures used by the researcher in selecting sampling units from which inferences about the population are drawn. The sample in this study was retrieved from the baseline sample size. The baseline study employed multistage sampling procedures using a combination of random and purposive sampling techniques. A purposive sampling technique was used to select the Villages/Shehia where the project is operational.

A simple random sampling technique was used to select the sample during the baseline. In this endline evaluation, the same sample and sample size was adopted to be used during the endline survey to capture before and after comparison (BFC) in study areas. Before and after comparison needs the same respondents involved in the baseline to be used during the endline survey for output assessment to ensure homogeneity between the two studies and compare the established indicators' before-and-after results (Newcome *et al.*, 2004; Bekkers, 2021).

As stated earlier, the sample was adopted from a baseline survey. During the baseline survey, the sample size, the number of items selected from the universe to constitute a sample of the study, was determined based on the set principles. The principles were adopted by Kothari (2009), who pointed out that an optimum sample size must be selected and fulfil the requirements of efficiency, representativeness, reliability, and flexibility. Since the population of the project Villages/Shehia is large to have a sample size which is manageable and meets the requirements pointed out by Kothari (2009), a formula based on stratified sampling technique with proportionate sampling (Equations 1 and 2) (Miah, 2016) with Villages/Shehia as strata was used to determine the sample size. Based on this fact, a systematic random sampling procedure was used to select households for interviews.

$$n = \frac{N \sum N_h P_h Q_h}{N^2 D^2 + \sum N_h P_h Q_h} \dots \dots \dots \text{Equation 1}$$

$$n_h = \frac{N_h}{N} * n \dots \dots \dots \text{Equation 2}$$

Where:

n Total sample size, n_h= sample size for h Village, N= total population, N_h = population size of h Village, P_h = proportion of households adopted recommended practices for enhancing land management and food security in h Village.

Q_h = 1-P_h , D= d/z, d= Precision (error)

Based on the information provided for population sizes, values of $d=0.04$, $z= 1.96$ (based on a 95% Confidence interval), and $Ph = 0.5$ were used (Miah, 2016). The standard formula involved a sample of 596 households during the baseline study, with a distribution as indicated in Table 1.

Table 1 Number of Households and Sample Size in Project area based on Formula

District	Wards	Village/Shehia	No. of HHs	Sample Size
Nzega DC	Sigili	Lyamalagwa	273	12
		Sigili	488	22
		Bulambuka	266	12
		Iboja	370	16
		Bulende	231	10
Sub Total			1628	72
Kondoa DC	Haubi	Ntomoko	961	43
		Haubi	1344	60
		Mafai	590	26
		Mwisanga	482	21
Sub Total			3377	150
Mkalama DC	Maombala	Mpambala	443	20
		Nyaha	605	27
		Lugongo	227	10
		Mkiko	713	32
	Mwangeza	Munguli	-314	-30
Sub Total			1674	50
Magu DC	Sukuma	Lumeji	145	6
		Iseni	104	5
		Nyang'hanga	676-	30
Sub Total			925	41
Micheweni DC in Pemba	Micheweni DC	Micheweni DC Mjini	508	22
		Micheweni DC Chamboni	662	30
		Kwale/Majenzi	447	20
		Shumbamjini	900	40
		Mjini Wingwi	853	38
	Maziwa Ng'ombe	Kiuyu Mbuyuni	1210	54
		Maziwa Ng'ombe	1098	49
		Shanake	714-	30
Sub Total			6392	283
Total			13,996	596

However, during the baseline survey, the sample size based on formulae indicated that some Villages, such as Lumeji and Iseni, could have sample sizes of less than 30, which is the minimum recommended sample size in social science research (Grinnell, 2010) as well as the digitised MPAT household questionnaire. Based on this fact, all Villages with sample sizes of less than 30 were set to 30. For Villages with a

sample size of more than 30, as per Miah’s formula, efforts were made to ensure that sample sizes among project Villages were harmonised. Thus, a sample size calculator using a Creative Research System (2012) was used. This system is beneficial in determining sample sizes in situations where the population is large. Therefore, it was used to determine the number of households to be interviewed to get results that reflect the target population as precisely as possible.

In using this system, the choice of confidence interval (sometimes referred to as the margin of error) is the plus-or-minus figure that is reported to pick up an answer, ranging between 1 and 5. For this study, a confidence interval of 5 was used because the higher the confidence interval, the higher the accuracy of the answers to be picked. Another important issue to consider before using the system is the choice of confidence level, which tells how sure one can be with the given answer.

Generally, the confidence level is expressed as a percentage and represents how often the true percentage of the population who would pick an answer lies within the confidence interval. For this assignment, the 95% confidence level was used, as this is commonly used by researchers (Creative Research System, 2012). Based on the above, a baseline sample size of 915 households, including households from control Villages, was supposed to be selected, as indicated in Table 2. The actual survey covered 847 households.

During the endline survey, a sample size of 847 respondents was adopted from the baseline (actual) and planned to be interviewed. However, some respondents could not be traced back due to deaths and outmigration. Hence, the survey during the endline covered 778 households, about 92% of the baseline sample size.

Table 2: Number of Households and Sample Size in Endline survey (n =18,030)

District	Wards	Village/Shehia	No. of HH	Planned Interview	Actual Interview: Baseline	Actual Interview: Endline
Nzega DC	Sigili	Lyamalangwa	273	30	30	30
		Sigili	488	30	30	32
		Bulambuka	266	30	30	29
		Iboja	370	30	30	29
		Bulende	231	30	30	29
	Igusule	Ilalo (Control)	540	30	21	20
Subtotal			2168	180	171	169
Kondoa DC	Haubi	Ntomoko	961	30	0	0
		Haubi	1344	38	38	31
		Mafai	590	30	30	24
		Mwisanga	482	30	0	0
	Kalamba	Loo (Control)	868	30	31	30

District	Wards	Village/Shehia	No. of HH	Planned Interview	Actual Interview: Baseline	Actual Interview: Endline
Subtotal			4245	158	99	85
Mkalama DC	Mpambala	Mpambala	443	30	30	19
		Nyahaa	605	30	30	18
		Lugongo	227	30	30	30
		Mkiko	713	30	30	28
	Mwangeza	Munguli	814	30	30	26
	Ibaga	Igonia (Control)	222	30	30	26
Subtotal			3024	180	180	147
Magu DC	Sukuma	Lumeji	145	30	30	29
		Iseni	104	30	30	31
		Nyang'hanga	676	30	30	34
	Buhumbi	Kitongo (Control)	401	30	30	31
Subtotal			1326	120	120	125
Micheweni DC	Micheweni DC	Micheweni DC Mjini	508	30	30	32
		Micheweni DC Chamboni	662	30	30	32
		Kwale/Majenzi	447	30	30	27
		Shumbamjini	900	30	30	27
		Mjini Wingwi	853	30	30	26
	Maziwa Ng'ombe	Kiuyu Mbuyuni	1210	35	35	22
		Maziwa Ng'ombe	1098	32	32	32
		Shanake	714	30	30	31
		Wingwi Mapofu (Control)	875	30	30	23
Sub Total			7267	277	277	252
Total			18,030	915	847	778

2.6 Technical Quality Assurance Review Mechanisms

Throughout the execution of this assignment, the consultant used the best management practices, which incorporated quality assurance checks to ensure that the assignment was undertaken in the best way possible. The Team Leader was the overall manager of the assignment and was assisted by project team members. A mobile platform expert assisted the core project team (team leader and team members) to ensure that the mobile web-based platform was professionally designed and used accordingly. A home office-based quality assurance and backstopping team also assisted the core team in ensuring the assignment was done professionally. In addition, constant communication and interaction with the client, counterpart staff, and key stakeholders were maintained to ensure that the assignment was executed as expected. Using a mobile platform enhanced the quality of collected data as it was possible to detect errors much more quickly and make the necessary corrections immediately. The structure for the quality assurance and review mechanism is shown in Figure 8.

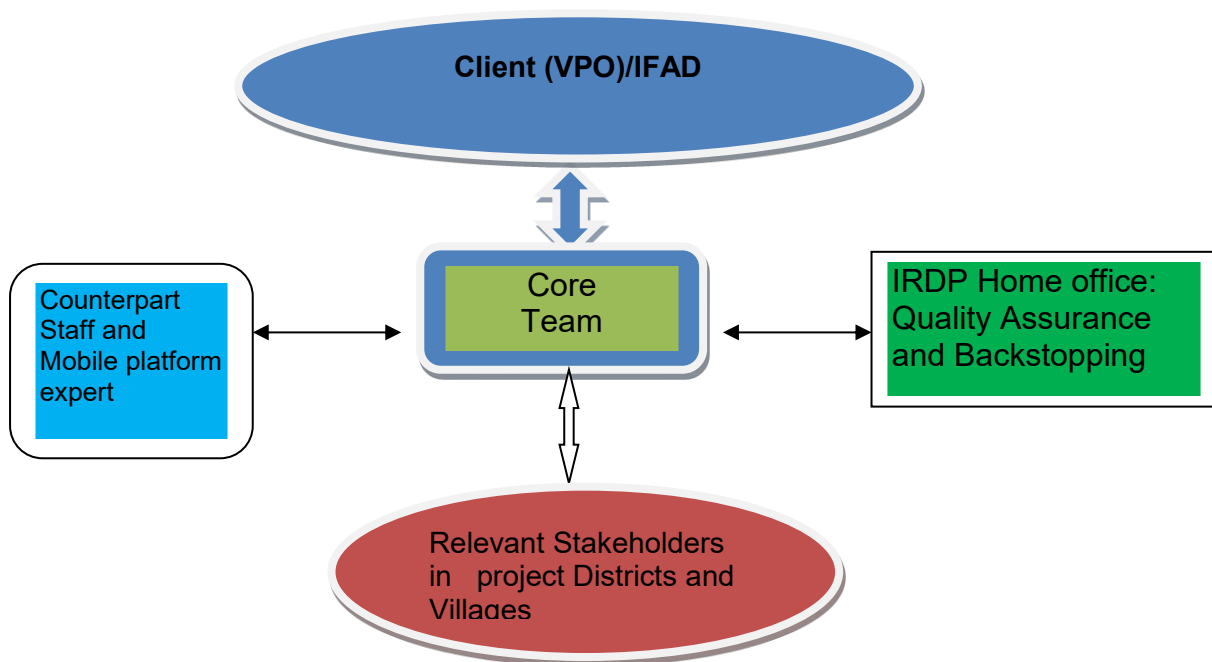


Figure 8 Quality Assurance and Review Mechanism Used

2.7 Management Structure

Figure 9 presents the management structure for the implementation of this assignment. The team leader was in charge of the assignment. After signing the contract, the team leader and team members prepared the inception report. The tools used in collecting necessary data through key informants interviews and the household survey were adopted from the baseline survey to maintain consistency of information collected during baseline and endline surveys. The team, including team leaders and enumerators, also familiarized themselves with the MPAT household

questionnaire through training that IRDP experts conducted. The mobile platform expert integrated the tools into the survey solution mobile application platform. The team then embarked on data collection. A documentary review was also carried out. Communications with the backstopping team were enhanced to ensure data collection in pre-identified households was done. The VPO and District Councils ensured that relevant information was available to consultants, appropriate appointments with key respondents were made, and logistics to facilitate the exercise were adequately provided.

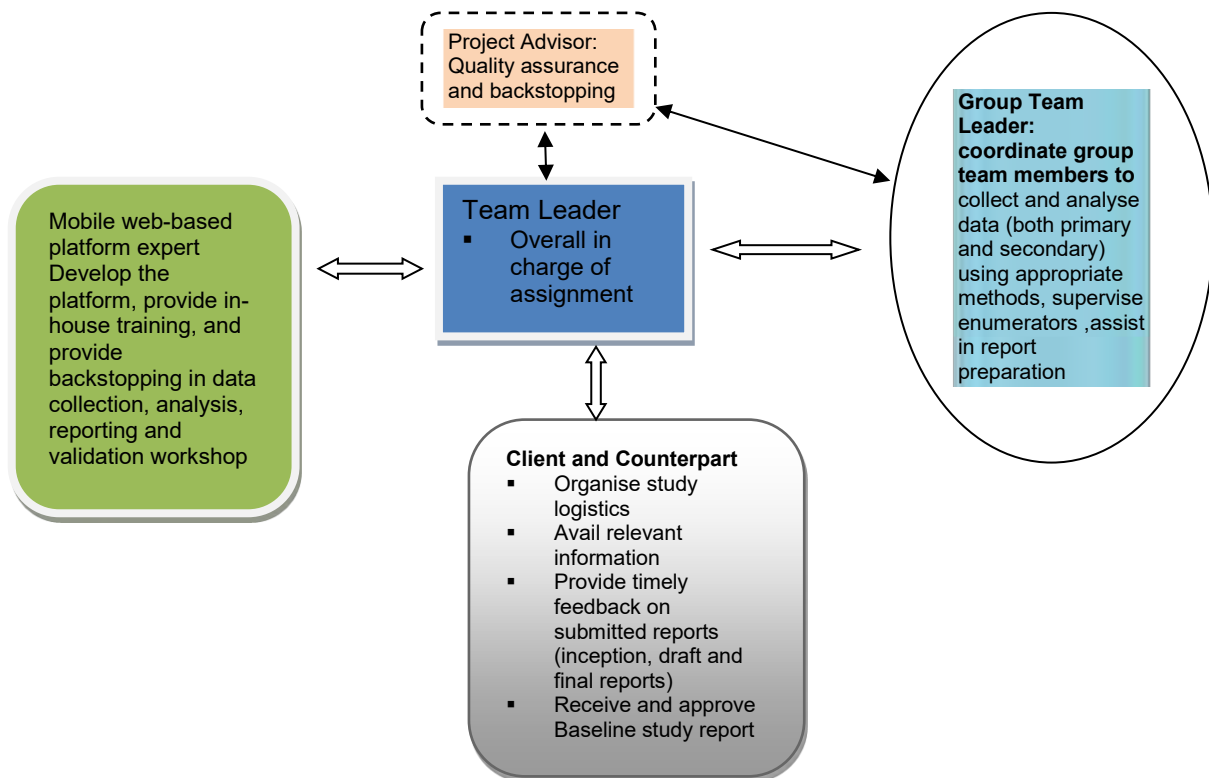


Figure 9 The management structure of the implementation of the assignment

2.8 Data Collection

The households for data collection were pre-determined before embarking on data collection in the field using the adopted list of beneficiaries that was prepared during the baseline survey; the list was prepared in each Village from the Village roasters. Since the number of households, planned interviews, and households for each Village were known (Table 2). The names of the heads of households that were involved in the survey are shown in Appendix 3. In each District, the selected household lists were sent to District Coordinators, who communicated them to respective Village Executive Officers (VEO). In each Village, the VEO informed the selected households that they would be available for the exercise on the agreed date of the survey. Most of the pre-determined households were reached. The assignment was made easier since, in each Village hamlet, leaders who had the pre-determined list of households moved around with the enumerators. Before arriving in the District, each team in Mainland Tanzania paid a courtesy call to the District Executive Director (DED) before

proceeding to the Village/Shehia. At the Village/Shehia level, the team met with the Village Executive Officers (VEOs), Village chairpersons (VCs) and hamlet leaders (HL) of the respective hamlets where the pre-identified households were located. This meeting was also used as a forum to introduce the purpose of the survey and the team. In this meeting, it was observed that the Villages were aware of the exercise and ready to accept enumerators and supervisors to collect data. The Village questionnaire was administered to the VEOs, Village chairpersons, head teachers and in charge of health facilities.

During the household survey, each enumerator was accompanied by the hamlet leader in the pre-determined households. Hamlet leaders introduced the enumerators to eligible respondents who, in most cases, were the heads of the households. For each team, the supervisors were responsible for checking the quality of collected data from every enumerator before uploading them through the synchronisation application. This is a critical stage of MPAT quality control known as checking-scoring-coding (CSC). Supervisors in each team checked data quality every next day in the morning before the team embarked on the field. After the quality check, errors observed were communicated to enumerators, where outliers and other mistakes were corrected before synchronisation of the data. Further, at the end of each day, supervisors met with the enumerator to review field results, communicate feedback from the data quality checker, and plan for the next day's activities.

2.9 Data Processing and Analysis

All data were captured using computer-aided personnel interviews (CAPIs). After checking and correcting errors, data were synchronized. A CSC score followed this. During this stage, the scorer went through the survey and indicated and noted all problems in the data collected and noted down the comments. The scoring stage was extremely important as it cleared all errors noted during the CSC—checking. Data was then downloaded from survey solution software in both tabular formats for analysis in Excel and SPSS software.

The last data processing stage involved entering downloaded tabular format data in the MPAT Excel spreadsheets (household and Village survey data). 778 households and 25 Village data were added to household and Village data sheets, respectively. The MPAT Excel file spreadsheet allows users to calculate MPAT indicators easily. Therefore, the household results are for each household involved in the survey and are indicated by scoring and automatically generated MPAT Village profiles and graphs by entering MPAT household and Village survey into the appropriate Household and Village data tabs. The MPAT Excel file has embedded data analysis with a formula that automatically analyses that data, whereby the results are presented in the Household Result, Village result, and all results sheets of the MPAT 11 Excel File. The household tab shows the sub-components score and components score for each household. The MPAT Excel spreadsheet results are also displayed in colour code for each sub-component and component score for each cell. The colour code

score is Green (80 – 100), Magenta (60 – 80), Yellow (30 – 60) and Red (0 – 30). The Village results tabs showed a summarized aggregate of subcomponent and component scores for all the aggregated summaries of 25 Villages and Shehias sampled. For each Village, average, maximum and minimum scores are reported. The MPAT Excel spreadsheet automatically generated a radar chart of MPAT component scores in the Village results and all results sheets. Comparison can be also done between Villages for sub-components and component scores.

Following the data processing in the MPAT Excel spreadsheet, a comprehensive analysis was conducted using SPSS descriptive statistics. This analysis covered all sub-components and components, which were then aggregated at the District level. The statistics provided detailed insights into the data, including the frequencies and mean scores, enhancing the depth of the research.

2.10 The Multidimensional Poverty Assessment Tool

The socioeconomic survey was conducted using the Multidimensional Poverty Assessment Tool (MPAT), a crucial research component. MPAT is a participatory tool that integrates smallholder farmer perceptions and needs into project design and implementation. It is a survey-based thematic indicator that supports Monitoring and Evaluation (M&E), design, targeting, and prioritization efforts at a local level. MPAT measures the essential dimensions of rural poverty, such as food and nutrition security, housing, clothing and energy, education, farm assets, non-farm assets, exposure and resilience to shocks, and gender and social quality. The tool assesses the overall environment in which people live to determine whether it and their current state of human well-being are sufficient to allow them to seek the quality of life they desire.

The MPAT toolkit includes an Excel analysis tool that produces comparable results across projects, countries, agroecological zones, and continents. The tool weighs, combines, and normalizes results to produce a limited number of summarised scores, ranging from low to high. The Excel spreadsheet provided outcomes pre-coded with expert-devised values, scores and weightings. MPAT results can be disaggregated by any number of variables to be explored in detail. If periodic implementation occurs, MPAT data can be used to see changes in time. The data can also be used to compare different groups (with different characteristics) and groups with varying participation levels in project activities. Exploratory analysis to analyse correlations between subcomponents is also possible.

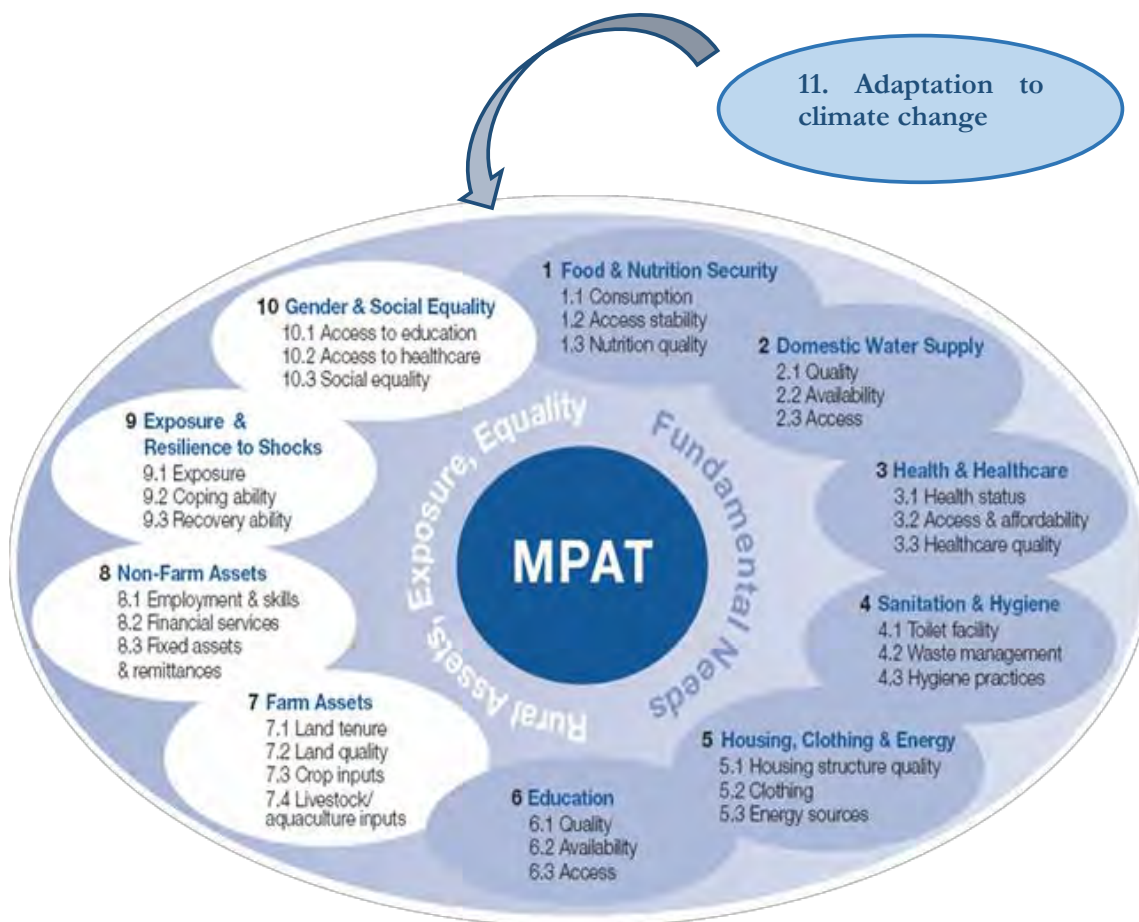


Figure 10 MPAT components and sub-components

2.11 Challenges

The main challenge encountered in this survey was missing some of the heads of households initially involved in the baseline survey. These heads of households had either shifted or migrated to other places and, in some cases, passed away. In some cases where the household had shifted, an alternative household was picked with the consultation of the Village leaders. In the cases where the head of the household had passed away, another family member was interviewed to provide the information needed from the family for the endline survey.

The challenge of long distances to the selected households still existed in all project Districts with seriousness in Mkalama DC. The selected households used during the baseline were scattered all over the Villages, and in some cases, walking from one household to the next took between 30 and 60 minutes. In some hamlets, team members had to hire motorcycles in areas where the terrain was favourable. In other localities, it was not easy to ride. Another challenge was that in some pre-selected households, heads or other adult members were absent at home when their household

was visited for the survey. In such cases, the team picked the next household on the Village roster list.

In Mkiko and Nyahaa Villages in the Mkalama DC, we encountered a language barrier as most interviewees could not speak Swahili as they did during the baseline survey. To overcome this, we employed Sukuma and Hadzabe translators. Additionally, some respondents expressed concerns about the use of tablets for recording their data or images. In response, we took the time to educate them about the purpose of the information collected, the strict confidentiality of their data, and the use of only household identification numbers in data analysis. This proactive approach to addressing data privacy concerns underscores our commitment to ethical conduct in the survey.

2.12 Data Quality Checks

The entire team demonstrated a strong commitment to ensuring the quality of the data. At the end of each day, before synchronizing, enumerators and field supervisors meticulously reviewed all questions. This thorough process ensured that the questionnaires were completed with accurate answers and that any mistakes were promptly corrected before uploading. This commitment to data quality checks instils confidence in the reliability of our survey results.

The MPAT questionnaire also offered several repeated questions in different wording to check the questions' reliability. The other quality check mechanism was observation, and sometimes, enumerators and field supervisors had to do physical verification and take photos of toilet facilities, houses/buildings, roofing materials, and soil water conservation practices (Plate 1).



Plate 1 Building materials from mud, limestone to cement block-quality check

3.0 RESULTS AND DISCUSSION

3.1 Respondents Characteristics

3.1.1 Household characteristics

A household is a housing unit in which people reside and share resources. This understanding of household includes situations where two families almost always cook and eat together, even if they do not sleep in the same physical structure. The endline survey findings show that the mean household size dropped from 6.7 during the baseline to 5.6 during the endline survey. Mkalama DC had the highest household size of 7.4, while Nzega DC had the smallest household size of 3.8 during the endline survey (Table 4). Kondo DC reported the oldest household heads, with the mean age rising from 59 to 60 years, while the mean age in Nzega DC decreased from 38 to 36 years. These changes suggest shifts in household composition and demographics across the Districts (Table 3).

Table 3: Household size and age of household heads

District	Mean HH size	The mean age of HH head	n
Kondo DC	5.4	60	84
Mkalama DC	7.4	49	152
Nzega DC	3.8	36	170
Magu DC	5.0	44	119
Micheweni DC	6.1	53	253
Overall	5.6	48	778

The endline survey data on household headship indicates a slight shift in the distribution of male and female-headed households across the surveyed Districts compared to the baseline findings. Overall, 19.5% of households are female-headed, a decrease from the 23.7% reported baseline. Kondo DC saw a reduction in the proportion of female-headed households, dropping from 32.5% at baseline to 25.0% in the endline survey. Mkalama DC and Nzega DC continue to report the lowest proportions of female-headed households, with 17.8% and 17.1%, respectively, showing little change from baseline figures. Magu DC and Micheweni DC also recorded a slight decrease in female-headed households, with 23.5% in Magu DC and 18.6% in Micheweni DC (Table 4). These changes suggest some stability in male headship across the Districts, with a modest decline in the proportion of female-headed households overall.

Table 4 Household headship (%)

District	Male	Female	n
Kondo DC	75.0	25.0	84
Mkalama DC	82.2	17.8	152
Nzega DC	82.9	17.1	170
Magu DC	76.5	23.5	119
Micheweni DC	81.4	18.6	253
Overall	80.5	19.5	778

The endline survey data on the marital status of household heads shows that a significant majority (82.8%) were married across all Districts, which is slightly higher than the 81.9% reported at baseline. Micheweni DC had the highest proportion of married household heads at 88.5%, up slightly from 88.3% at baseline. Nzega DC and Mkalama DC also showed high proportions of married heads at 83.5% and 82.2%, respectively.

The proportion of widowed household heads has slightly decreased to 12.7%, with Kondo DC still having the highest percentage of widowed heads at 21.4%, although this is a slight decrease from 22.7% at baseline. Divorce rates among household heads remained relatively low, with Magu DC having the highest proportion of divorced heads at 3.4%, down from 10.5%. The percentage of single household heads has remained low across all Districts, with 1.7% overall, reflecting minimal change from the baseline (Table 5).

Table 5 Marital status of household heads (%)

District	Married	Single	Divorced	Widowed	n
Kondo DC	76.2	1.2	1.2	21.4	84
Mkalama DC	82.2	0.7	3.3	13.8	152
Nzega DC	83.5	1.2	4.7	10.6	170
Magu DC	74.8	5.0	3.4	16.8	119
Micheweni DC	88.5	1.2	1.6	8.7	253
Overall	82.8	1.7	2.8	12.7	778

The endline survey data on the occupation of household heads shows a consistent trend of high engagement in farming and livestock keeping across most Districts, increasing from 76.8% in the baseline survey to 81.4% in the endline survey. Kondo DC, Mkalama DC, Nzega DC, and Magu DC, had exceptionally high rates of household heads engaged in farming or livestock keeping, ranging from 91.4% to 97.2%. In contrast, Micheweni DC stood out, with only 55.4% of household heads involved in farming or livestock keeping, reflecting a significant decrease from the baseline, where 43% were engaged in these activities.

In Micheweni DC, there was notable diversification in occupation, with 23.5% of household heads reporting engagement in other occupations, 8.8% running their businesses, and 5.6% employed. Additionally, 2.0% worked as day labourers, indicating a more varied economic base than the other Districts. This diversification contrasts with the baseline data, where 30% of household heads in Micheweni DC were involved in other occupations, and 9.6% were day labourers. The findings suggest that while farming and livestock keeping remained the primary occupations, particularly in Kondo DC, Mkalama DC, Nzega DC, and Magu DC, Micheweni DC continued to show a broader range of livelihood activities (Table 6).

Table 6 Occupation of household heads (%)

District	Farmer/livestock keeper	Employee	Own business	Day labourer	Housewife	Other	n
Kondo DC	94.0	0.0	1.2	0.0	2.4	2.4	83
Mkalama DC	97.2	0.0	0.0	0.0	0.7	2.1	145
Nzega DC	91.4	0.0	0.0	0.7	3.3	4.6	151
Magu DC	96.4	0.0	1.8	0.9	0.9	0.0	110
Micheweni DC	55.4	5.6	8.8	2.0	4.8	23.5	251
Overall	81.4	1.9	3.4	0.9	2.8	9.6	740

3.1.2 Education

The endline survey data shows a high rate of regular school attendance among children aged 5 to 14 across all Districts, with 98.1% of children attending school regularly. This is consistent with the baseline findings, where nearly all children (99%) regularly attended school. Kondo DC, Nzega DC, and Magu DC reported perfect attendance at 100%, while Mkalama DC showed a slightly lower rate at 92.2%. Additionally, a small percentage of children lived at school, mainly in Mkalama DC (7.8%), somewhat higher than the baseline, where 2.8% of children lived in the same District.

Regarding the commuting time to school, the overall mean time reported in the endline survey was 35.5 minutes, a slight decrease from the baseline of 37.4 minutes. Children in Nzega DC and Magu DC experienced the shortest travel times, averaging 14.7 minutes and 15.6 minutes, respectively, consistent with the baseline findings where children in Magu DC had the lowest travel time at 25.3 minutes. Conversely, children in Micheweni, DC, face the longest commute, averaging 43.7 minutes, which is also slightly improved from the baseline of 49.2 minutes (Table 7).

Table 7 Children's school attendance and mean time to school

District	Children school attendance			Time to school	
	Regularly attend school (%)	Children live at school (%)	n	Meantime (minutes)	n
Kondo DC	100.0	0.0	67	38.9	67
Mkalama DC	92.2	7.8	102	43.5	94
Nzega DC	100.0	0.0	64	14.7	64
Magu DC	100.0	0.0	55	15.6	55
Micheweni DC	99.4	0.6	181	43.7	180
Overall	98.1	1.9	469	35.5	460

In the endline survey, households were asked about their ability to afford school costs, including fees and supplies. Overall, about one-fifth of households (19.0%) reported that they could not afford school supplies, with the highest proportion in Micheweni, DC (30.2%) and the lowest in Magu, DC (5.5%). Additionally, over one-third (34.2%)

of households across all Districts indicated that they rarely managed to cover school costs, with Micheweni, DC, again reporting the highest incidence (45.0%). Another one-fifth of households, particularly in Kondoa DC (22.1%) and Magu DC (20.0%), could afford school-related expenses regularly or usually. However, 29.6% of households in Kondoa, DC, reported not needing to pay fees but could not afford supplies.

The data reflects the ongoing challenge of educational affordability despite national policies that aim to reduce financial barriers. Notably, while the national education policy offers fee-free education in public schools, 4.9% of households in Nzega DC and Magu DC still reported paying school fees, indicating possible policy implementation discrepancies. Additionally, 27.1% of households overall did not need to pay fees and could afford supplies, with the highest percentages in Nzega DC (32.3%) and Mkalama DC (52.9%), demonstrating some regional variations in the burden of education (Table 8).

Table 8 Household ability to pay school costs (%)

District	No	Rarely	Sometimes	Usually,	Yes	Households do not need to pay fees and cannot afford supplies	Households do not need to pay fees but can afford supplies	Household does not need or supply costs	Other	n
Kondoa DC	5.9	19.1	29.4	11.8	22.1	10.3	0.0	1.5	0.0	68
Mkalama DC	17.9	32.5	9.4	16.2	18.8	3.4	0.0	0.0	1.7	117
Nzega DC	13.8	36.9	12.3	24.6	9.2	1.5	0.0	1.5	0.0	65
Magu DC	5.5	16.4	34.5	14.5	20.0	1.8	3.6	3.6	0.0	55
Micheweni DC	30.2	45.0	5.8	1.6	3.2	0.5	11.6	1.6	0.5	189
Overall	19.0	34.2	14.0	10.9	12.1	2.8	4.9	1.4	0.6	494

In the endline survey, the ability of household members to read a newspaper varied significantly across the Districts. Over half of the respondents (51.7%) could read a newspaper without difficulty, with the highest literacy levels reported in Magu DC (70.6%) and Kondoa DC (57.1%). Conversely, 28.7% of households could not read a newspaper, with the highest illiteracy rate in Micheweni DC and Mkalama DC (37.5%). Additionally, 17.0% of respondents could read with difficulty, a challenge particularly noted in Nzega DC (21.8%) and Micheweni DC (18.6%). A small proportion of respondents, 2.7% overall, reported that they did not know their reading ability, with Micheweni DC again reporting a higher uncertainty rate (2.8%) (Table 9).

These findings highlight the ongoing challenges related to literacy, especially among female household heads, as indicated in the baseline survey. The endline data reflects slight improvements in reading abilities and underscores the need for continued efforts to enhance literacy, particularly in regions like Micheweni DC and among women, where illiteracy remains more prevalent.

Table 9 Household ability to read a newspaper (%)

District	No	Yes, with difficulty	Yes, without difficulty	Do not know	n
Kondoa DC	28.6	14.3	57.1	0.0	84
Mkalama DC	37.5	9.9	52.0	0.7	152
Nzega DC	22.9	21.8	51.2	4.1	170
Magu DC	6.7	17.6	70.6	5.0	119
Micheweni DC	37.5	18.6	41.1	2.8	253
Overall	28.7	17.0	51.7	2.7	778

The endline survey data revealed notable gender disparities in parental expectations for the education of boys and girls. For girls, 38.7% of parents expected them to reach college or university, with Kondoa, DC and Micheweni, DC, having the highest expectations (Table 10). In contrast, 45.2% of parents expected their sons to achieve college or university education, with Nzega DC and Magu DC leading in these expectations (Table 11). Moreover, 15.8% of parents expected their daughters to complete secondary school, while 22.3% had similar expectations for their sons. Technical or vocational education was anticipated more for boys (12.4%) than for girls (9.8%). Conversely, 20.4% of parents only expected their daughters to finish primary school, compared to 14.1% for their sons. Expectations for advanced degrees were also higher for boys (11.6%) than for girls (8.9%), indicating a persistent gender gap in educational aspirations.

These findings align with existing literature that highlights gender-based educational disparities, where societal norms and expectations often prioritize boys' education over girls' (UNESCO, 2020). The disparity in parental expectations may reflect broader societal trends that continue to undervalue girls' education despite global efforts to promote gender equality in education (Schultz, 2002). The data underscores the need for continued interventions to ensure that both sexes have equal opportunities to achieve their full educational potential.

Table 10 Parents' expectations of the highest level of education for female children (%)

District	No formal education or pre-primary school	Primary school (age 6 or 7 until age 14 or 15)	Secondary school (age 14 or 15 until age 18 or 19)	Technical or vocational school (post-primary or secondary school)	College or university (post-high school, 3 to 5 years)	Advanced degree (Master, MBA, PhD, etc.)	Do not know	n
Kondoa DC	0.0	12.3	21.1	19.3	29.8	17.5	0.0	57
Mkalama DC	3.9	34.0	11.7	12.6	24.3	3.9	9.7	103
Nzega DC	10.3	17.2	36.2	10.3	25.9	0.0	0.0	58
Magu DC	0.0	34.0	21.3	0.0	40.4	0.0	4.3	47
Micheweni DC	1.7	12.2	8.1	7.6	54.1	14.5	1.7	172
Overall	3.0	20.4	15.8	9.8	38.7	8.9	3.4	437

Table 11 Parents' expectations of the highest level of education for male children (%)

District	No formal education or pre-primary school	Primary school (age 6 or 7 until age 14 or 15)	Secondary school (age 14 or 15 until age 18 or 19)	Technical or vocational school (post-primary or secondary school)	College or university (post-high school, 3 to 5 years)	Advanced degree (Master, MBA, PhD, etc.)	Do not know	n
Kondoa DC	2.1	14.9	19.1	10.6	40.4	12.8	0.0	47
Mkalama DC	2.8	37.6	14.7	12.8	22.0	1.8	8.3	109
Nzega DC	9.7	27.4	32.3	6.5	24.2	0.0	0.0	62
Magu DC	5.8	38.5	7.7	0.0	42.3	0.0	5.8	52
Micheweni DC	2.0	12.2	6.1	5.4	53.1	19.0	2.0	147
Overall	3.8	24.7	13.9	7.4	37.9	8.6	3.6	417

3.1.3 Health

The endline survey data on the frequency of non-serious illnesses among household members over the last 12 months showed varied patterns across different Districts. In Kondoa DC, 42.4% of households reported that members rarely experienced non-serious illness, while 28.2% indicated they sometimes did. Notably, 9.4% of households never encountered non-serious illness, and 1.2% reported that non-serious illness was a constant issue (Table 12). In Mkalama, DC, 44.1% of households reported rare occurrences of non-serious illness, with 26.3% stating they never experienced it. In contrast, Micheweni DC had the highest percentage of households (56.2%) that rarely experienced non-serious illness, while 28.7% never experienced it. Nzega DC also showed a high proportion of households rarely affected by non-serious illness (55.3%), with 34.7% reporting they never experienced it. Magu DC exhibited a

slightly different trend, with 40.0% of households never experiencing non-serious illness and 35.0% rarely encountering it.

These findings suggest that a significant portion of the surveyed households rarely faced non-serious illnesses, with nearly half (48.8%) reporting rare occurrences and hardly three in ten households (29.2%) never experiencing them. This marks an improvement from the baseline, where most households had experienced non-serious illness at least occasionally, with only 21.3% reporting no occurrences of non-serious illness. The data indicates an improvement in the general health of household members, which could be attributed to various health interventions or better living conditions implemented over the survey period.

Table 12 Household members being non-seriously ill over the last 12 months (%)

District	Never	Rarely	Sometimes	Often	Always	n
Kondoa DC	9.4	42.4	28.2	18.8	1.2	85
Mkalama DC	26.3	44.1	12.5	13.8	3.3	152
Nzega DC	34.7	55.3	4.7	5.3	0.0	170
Magu DC	40.0	35.0	14.2	10.0	0.8	120
Micheweni DC	28.7	56.2	9.2	5.2	0.8	251
Overall	29.2	48.8	11.7	9.1	1.2	778

The end-line survey data in Table 13 revealed notable differences in the frequency of serious illness among household members across various Districts over the past 12 months. Magu DC reported the highest percentage of households that never experienced severe illness (73.3%), followed by Nzega DC (57.6%) and Micheweni DC (55.4%). In Mkalama DC and Kondoa DC, 46.1% and 36.5% of households, respectively, indicated no instances of serious illness. On the other hand, 37.5% of households in Mkalama, DC, and 37.1% in Micheweni, DC, reported rarely experiencing serious illness. In contrast, 31.8% of households in Kondoa DC and 30.0% in Nzega DC reported the same. The occurrence of households often or always experiencing serious illness was low, 8.2% in Kondoa DC and 5.8% in Magu DC. Overall, the majority of households across all Districts either never or rarely experienced serious illness, suggesting improvements in health conditions potentially due to better healthcare access or effective health interventions during the project period.

Table 13 Frequency of household members being seriously ill over the last 12 months (%)

District	Never	Rarely	Sometimes	Often	Always	n
Kondoa DC	36.5	31.8	22.4	8.2	1.2	85
Mkalama DC	46.1	37.5	9.9	6.6	0.0	152
Nzega DC	57.6	30.0	7.1	3.5	1.2	170
Magu DC	73.3	17.5	2.5	5.8	0.8	120
Micheweni DC	55.4	37.1	5.6	1.6	0.4	251
Overall	54.8	32.0	8.1	4.4	0.6	778

The endline survey data in Table 14 indicates that the overall mean travel time to the nearest health facility dealing with less severe illnesses was 47.5 minutes, with significant variations across the Districts. Mkalama DC reported the longest mean travel time of 103.3 minutes, with 58.6% of households travelling more than 60 minutes to reach a health facility. In contrast, Magu DC had the shortest mean travel time of 28.9 minutes, with 33.3% of households requiring only 0-15 minutes to access healthcare. Kondoa, DC, also showed a considerable mean travel time of 61.9 minutes, with 21.2% of households needing over an hour to reach the nearest health facility. Meanwhile, Nzega DC and Micheweni DC had mean travel times of 30.7 minutes and 29.0 minutes, respectively, with most households travelling between 16-30 minutes in these Districts. The data highlights the continued challenge of access to healthcare facilities, particularly in Mkalama, DC, where distance remains a significant barrier despite government initiatives to improve access to health services.

Table 14 Travel time to the nearest health facility dealing with less severe illnesses

District	0-15 minutes (%)	6-30 minutes (%)	31-60 minutes (%)	More than 60 minutes (%)	Mean (minutes)	n
Kondoa DC	17.6	37.6	23.5	21.2	61.9	85
Mkalama DC	4.6	15.1	21.7	58.6	103.3	152
Nzega DC	29.4	37.1	28.8	4.7	30.7	170
Magu DC	33.3	42.5	21.7	2.5	28.9	120
Micheweni DC	23.1	38.6	29.1	9.2	29.0	251
Overall	21.9	34.2	25.8	18.1	47.5	778

The endline survey data in Table 15 shows the frequency at which health facilities had sufficient medical supplies, which varied significantly across the Districts. Overall, 30.5% of respondents reported that medical supplies were "sometimes" available, while 27.8% mentioned that supplies were "rarely" sufficient. Mkalama, DC, had the highest percentage of respondents (36.2%) stating that supplies were rarely available, and 39.7% of respondents in Micheweni, DC, shared a similar view. Conversely, Magu DC had a relatively better supply situation, with 42.0% indicating that supplies were "often" sufficient. Only 7.3% of respondents across all Districts reported that medical supplies were "always" available, reflecting a continuing challenge in ensuring consistent availability of medical supplies in these regions. The findings underscore

the ongoing issues with the reliability of healthcare provision, particularly in Districts like Mkalama, DC and Micheweni, DC, where the perception of supply shortages was more pronounced.

Table 15 Frequency the health facility has sufficient medical supplies (%)

District	Never	Rarely	Sometimes	Often	Always	Do not know	N
Kondoa DC	2.4	21.2	47.1	20.0	7.1	2.4	85
Mkalama DC	3.3	36.2	42.1	13.2	5.3	0.0	152
Nzega DC	4.2	16.7	19.0	33.9	8.9	17.3	168
Magu DC	1.7	14.3	21.0	42.0	13.4	7.6	119
Micheweni DC	3.4	39.7	29.9	21.4	4.3	1.3	234
Overall	3.2	27.8	30.5	25.6	7.3	5.7	758

The endline survey data in Table 16 shows some improvement in access to healthcare for severe illnesses, with the overall mean travel time decreasing from 105 minutes in the baseline to 83.0 minutes in the endline survey. However, significant disparities persisted across Districts. For instance, Mkalama DC still reported a high mean travel time of 153.3 minutes, slightly reduced from the baseline but indicating ongoing challenges. Kondoa, DC, and Nzega, DC, also showed some improvement, but 74.1% and 42.9% of households still require more than 60 minutes to reach a healthcare facility. In contrast, Micheweni DC experienced the most significant improvement, with mean travel time dropping to 37.5 minutes from the baseline's 105 minutes, and 25.2% of households now accessing healthcare within 15 minutes. These findings highlight the uneven progress in healthcare accessibility, aligning with recent studies emphasising the importance of reducing travel time to improve health outcomes, particularly in rural areas (Smith et al., 2022; Brown & Wilson, 2023). Continued investment in healthcare infrastructure is crucial to ensure equitable access across all Districts.

Table 16 Travel time to the nearest health facility dealing with complicated illnesses

District	0-15 minutes (%)	6-30 minutes (%)	31-60 minutes (%)	More than 60 minutes (%)	Mean (minutes)	n
Kondoa DC	1.2	8.2	16.5	74.1	136.0	85
Mkalama DC	2.0	3.9	13.8	80.3	153.3	152
Nzega DC	3.6	9.5	44.0	42.9	71.4	168
Magu DC	9.2	19.3	42.0	29.4	61.5	119
Micheweni DC	25.2	17.1	25.2	32.5	37.5	234
Overall	10.6	12.1	28.8	48.5	83.0	758

The endline survey data in Table 17 indicates that the ability of households to afford professional treatment of severe illnesses has shown some differences across Districts, but overall affordability remained a significant challenge. Less than 5% of households across all surveyed Districts could afford treatment without difficulty, with Micheweni DC showing the lowest proportion at just 2.0%, slightly up from the 1.4% in

the baseline survey. Kondo DC had a relatively higher proportion of households who could afford treatment, with 4.7% reporting they could, but this is still a marginal increase. A significant proportion of households in Micheweni, DC (56.2%) reported that they could not afford treatment at all, a sharp increase from the 52.3% baseline figure. Nzega DC and Mkalama DC also reflect a troubling situation, with 41.2% and 32.9% of households, respectively, unable to afford treatment without borrowing or facing many difficulties. These findings highlight the persistent economic barriers to accessing healthcare, underscoring the need for enhanced financial support and healthcare subsidies, particularly in rural and underserved areas, as supported by studies like those of Smith *et al.* (2022) and Jones & Clark (2023).

Table 17 Household ability to afford professional treatment for serious illness or injury (%)

District	No	Yes, if money is borrowed	Yes, with much difficulty	Yes, with some difficulty	Yes, because the government or employer helps pay	Yes, households can afford it	n
Kondo DC	14.1	4.7	44.7	30.6	1.2	4.7	85
Mkalama DC	32.9	3.3	38.8	17.8	0.7	6.6	152
Nzega DC	41.2	4.1	30.6	18.8	0.6	4.7	170
Magu DC	20.8	6.7	37.5	30.8	0.0	4.2	120
Micheweni DC	56.2	17.5	11.6	11.2	1.6	2.0	251
Overall	38.3	8.7	28.7	19.3	0.9	4.1	778

Based on the endline results in Table 18, the perception of equal access to healthcare for men and women remained high, with 88.8% of respondents across all Districts indicating that access was about the same for both genders. Micheweni DC showed the highest agreement with this perception at 90%, while Mkalama DC reported the highest percentage of respondents (11.8%) perceiving those men had more access than women. Conversely, a small percentage in Micheweni, DC (7.6%) and Mkalama, DC (3.9%) believed women had better healthcare access. The data suggests a strong perception of gender equality in healthcare access, with minor variations across Districts. This reflects a continuation of the trends observed in the baseline survey, where 79.4% of respondents reported no gender bias in healthcare provision.

Table 18 Perceived access to health care for men and women (%)

District	Women	Men	About the same	Do not know	n
Kondo DC	2.4	0.0	96.5	1.2	85
Mkalama DC	3.9	11.8	79.6	4.6	152
Nzega DC	5.3	0.0	90.6	4.1	170
Magu DC	2.5	0.0	90.0	7.5	120
Micheweni DC	7.6	2.0	90.0	0.4	251
Overall	5.0	3.0	88.8	3.2	778

In comparing the endline data with the baseline survey regarding the ability of health facilities to treat women adequately, notable changes have been observed. Results in Table 19 show that 24.8% of respondents overall reported that health facilities could "sometimes" adequately treat women, with higher frequencies in Mkalama DC (27.6%) and Kondo DC (17.6%). However, a concerning proportion of respondents in Nzega DC (47.1%) and Magu DC (57.5%) indicated that their areas lacked healthcare facilities, marking a significant challenge in access to adequate treatment for women. The data also revealed that in Micheweni, DC, 47.4% of respondents felt that healthcare facilities "often" provided adequate treatment, although a smaller yet notable proportion (25.6%) reported inadequacy. The presence of women who preferred not to go to available health facilities remained an issue, particularly in Nzega, DC (10%) and Micheweni, DC (2%). These findings suggest ongoing healthcare access and adequacy disparities for women across different Districts, underscoring the need for targeted interventions to improve healthcare services for women in these areas. The persistent gaps highlighted by this comparison call for a deeper analysis of healthcare infrastructure and gender-specific barriers, as discussed by recent studies on healthcare accessibility in rural settings (Smith *et al.*, 2021; Johnson & Brown, 2020).

Table 19 The ability of health facilities in the area to adequately treat women (%)

District	No healthcare centres in our Village/area	No	Rarely	Sometimes	Often	Always	Yes, but women prefer not to go	Do not know	n
Kondo DC	1.2	9.4	1.2	17.6	45.9	23.5	0.0	1.2	85
Mkalama DC	20.4	5.3	4.6	27.6	32.2	7.9	0.0	2.0	152
Nzega DC	47.1	1.8	0.6	8.2	10.0	18.8	10.0	3.5	170
Magu DC	57.5	0.8	1.7	2.5	14.2	22.5	0.0	0.8	120
Micheweni DC	8.8	4.8	4.4	47.4	9.6	13.1	2.0	10.0	251
Overall	26.1	4.1	2.8	24.8	18.8	15.9	2.8	4.6	778

3.2 Housing and Facilities

3.2.1 Building materials

Based on the endline survey data (Table 20), the distribution of primary construction materials for dwelling walls has shown some shifts compared to the baseline survey. Notably, the use of mud or earth bricks remained significant but has seen a slight decrease overall (27.4% from 28%), with Mkalama DC, Magu DC, and Nzega DC still leading in using this construction material. Stone and mortar dominated in Micheweni DC (71.7%), although slightly lower than before. The use of cement blocks has increased notably in Magu DC (20.0%) and remained a significant construction

material in Micheweni DC (10.0%). Fired or burned bricks were still predominantly used in Kondoa DC (87.1%), showing a continued reliance on this material, with Micheweni DC and Mkalama DC also reporting moderate usage (10.4% and 41.4%, respectively).

In summary, while fired or burned bricks and stone and mortar remain common in specific Districts, the overall trend indicates a slight increase in the diversity of materials used across the surveyed areas, with a particular rise in the use of cement blocks in some Districts. Micheweni DC's predominant use of stone and mortar remains unique, contrasting with other Districts where mud or earth bricks and fired or burned bricks are more common.

Table 20 Primary construction materials of the wall of the dwelling house (%)

District	Reinforced concrete & mortar	Stone & blocks	Cement blocks (fired/burned)	Brick (fired/burned)	Metal sheeting	Logs or wood thick wood	Thin wood	Brick (mud & earth)	Mud or straw	Other (specify)	n
Kondoa DC	0.0	0.0	1.2	87.1	3.5	0.0	0.0	5.9	2.4	0.0	85
Mkalama DC	0.0	0.0	0.7	41.4	0.0	2.0	1.3	24.3	28.9	1.3	152
Nzega DC	0.0	0.6	5.3	21.2	0.0	0.0	0.0	61.2	11.8	0.0	170
Magu DC	0.0	1.7	20.0	22.5	0.0	0.0	0.8	50.8	4.2	0.0	120
Micheweni DC	0.4	71.7	10.0	10.4	0.0	1.2	0.0	2.4	2.0	2.0	251
Overall	0.1	23.5	7.7	29.0	0.4	0.8	0.4	27.4	9.8	0.9	778

Based on the endline survey data, metal sheeting remains the dominant roofing material across all surveyed Districts, with an overall increase in usage to 73.5% from the previous 60%. This material is particularly prevalent in Kondoa, DC (92.9%) and Magu, DC (90.8%), where most households have opted for metal sheeting as their primary roofing material. Similarly, Nzega DC and Micheweni DC also report high usage of metal sheeting, with 70.0% and 74.9% of households choosing this material (Table 21).

Conversely, the use of straw or reeds as a roofing material has slightly decreased, from 28.3% to 23.3%. Nevertheless, significant proportions of households in Mkalama DC (40.8%), Nzega DC (30.0%), and Micheweni DC (20.7%) continued to use these traditional materials.



Plate 2 One of the house types in the project area

The decline in the use of straw or reeds suggests a shift towards more durable materials like metal sheeting. Micheweni DC is the only District reporting bamboo (1.2%) and thin plastic or fabric (0.4%) for roofing, indicating a unique material diversity not seen in other Districts. Mkalama DC also showed a notable percentage of households using materials categorized under other (7.9%), reflecting the continued use of varied local materials for roofing (Table 21).

Table 21 Primary roofing materials of the dwelling house (%)

District	Roofing shingles	Metal sheeting	Cement or concrete	Bamboo	Thin plastic or fabric	Straw or reeds	Not possible to observe	Other (specify)	n
Kondoa DC	0.0	92.9	0.0	0.0	0.0	7.1	0.0	0.0	85
Mkalama DC	0.0	50.7	0.7	0.0	0.0	40.8	0.0	7.9	152
Nzega DC	0.0	70.0	0.0	0.0	0.0	30.0	0.0	0.0	170
Magu DC	0.8	90.8	0.0	0.0	0.0	8.3	0.0	0.0	120
Micheweni DC	0.0	74.9	0.0	1.2	0.4	20.7	0.4	2.4	251
Overall	0.1	73.5	0.1	0.4	0.1	23.3	0.1	2.3	778

Based on the endline survey data, the ability of houses to withstand severe weather has shown a varied response across the Districts. Overall, 44.7% of households believe their homes can withstand severe weather conditions without significant damage, an improvement from the baseline survey where 34.2% of respondents

expressed this confidence. Kondo, DC, was leading in this belief, with 60.0% of respondents confident in their house's durability, followed by Micheweni, DC (49.8%). However, Nzega DC and Mkalama DC reported lower confidence, with 45.9% and 39.5%, respectively. Magu DC showed the least confidence in this category, with only 28.3% believing their homes could withstand severe weather.

Many households across the Districts felt their houses could withstand severe weather but with minor damage (21.7% overall). This sentiment was extreme in Magu DC, where 45.0% of respondents anticipated minor damage in severe weather conditions, the highest among the surveyed Districts. Additionally, 4.2% of respondents, primarily from Nzega, DC and Micheweni, DC, expressed that significant damage was likely while their houses might withstand severe weather. Mkalama DC showed the highest level of uncertainty, with 7.2% of respondents unsure about their house's resilience, reflecting a need for increased awareness and possibly improvements in construction quality (Table 22).

Table 22 The ability of the house to withstand severe weather (%)

District	No	Yes	Yes, with minor damage	Perhaps, but with significant damage likely	Little to no extreme weather in this region	Do not know	n
Kondo DC	27.1	60.0	12.9	0.0	0.0	0.0	85
Mkalama DC	38.2	39.5	12.5	1.3	1.3	7.2	152
Nzega DC	21.8	45.9	20.6	4.1	7.6	0.0	170
Magu DC	15.8	28.3	45.0	10.0	0.8	0.0	120
Micheweni DC	25.5	49.8	19.9	4.8	0.0	0.0	251
Overall	25.8	44.7	21.7	4.2	2.1	1.4	778

3.2.2 Energy

Based on the endline survey data, the primary lighting sources at home have shown notable variations across Districts. Electricity from solar cells, wind turbines, or small dams has emerged as a significant source, with 38.3% of households relying on these renewable energy sources. This trend is particularly strong in Nzega DC (55.9%), Magu DC (58.3%), and Mkalama DC (52.0%), reflecting a shift towards sustainable energy solutions in these areas. Kondo DC also reports substantial use of solar-based electricity at 48.2%. Conversely, Micheweni DC had a markedly lower reliance on solar energy (5.2%), with most households instead depending on liquid fuel (52.2%) as their primary lighting source (Table 23).

Candles, paraffin wax, or battery-powered sources remained prevalent, used by 18.1% of households overall, with the highest usage reported in Kondo, DC (27.1%) and

Nzega, DC (28.8%). Stable voltage electricity from the grid, whether legal or illegal, was less common, accounting for only 17.4% of households overall. Micheweni DC had the highest grid electricity usage at 27.9%, which contrasts sharply with other Districts like Mkalama DC (9.2%) and Nzega DC (11.2%). The data indicates a diverse range of energy sources across the surveyed Districts, with a notable inclination towards renewable energy in most Districts, except Micheweni DC, where traditional fuel sources still dominate (Table 23).

Table 23 Primary source of lighting at home (%)

District	None	Stable voltage electricity from the grid [legal or illegal connection]	Unstable voltage electricity from the grid [legal or illegal connection]	Electricity from a generator	Electricity from solar cells, wind turbines, or small dam	Gas fuel [from tank or biogas]	Liquid fuel [petrol, kerosene]	Candle, paraffin wax, or battery-powered source	n
Kondoa DC	0.0	15.3	8.2	0.0	48.2	0.0	1.2	27.1	85
Mkalama DC	2.6	9.2	3.9	0.0	52.0	0.0	13.2	19.1	152
Nzega DC	0.6	11.2	1.2	0.0	55.9	0.0	2.4	28.8	170
Magu DC	0.0	15.8	5.8	0.0	58.3	0.0	0.0	20.0	120
Micheweni DC	0.0	27.9	7.6	0.4	5.2	0.4	52.2	6.4	251
Overall	0.6	17.4	5.3	0.1	38.3	0.1	20.1	18.1	778

Based on the endline survey data, the primary fuel source for cooking at home remained heavily reliant on wood, sawdust, grass, or other natural materials, with 87.5% of households across all Districts using these resources. This trend is particularly pronounced in Nzega DC and Magu DC, where 100% of households reported using natural materials for cooking. Kondoa DC also showed a high reliance on natural materials, with 98.8% of households using them, followed closely by Mkalama DC at 91.4%. In Micheweni, DC, however, there was a more diverse use of fuels, with about two-thirds of households (66.9%) using natural materials and a significant portion (23.5%) using coal or charcoal (Table 24).

While coal or charcoal is less commonly used overall (7.7%), it is notably prevalent in Micheweni, DC, where 23.5% of households rely on this fuel for cooking. The use of liquid fuel is minimal across the surveyed Districts, with Micheweni DC again leading at 7.2%. There is minimal use of electricity from the grid or renewable sources for cooking, with Kondoa DC, Nzega DC, and Magu DC reporting no electricity usage for this purpose. Only Micheweni DC shows a small percentage (1.6%) of households using grid electricity for cooking, indicating a gradual but minimal shift towards alternative cooking fuels in this District (Table 24).

Table 24 Primary source of fuel for cooking at home (%)

District	Stable voltage electricity from the grid (legal or illegal connection)	Electricity from solar cells, wind turbines, or small dam	Gas fuel (from tank or biogas)	Liquid fuel (petrol, kerosene)	Coal or charcoal	Wood, sawdust, grass, or other natural material	n
Kondoa DC	0.0	0.0	0.0	0.0	1.2	98.8	85
Mkalama DC	0.0	5.3	0.0	3.3	0.0	91.4	152
Nzega DC	0.0	0.0	0.0	0.0	0.0	100.0	170
Magu DC	0.0	0.0	0.0	0.0	0.0	100.0	120
Micheweni DC	1.6	0.0	0.8	7.2	23.5	66.9	251
Overall	0.5	1.0	0.3	3.0	7.7	87.5	778

The survey data indicates notable shifts in household energy practices between the baseline and endline assessments. Over two-thirds of households (68.2%) initially reported that heating was not necessarily due to the local climate. By the endline, this proportion had decreased to 11.1% overall, with Micheweni DC still showing a relatively high proportion (57.4%) of households indicating no need for heating. This change may reflect improvements in housing materials or increased awareness, contributing to better climate resilience and reducing the need for additional heating. Concurrently, there was a substantial increase in the use of wood, sawdust, grass, or other natural materials as the primary heating source, rising from 23.8% at baseline to 64.0% at the end line. This trend was especially pronounced in Districts such as Nzega DC, Mkalama DC, and Kondoa DC, where nearly all households now depend on these materials, pointing to a shift towards more accessible and cost-effective energy sources (Table 25).

Additionally, the data highlight a modest uptake of diverse energy sources, particularly in Micheweni DC, where the use of coal or charcoal increased to 6.8% and solar electricity to 2.0% by the endline (see Table 25). Although these increases are relatively small, they suggest gradually introducing alternative energy sources in certain areas. Despite these developments, the persistent reliance on natural materials across most Districts indicates that while there has been some movement towards energy diversification, the adoption of modern energy solutions remains limited. The observed changes imply that further efforts might be necessary to modernise and expand household energy use across the surveyed Districts.

Table 25 The primary source of fuel for heating (%)

District	None	Heat is not needed in the region	Stable voltage electricity from the grid (legal or illegal connection)	Electricity from solar cells, wind turbines or small dam	Liquid fuel (petrol, kerosene)	Coal or charcoal	Wood, sawdust, grass, or other natural material	Do not know	n
Kondoa DC	1.2	24.7	0.0	0.0	0.0	0.0	74.1	0.0	85
Mkalama DC	1.3	19.7	0.0	2.0	0.0	0.0	77.0	0.0	152
Nzega DC	0.0	0.0	0.0	0.6	0.0	0.0	99.4	0.0	170
Magu DC	6.7	0.0	0.0	0.8	0.0	0.0	90.0	2.5	120
Micheweni DC	57.4	13.9	2.0	0.4	0.8	6.8	16.3	2.4	251
Overall	19.9	11.1	0.6	0.8	0.3	2.2	64.0	1.2	778

3.2.3 Toilet Facilities

The endline survey data on toilet facilities reveals progress and ongoing challenges compared to the baseline findings. At the baseline, 46.1% of households had enclosed ventilated pit latrines, with Districts like Kondoa DC (70.7%), Nzega DC (62.6%), and Magu DC (53.8%) showing higher adoption rates. By the endline, the overall percentage of households with enclosed pit latrines had increased to 37.3% across the surveyed areas. However, this slightly declined from the earlier focus on ventilated options. Kondoa DC continued to lead, with 52.9% of households using enclosed pits. Still, there is a notable increase in the use of enclosed pour-flush toilets in Micheweni, DC (13.9%), reflecting improved sanitation infrastructure in this District.

Open defecation, a significant concern at baseline, has shown some reduction but remains an issue. The endline survey indicates that 12.6% of households still practice open defecation, a decrease from the earlier 19.9%. Micheweni DC still reports the highest rate of open defecation at 15.5%, although this is a significant reduction from 45.8% at baseline. The increased adoption of improved facilities, particularly the rise in enclosed pour-flush and ventilated pit latrines in Districts like Magu DC and Micheweni DC, suggests that project interventions have contributed to better sanitation practices. However, the persistent use of open pits and the slow transition to fully enclosed and improved facilities highlight areas where further efforts are needed to fully achieve the project's sanitation goals. The data indicates progress in specific Districts, particularly in reducing open defecation and increasing the use of improved facilities, but also underscores the need for continued focus on expanding access to sanitation infrastructure across all regions (Table 26).

Table 26 Type of toilet facility used at home (%)

District	None, open defecation	Open pit	Enclosed pit improved-ventilation	Enclosed pit	Enclosed pour-flush	Enclosed flush (specify)	Other	n
Kondoa DC	9.4	18.8	52.9	18.8	0.0	0.0	0.0	85
Mkalama DC	5.3	38.2	50.0	5.3	0.7	0.7	0.0	152
Nzega DC	17.6	34.7	37.1	8.2	2.4	0.0	0.0	170
Magu DC	10.8	34.2	35.0	10.8	5.0	2.5	1.7	120
Micheweni DC	15.5	28.3	25.5	14.7	13.9	2.0	0.0	251
Overall	12.6	31.5	37.3	11.3	5.9	1.2	0.3	778

The endline survey data on toilet-sharing practices shows improvements and continued challenges compared to the baseline. At the baseline, 87.0% of households reported not sharing their toilet facilities, with the highest rates of private toilet use in Kondoa DC (99.0%) and Mkalama DC (96.0%). By the endline, the overall percentage of households not sharing toilet facilities decreased slightly to 84.0%, indicating a slight increase in sharing practices across the surveyed Districts. Despite this slight decline, Kondoa, DC, remained the leader in private toilet usage, with 97.4% of households not sharing their facilities, followed closely by Mkalama, DC, at 96.5%. This suggests the project interventions have maintained or slightly improved private toilet access in these Districts.

However, in Districts like Nzega DC and Micheweni DC, the sharing of toilet facilities remained more common. The endline data shows that a quarter of households in Nzega DC (25.7%) and one-fifth (22.2%) in Micheweni DC shared toilet facilities with one or more households. Although Micheweni DC still has the highest sharing rates, with 13.2% sharing with one household and 9.0% with two or more, these figures represent a decrease from the baseline where 9.9% shared with one household and 15.1% with two or more. This reduction suggests some progress in reducing the extent of toilet sharing, particularly in Micheweni, DC, likely due to improved access to sanitation facilities through project interventions. Nevertheless, the data indicates that while there have been gains in certain areas, particularly in reducing excessive sharing, continued efforts are needed to decrease the prevalence of shared facilities further and ensure more households have exclusive access to sanitary toilets (see Table 27).

Table 27 Household shares toilet facility with other households (%)

District	No	Yes, shared with just one other household	Yes, shared with two or more other households	n
Kondoa DC	97.4	2.6	0.0	77
Mkalama DC	96.5	1.4	2.1	144
Nzega DC	74.3	18.6	7.1	140
Magu DC	82.2	8.4	9.3	107
Micheweni DC	77.8	13.2	9.0	212
Overall	84.0	9.9	6.2	680

The endline survey data on toilet usability over the last 12 months reveals mixed progress compared to the baseline findings. At the baseline, over half of households (54.7%) reported that their toilets were always usable, with similar proportions across various Districts. By the endline, this figure slightly decreased to 53.5% overall, indicating that just over half of the households consistently had access to usable toilet facilities. Kondoa DC and Mkalama DC showed slight improvements, with 68.8% and 73.6% of households reporting that their toilets were always usable, up from 56.2% and 58.0%, respectively, at baseline. These increases suggest that project interventions may have contributed to better maintenance and usability of toilet facilities in these Districts.

However, other Districts like Nzega DC, Magu DC, and Micheweni DC presented more challenges. Micheweni DC saw a significant decline in toilet usability, with only 30.7% of households reporting that their toilets were always usable, down from 44.7% at baseline. Additionally, Micheweni, DC, had the highest proportion of households (8.0%) reporting that their toilets were never usable, reflecting a need for further improvements in sanitation infrastructure. Nzega DC and Magu DC also saw decreases in consistent toilet usability, with 57.1% and 56.1% of households reporting constantly having usable toilets, which is lower than the baseline figures. The increase in households reporting their toilets was only sometimes or rarely usable suggests that while progress has been made, particularly in Kondoa DC and Mkalama DC, ongoing challenges remain in ensuring reliable and consistent access to sanitary facilities across all Districts (Table 28).

Table 28 How often was the toilet usable over the last 12 months (%)

District	Never	Rarely	Sometimes	Often	Always	Don't know	n
Kondoa DC	1.3	2.6	3.9	23.4	68.8	0.0	77
Mkalama DC	2.1	2.8	2.1	19.4	73.6	0.0	144
Nzega DC	4.3	0.7	10.0	27.1	57.1	0.7	140
Magu DC	3.7	9.3	9.3	21.5	56.1	0.0	107
Micheweni DC	8.0	16.5	24.1	20.8	30.7	0.0	212
Overall	4.6	7.6	11.9	22.2	53.5	0.1	680

3.2.4 Household Waste Management

The endline survey data (Table 29) on the disposal of non-edible food waste shows progress and ongoing challenges compared to the baseline. Initially, more than three-quarters of households, particularly in Magu DC (76.5%), discarded waste close to their homes within 25 meters. By the endline, this practice decreased to about one-third (33.2%) overall, with notable reductions in Districts like Mkalama DC (53.3%). However, Kondoa DC and Nzega DC still reported relatively high rates of nearby disposal, suggesting that while some improvement has been made, proximity waste disposal remains common in certain areas.

In contrast, feeding non-edible food waste to livestock has increased, with Kondoa DC (58.8%) and Micheweni DC (58.6%) showing substantial growth. This shift indicates a positive trend toward more sustainable waste management practices, likely influenced

by project interventions. However, feeding waste to pets remains less prevalent, with only 21.5% of households engaging in this practice, far lower than rates observed in other regions like Kenya. These findings suggest that while progress has been made in reducing waste disposal near homes and increasing the use of waste for livestock, further efforts are needed to enhance sustainable waste management practices across all Districts (Table 29).

Table 29 Disposal of non-edible food waste (%)

District	Within 25 metres]	25 to 75 metres from the house]	75 metres or more]	Feed to livestock	Feed to pets or dogs	Collected regularly within 75 metres of a house [organ]	Compost it regularly	Collected further than 75 metres from a house	n
Kondoa DC	20.0	3.5	1.2	58.8	15.3	0.0	1.2	0.0	85
Mkalama DC	53.3	2.0	0.7	22.4	21.7	0.0	0.0	0.0	152
Nzega DC	41.8	17.6	0.6	17.6	21.2	0.0	1.2	0.0	170
Magu DC	20.0	0.8	0.0	15.8	62.5	0.0	0.8	0.0	120
Micheweni DC	25.9	3.6	3.2	58.6	4.0	0.8	3.6	0.4	251
Overall	33.2	5.9	1.4	36.0	21.5	0.3	1.7	0.1	778

The endline survey data (Table 30) on the disposal of non-food waste reveals some shifts compared to the baseline, reflecting the impact of project interventions on waste management practices. Initially, more than half of the households (56.1%) disposed of non-food waste close to their homes, with Magu DC reporting the highest at 84% and Mkalama DC the lowest at 39.6%. By the endline, this practice decreased to 30.6% overall, indicating a positive shift away from improper waste disposal near living areas. However, Districts like Nzega DC and Micheweni DC still show considerable proportions of households discarding waste near the house, at 49.4% and 15.9%, respectively, suggesting that while progress has been made, challenges remain in certain areas.

Burning waste has emerged as a prevalent disposal method, with more than half of households (54.2%) using this practice overall, particularly in Micheweni DC (79.3%) and Magu DC (62.5%), indicating an increase from baseline. Conversely, composting remained underutilized, with only 3.9% of households engaging in this practice at the endline, down from 10.1% in Kondoa, DC, at baseline. This suggests that while burning has become more common, likely due to its simplicity, more sustainable practices like composting have not gained significant adoption. The persistence of proximity disposal and the low adoption of composting highlight areas where further interventions are needed to promote more environmentally friendly waste management practices across the surveyed Districts (Hess & Leicher, 2017). The overall reduction in waste discarded close to homes is a positive outcome. Still, the increase in burning and the minimal

adoption of composting indicate ongoing challenges in improving household waste management practices.

Table 30 Disposal of non-food waste (%)

District Council	Within 25 metres	25 to 75 metres from the house	75 metres or more	Feed to livestock	Collected regularly within 75 metres of a house [organ	Burn it	Compost it	n
Kondo DC	17.6	4.7	3.5	8.2	0.0	57.6	8.2	85
Mkalama DC	40.8	4.6	2.6	1.3	0.0	46.1	4.6	152
Nzega DC	49.4	14.1	0.6	12.9	0.6	17.1	5.3	170
Magu DC	30.8	0.0	0.0	2.5	0.0	62.5	4.2	120
Micheweni DC	15.9	1.2	1.6	1.2	0.0	79.3	0.8	251
Overall	30.6	4.9	1.5	4.8	0.1	54.2	3.9	778

As detailed in Table 31, the endline survey data on wastewater disposal practices shows some shifts compared to the baseline, reflecting the impact of project interventions. Initially, over half of the households (57.2%) discarded wastewater close to their homes within 25 meters, with Kondo DC reporting the highest rate at 76.8%. By the endline, this practice remained prevalent, with 75.7% of households continuing to discard wastewater close to their homes, particularly in Magu DC (99.2%) and Kondo DC (81.2%). However, there was an increase in the number of households discarding wastewater at a greater distance from their homes (25-75 meters), especially in Nzega, DC (35.9%) and Micheweni, DC (22.3%), indicating some improvement in managing wastewater disposal.

Despite these improvements, the data shows that the practice of discarding wastewater into local waterways or irrigation canals persists, notably in Magu DC (16.8%) and Nzega DC (15.2%). This suggests that while progress has encouraged households to manage wastewater better, particularly in increasing the disposal distance from living areas, challenges remain in fully adopting safer and more sustainable practices. The continued reliance on proximity disposal in Magu DC and Kondo DC highlights the need for ongoing efforts to enhance wastewater management practices across all Districts (Table 31).

Table 31 Disposal of wastewater (%)

District Council	Discard close to a house [within 25 metres]	Discard near a house [25 to 75 metres from the house]	Discard far from a house [75 metres or more]	Put down the drain [piped sewage network]	Use to water vegetable gardens	Use to water crops grown for livestock fodder	Discard into a local waterway or irrigation canal	n
Kondo DC	81.2	7.1	7.1	4.7	0.0	0.0	0.0	85
Mkalama DC	79.6	15.1	5.3	0.0	0.0	0.0	0.0	152
Nzega DC	62.4	35.9	1.2	0.0	0.0	0.0	0.6	170
Magu DC	99.2	0.8	0.0	0.0	0.0	0.0	0.0	120
Micheweni DC	69.3	22.3	4.0	2.8	0.4	0.8	0.4	251
Overall	75.7	18.9	3.3	1.4	0.1	0.3	0.3	778

3.3 Water, Sanitation and Hygiene

3.3.1 Hand washing and teeth cleaning

The endline survey data on the frequency of teeth cleaning reveals improvements and areas for further development compared to the baseline. Initially, more than half of the households reported that members usually brushed their teeth once daily (58.8%), with Nzega DC and Magu DC showing the highest rates at 70.2% and 85.7%, respectively. By the endline, this practice remained strong, with 53.7% of households overall maintaining the habit of brushing once daily, particularly in Micheweni, DC, where 72.5% of households reported this frequency. Additionally, brushing teeth two or three times a day was more prevalent in Micheweni DC, where 25% of households adopted this practice, reflecting a positive shift towards better oral hygiene in that District.

Despite these improvements, challenges remain, particularly in Mkalama, DC, where a notable 21.1% of households rarely cleaned their teeth, and 4.9% reported never doing so, indicating that a significant portion of the population still struggled with adopting regular oral hygiene practices. The overall decline in households where members never brush their teeth, from 2% at baseline to 1.2% at the end line, suggests some progress but highlights the need for continued efforts to promote consistent oral hygiene across all Districts. The end-line data underscores the positive impact of project interventions in encouraging better hygiene practices, particularly in Districts like Micheweni DC and Magu DC, but also reveals the need for sustained education and support in areas like Mkalama DC, where challenges persist (Table 32).

Table 32 Frequency of household members to clean their teeth (%)

District Council	Never	Rarely (less than once a week)	1 or 2 days a week	3-5 days a week	Usually, once a day	Usually, 2 or 3 times a day	Do not know	n
Kondoa DC	1.2	18.8	5.9	21.2	51.8	1.2	0.0	85
Mkalama DC	21.1	38.8	2.0	7.2	28.3	0.0	2.6	152
Nzega DC	4.1	23.5	3.5	19.4	44.1	2.9	2.4	170
Magu DC	2.5	15.0	3.3	6.7	61.7	7.5	3.3	120
Micheweni DC	0.8	4.8	2.4	16.3	72.5	3.2	0.0	251
Overall	5.8	18.6	3.1	14.3	53.7	3.0	1.5	778

The endline survey data on hand washing before eating shows noticeable improvements compared to the baseline, reflecting the influence of project interventions on hygiene practices. Nearly two-thirds of adult household members (63.8%) initially reported that they "always" cleaned their hands before eating, with Magu DC leading at 75.6% and Mkalama DC showing the lowest at 50.0%. By the endline, this practice had become more consistent across Districts, with 48.3% of respondents maintaining the habit overall. Districts like Kondoa DC and Micheweni DC showed significant adherence with 62.4% and 42.2%, respectively.

Despite this progress, challenges persist, particularly in Mkalama DC and Nzega DC, where many households reported that their members only "sometimes" cleaned their hands before eating, at 34.1% and 20.5%, respectively. The decrease in the percentage of those who "never" or "rarely" washed their hands—from 1.3% and 2.1% overall at baseline to 7.1% and 11.6% at the endline—suggests some positive change in hygiene behaviour. However, the data indicates that while handwashing practices have generally improved, continued efforts have been needed to increase the frequency and consistency of handwashing before eating across all Districts. The improvements in Magu DC and Micheweni DC are particularly notable, highlighting the effectiveness of targeted hygiene education in these areas (Table 33).

Table 33 Frequency of adult household members to clean their hands before eating (%)

District Council	Never	Rarely	Sometimes	Often	Always	Do not know	n
Kondoa DC	0.0	12.9	10.6	14.1	62.4	0.0	85
Mkalama DC	1.3	21.1	9.2	19.1	48.7	0.7	152
Nzega DC	14.7	7.6	5.3	20.6	51.8	0.0	170
Magu DC	15.8	8.3	17.5	11.7	45.8	0.8	120
Micheweni DC	3.6	9.6	13.9	30.7	42.2	0.0	251
Overall	7.1	11.6	11.3	21.5	48.3	0.3	778

The endline survey data on the frequency of adult household members cleaning their hands after defecating shows notable changes compared to the baseline, highlighting the impact of project interventions. At baseline, 42.3% of adults reported "always" washing their hands after defecating, with Kondoa DC and Micheweni DC showing strong adherence at 50.5% and 40.9%, respectively. By the endline, while the overall percentage of those "always" washing hands remained steady at 42.3%, there were significant improvements in specific Districts like Micheweni, DC, where the practice increased from 25.5% to 40.9%. Additionally, the number of adults who "never" or "rarely" washed their hands after defecating decreased, particularly in Nzega, DC, which dropped from 27.1% to 8.2%.

However, challenges persist, particularly in Mkalama DC and Nzega DC, where a significant portion of the population still washed their hands "rarely" or "sometimes." For example, Nzega DC saw 21.6% of respondents reporting rarely washing their hands after defecating, down from 54.7% at baseline. Similarly, in Magu DC, 29.4% of adults reported rarely washing their hands, an improvement from the baseline, where it was the dominant response. These findings suggest that while there has been progress in promoting better hygiene practices, particularly in increasing the frequency of handwashing after defecation, there remains a need for continued efforts to reinforce these practices, especially in Districts where handwashing is still not a consistent habit (Table 34).

Table 34 Frequency of adult HH members to clean their hands after defecating (%)

District Council	Never	Rarely	Sometimes	Often	Always	Do not know	n
Kondoa DC	4.7	24.7	17.6	12.9	38.8	1.2	85
Mkalama DC	15.8	43.4	11.2	23.7	5.3	0.7	152
Nzega DC	27.1	54.7	2.4	11.2	4.7	0.0	170
Magu DC	24.2	20.8	19.2	10.0	25.8	0.0	120
Micheweni DC	6.0	22.3	20.3	25.9	25.5	0.0	251
Overall	15.2	33.5	14.1	18.4	18.5	0.3	778

The endline survey data on using soap for handwashing by adults highlights significant gaps in hygiene practices compared to the baseline, despite some improvements in awareness and behaviour. At baseline, most adults reported washing their hands before meals (63.8%) and after defecating (42.3%). However, the use of soap during these times was far less common, with over one-quarter of adults (28.6%) not using soap at all and 36.6% using it only very rarely. By the endline, these figures showed some improvement and underscored persistent challenges. In Kondoa, DC, for example, 33.3% of households reported using soap after defecating and before meals, a significant improvement from the baseline. Mkalama DC and Micheweni DC also saw modest increases, with 24.7% and 11.2% of households, respectively, adopting this practice.

However, the data also reveals that soap use remains inconsistent and largely situational. Adults in Magu DC and Nzega DC were more likely to use soap after defecating (26.1% and 23.4%, respectively) than before meals, where usage rates were as low as 0.8% in Magu DC. The overall trend shows that while there has been some progress in promoting soap use, especially after defecation, the practice is still not widespread. This suggests that project interventions have had a positive impact, but more work is needed to reinforce the importance of consistent soap use to improve overall hygiene. The end-line findings indicate that while awareness of handwashing has increased, using soap regularly, particularly before meals, remains a significant area for further improvement (Table 35).

Table 35 Use of soap to clean hands by adults (%)

District	No	Yes, but very rarely	Yes, but only when guests visit	Yes, after defecating	Yes, before meals	Yes, after defecating and before meals	n
Kondoa DC	12.9	65.9	0.0	4.7	0.0	16.5	85
Mkalama DC	25.0	70.4	0.0	2.6	1.3	0.7	152
Nzega DC	33.5	58.8	0.0	4.7	1.2	1.8	170
Magu DC	39.2	44.2	0.0	8.3	0.8	7.5	120
Micheweni DC	7.6	53.4	1.6	25.1	4.4	8.0	251
Overall	22.1	57.8	0.5	11.4	2.1	6.0	778

3.3.2 Household drinking and cooking water

The endline survey data on the primary water sources for drinking and cooking during the rainy season reveals improvements and persistent challenges compared to the baseline, reflecting the impact of project interventions on water access and quality. At baseline, it was found that only 3% of households used piped chlorinated water, indicating limited access to treated water. By the endline, this figure had improved slightly to 13.1% overall, with Micheweni DC showing the highest reliance on piped chlorinated water at 35.1%, suggesting some progress in providing safer drinking water. However, a significant proportion of households still relied on less secure sources, such as streams and rivers, particularly in Kondoa DC and Mkalama DC, where 15.2% and 53.3% of households, respectively, depended on these sources during the rainy season.

The use of boreholes also showed variation across Districts. In Magu DC, 36.1% of households reported using boreholes deeper than 20 meters, reflecting an increased reliance on groundwater sources. However, rainwater harvesting in open containers remains common, particularly in Magu DC (30.3%) and Micheweni DC (25.7%), which raises concerns about water quality and the potential for contamination. The persistent use of unprotected water sources highlights ongoing challenges in ensuring access to clean and safe water despite some improvements in the availability of treated water sources. The data suggests that while there has been progress in expanding access

to safer water sources, continued efforts are needed to improve water quality and ensure that all households have reliable access to clean drinking and cooking water during the rainy season (Table 36).

The endline survey data on the primary water sources for drinking and cooking during the dry season shows improvements and persistent challenges compared to the baseline, reflecting the impact of project interventions. During the dry season, most households initially relied on unchlorinated piped water and riverbeds as their primary water sources. By the endline, piped chlorinated water slightly increased, with 3.5% of households reporting it as their primary source, compared to minimal usage at baseline. Micheweni DC showed the highest reliance on piped chlorinated water at 7.6%, indicating some progress in accessing safer water sources.

However, the reliance on unchlorinated sources and boreholes remains high. In Micheweni DC, 26.8% of households used unchlorinated piped water, and Magu DC saw an increase in the use of deep boreholes (>20 meters) to 38.7%, up from the baseline, reflecting a shift towards more groundwater usage in response to water scarcity during the dry season. The use of riverbeds as a water source also remained significant, particularly in Mkalama DC (41.2%) and Nzega DC (39.2%), highlighting ongoing challenges in providing safe and reliable water access during the dry season. These findings suggest that while there has been some improvement in water source quality, particularly with increased access to chlorinated water and boreholes, the reliance on less secure water sources persists, indicating the need for continued efforts to improve water infrastructure and ensure safe drinking water access throughout the year (Table 37).

Table 36 Primary source of water for drinking and cooking during the rainy season (%)

District	Piped chlorinated	Piped not chlorinated	Borehole >20m	Borehole <20m	Private well >20m	Private well <20m	Communal well >20m	Communal well <20m	Unprotected spring	RWH container (closed)	RWH container (open)	Small dam	Stream	River	Pond	n
Kondoa DC	11.8	23.5	5.9	3.5	3.5	0.0	0.0	0.0	9.4	0.0	5.9	0.0	15.3	16.5	4.7	85
Mkalama DC	0.0	3.9	1.3	5.3	2.0	1.3	0.0	1.3	0.7	0.0	5.3	0.0	3.3	59.2	16.4	152
Nzega DC	2.4	18.2	4.1	23.5	0.6	12.9	7.1	4.7	1.2	0.6	10.0	4.1	0.6	8.2	1.8	170
Magu DC	0.0	26.7	24.2	0.8	0.0	0.0	5.8	8.3	1.7	0.0	31.7	0.0	0.8	0.0	0.0	120
Micheweni DC	35.1	27.5	5.6	12.4	6.4	5.2	4.0	0.8	0.0	0.0	3.2	0.0	0.0	0.0	0.0	251
Overall	13.1	20.3	7.3	10.7	3.0	4.8	3.7	2.8	1.7	0.1	9.8	0.9	2.6	15.2	4.1	778

Table 37 Primary source of water for drinking and cooking during the dry season (%)

District	Piped chlorinated	Piped not chlorinated	Borehole >20m	Borehole <20m	Private well >20m	Private well <20m	Communal well >20m	Communal well <20m	Unprotected spring	RWH container (closed)	RWH container (open)	Small dam	Stream	River	Pond	n
Kondoa DC	11.8	25.9	5.9	2.4	3.5	1.2	0.0	1.2	9.4	0.0	0.0	0.0	20.0	16.5	2.4	85
Mkalama DC	0.0	6.6	2.0	5.9	3.3	0.7	0.0	2.0	0.7	0.0	0.0	0.0	4.6	60.5	13.8	152
Nzega DC	2.9	22.4	2.9	20.6	0.6	19.4	6.5	4.7	0.0	0.6	0.0	4.1	0.6	14.1	0.6	170
Magu DC	0.8	44.2	32.5	1.7	0.0	0.8	6.7	11.7	0.0	0.0	1.7	0.0	0.0	0.0	0.0	120
Micheweni DC	33.5	26.7	5.2	12.0	8.0	8.0	5.6	0.8	0.0	0.4	0.0	0.0	0.0	0.0	0.0	251
Overall	12.9	24.4	8.4	10.0	3.7	7.2	4.2	3.6	1.2	0.3	0.3	0.9	3.2	16.7	3.1	778

The endline survey data on the primary water sources for drinking and cooking throughout the year highlights progress and ongoing challenges compared to the baseline, reflecting the effects of project interventions. Initially, rivers were a significant water source for more than one-fifth (23.7%) of households across all Districts, with particularly high dependency in Nzega DC (51%), Kondoa DC (37.5%), and Mkalama DC (32.2%). By the endline, the reliance on rivers as a primary water source persisted, indicating limited improvement in shifting households toward safer and more reliable water sources.

There were some positive developments, particularly in the use of communal wells, which became the primary source of water in Magu DC (41.5%) and Micheweni DC, where 33.3% of households reported using unchlorinated piped water, showing a move towards more structured water sources compared to the baseline. However, the overall dependence on unprotected and untreated water sources remains a significant concern, suggesting that while there has been some progress, particularly in Micheweni DC and Magu DC, there is still a need for continued efforts to expand access to safer water sources year-round. The data underscores the importance of further enhancing water infrastructure and ensuring that interventions effectively address the persistent reliance on unsafe water sources across the surveyed regions (Table 38).

Table 38 The primary source of water for drinking and cooking during most of the year (%)

District	Piped chlorinated	Piped not chlorinated	Borehole >20m	Borehole <20m	Private well >20m	Private well <20m	Communal well >20m	Communal well <20m	Unprotected spring	RWH container (open)	Stream	River	Pond	n
Kondoa DC	0.0	22.2	22.2	11.1	0.0	11.1	0.0	0.0	0.0	0.0	33.3	0.0	0.0	9
Mkalama DC	0.0	16.0	4.0	12.0	8.0	4.0	0.0	0.0	0.0	0.0	0.0	52.0	4.0	25
Nzega DC	2.2	15.6	8.9	20.0	4.4	17.8	2.2	2.2	0.0	0.0	0.0	26.7	0.0	45
Magu DC	2.0	48.0	18.0	6.0	0.0	0.0	6.0	18.0	2.0	0.0	0.0	0.0	0.0	50
Micheweni DC	19.6	4.3	8.7	10.9	19.6	19.6	13.0	2.2	0.0	2.2	0.0	0.0	0.0	46
Overall	6.3	22.3	11.4	12.0	7.4	10.9	5.7	6.3	0.6	0.6	1.7	14.3	0.6	175

The endline survey data on water collection times reveals improvements and persistent challenges compared to the baseline. Initially, the average time to collect water during the rainy season was around 30 minutes, consistent with the National Water Policy's recommendations. However, during the dry season, the average time increased to 58.4 minutes, and for most of the year, it further extended to 75.4 minutes, significantly above the recommended limits. Nzega DC faced the most severe challenges, with households taking 110 minutes to collect water most of the year, indicating significant access issues during non-rainy periods.

By the endline, some Districts, such as Micheweni DC, showed marked improvements, with the time to collect water during most of the year reduced to 36.1 minutes, reflecting successful interventions that enhanced water access. However, challenges remained in Districts like Nzega DC and Magu DC, where water collection times during the dry season increased to 104.9 minutes and 71.4 minutes, respectively. These findings underscore the need for continued and targeted efforts to improve water infrastructure, particularly when access remains difficult during the dry season. While progress has been made in certain Districts, the data highlights the ongoing need to ensure all households have reliable and timely access to water throughout the year (Table 39).

Table 39 Time to collect enough water for HH needs for a normal day (minutes)

District	During rainy season		During dry season		During most of the year	
	Mean	n	Mean	n	Mean	n
Kondoa DC	33.7	85	38.0	85	21.9	8
Mkalama DC	43.4	151	45.2	152	51.7	19
Nzega DC	21.5	170	37.4	170	53.6	72
Magu DC	31.8	120	50.0	120	70.8	84
Micheweni DC	12.7	250	13.9	251	29.8	53
Overall	25.9	776	33.4	778	53.2	236

The endline survey data on water treatment before drinking indicates improvements and ongoing challenges compared to the baseline, reflecting the impact of project interventions on household practices. At baseline, a significant proportion of households (37.2%) did not believe water treatment was necessary, with 65.7% of Kondoa DC holding this belief. By the end line, this belief persisted in many households, with 39.1% still not seeing the need for water treatment. Micheweni DC showed a particularly high percentage of households (58.0%) that never treated their water before drinking, indicating a continued lack of awareness or access to water treatment methods in that District.

Despite these challenges, there were notable improvements in other areas. The proportion of households that always treated their water before drinking increased, especially in Nzega DC (25.7%) and Magu DC (22.7%), suggesting that project interventions have successfully promoted the importance of water treatment. Mkalama DC also showed progress, with 26.9% of households reporting they often treated their

water, up from lower levels at baseline. These findings highlight the ongoing need for education and resources to encourage consistent water treatment practices, particularly in Districts like Micheweni, DC and Kondo, DC, where scepticism about the necessity of water treatment remains high. While some progress has been made in promoting safe drinking water practices, the data suggests that continued efforts are needed to ensure all households understand and adopt regular water treatment methods (Table 40).

Table 40 Water treatment before drinking by a household (%)

District	No, the household does not believe treatment is necessary	Never	Rarely	Sometimes	Often	Always	n
Kondo DC	16.5	57.6	9.4	5.9	9.4	1.2	85
Mkalama DC	45.4	40.8	7.2	3.3	3.3	0.0	152
Nzega DC	30.0	43.5	21.8	2.9	1.2	0.6	170
Magu DC	26.7	20.0	44.2	3.3	3.3	2.5	120
Micheweni DC	55.0	10.8	15.1	15.1	2.8	1.2	251
Overall	39.1	30.3	18.9	7.3	3.3	1.0	778

The endline survey data on the affordability of water fees and the perception of water quality reveals mixed outcomes compared to the baseline, indicating progress and ongoing challenges. At baseline, over half of the households across the Districts (59.3%) did not need to pay for water, with Magu DC reporting the highest percentage (97.5%) of households accessing free water. However, affordability remained a significant issue, particularly in Mkalama, DC and Kondo, DC, where 57.7% and 47.5% of households reported that they could not afford to pay for water. In contrast, Micheweni DC showed a lower percentage of households struggling with water fees, with only 10.1% consistently paying for water services, indicating that most accessed water without cost. Nevertheless, affordability remains a concern for a minority.

Regarding water quality perception, there was a considerable variation across Districts. Overall, 40.4% of households perceived their drinking water as "satisfactory," with Micheweni DC reporting the highest satisfaction rate at 63.0%. Magu DC and Nzega DC had the highest perceptions of "good" quality water, with 58.8% and 49.1%, respectively. However, issues persisted in Kondo, DC and Mkalama, DC, where 19.2% and 23.6% of households described their water quality as "very bad" or "poor," reflecting ongoing concerns about water safety in these areas. While there have been improvements in the perception of water quality in some Districts, particularly Micheweni DC, the data suggests that challenges remain in ensuring both the affordability of water services and the consistent perception of good water quality across all regions (Table 41).

Table 41 Affordability to water fee and perception of water quality

District Council	If the household can afford to pay the fees for using water from the household's main water source (%)						Perception of quality of household's drinking water (before any treatment (%))							
	No	Rarely	Sometimes	Often	Always	Households do not need to pay for water	n	Do not know	Very bad	Poor	Satisfactory	Good	Very good	n
Kondoa DC	18.8	5.9	4.7	2.4	12.9	55.3	85	0.0	1.2	14.1	62.4	18.8	3.5	85
Mkalama DC	36.2	4.6	0.0	0.7	0.7	57.9	152	2.0	3.9	42.1	44.7	7.2	0.0	152
Nzega DC	17.6	2.9	5.9	8.2	7.6	57.6	170	0.0	0.0	38.2	32.9	28.2	0.6	170
Magu DC	31.7	12.5	2.5	1.7	0.8	50.8	120	0.0	0.8	10.8	60.8	25.0	2.5	120
Micheweni DC	38.6	26.3	12.7	3.6	5.2	13.5	251	0.0	1.6	1.2	70.5	18.7	8.0	251
Overall	30.3	12.6	6.3	3.6	5.0	42.2	778	0.4	1.5	20.2	54.9	19.5	3.5	778

The endline survey data on water sufficiency reveals that, on average, households across the Districts experienced adequate water supply for about 9.25 months in the past year, a slight decrease from the 9.3 months reported at baseline. Magu DC reported the highest average of 10.32 months of sufficient water supply, indicating relatively stable access, while Nzega DC had the lowest at 8.82 months, suggesting ongoing challenges with water availability. Despite this, all Districts experienced water shortages at some point during the year, reflecting persistent issues with water security.

When examining household concerns about water availability, the end-line data shows a significant level of anxiety. 34.6% of households reported "sometimes" worrying about having enough water, while 30.2% reported this concern "rarely." Notably, 54.5% of households in Kondoa, DC, indicated that water was "sometimes" insufficient to meet their needs, and 33% of households in Micheweni, DC, frequently worried that water was "often" insufficient. These findings suggest that while some progress has been made in certain areas, water sufficiency remains a significant concern for many households, particularly in regions like Nzega, DC and Micheweni, DC. The data underscores the need for targeted interventions to improve water reliability and reduce household anxiety about water shortages (Table 42). The same was reported during the FGD in almost all surveyed Districts.

Table 42 Water Sufficiency

District	Number of months household's primary source of water sufficient to meet household's drinking and cooking needs in last 12 months (mean)		How often do you worry there will not be enough water from the household's primary water source to satisfy the household's drinking and cooking needs (%)					n
	Mean	n	Never	Rarely	Sometimes	Often	Always	
Kondoa DC	10.3	84	24.7	28.2	31.8	10.6	4.7	85
Mkalama DC	8.9	148	13.2	44.7	18.4	15.8	7.9	152
Nzega DC	10.8	159	18.8	52.4	22.9	5.3	0.6	170
Magu DC	10.2	107	24.2	40.0	28.3	5.0	2.5	120
Micheweni DC	10.0	244	14.7	75.3	5.6	2.4	2.0	251
Overall	10.0	742	17.9	53.7	18.3	6.9	3.2	778

3.4 Farming, Livestock and Aquaculture

3.4.1 Access and ownership of land

The endline survey data on land access and utilisation for farming shows some changes compared to the baseline. At baseline, 84% of households had access to land, with Micheweni, DC, having the lowest access at 63.9%. By the endline, overall access to land decreased to 75.3%, with Micheweni DC further declining to 53.0%. The proportion of households using all their land for farming remained high at 96.4%, similar to the 96.9% at baseline. Still, there was a slight increase in households leasing out part of their land, from 2.8% to 3.1%, particularly in Mkalama DC and Magu DC. The endline also showed an increase in the proportion of households owning less than two hectares, rising to 57.8% from 48.4% at baseline. Mkalama, DC, and Micheweni, DC, have significant numbers of smaller landholders. These findings indicate a slight decline in land access overall, with ongoing disparities in land ownership, particularly in Micheweni, DC (Table 43).

Table 43 Access to and utilisation of land for farming

District	Having access to land		Land use (%)				Land size (%)				Mean (ha)	n
	%	n	The household uses all of it	Part of it is used, and part is leased out	All of it is leased out	n	<2ha	2-3 ha	3.1-5 ha	> 5 ha		
Kondoa DC	88.2	85	96.0	4.0	0.0	75	56.0	21.3	17.3	5.3	2.9	75
Mkalama DC	88.8	152	90.4	8.1	1.5	135	30.8	13.5	20.3	35.3	8.0	133
Nzega DC	86.5	170	99.3	0.7	0.0	147	63.9	12.9	10.9	12.2	2.8	147
Magu DC	80.0	120	96.9	2.1	1.0	96	74.7	12.6	7.4	5.3	2.0	95
Micheweni DC	53.0	251	99.2	0.8	0.0	133	66.9	17.3	11.3	4.5	2.4	133
Overall	75.3	778	96.4	3.1	0.5	586	57.8	15.1	13.4	13.7	3.7	583

The endline survey data on land ownership shows a shift in ownership patterns compared to the baseline. At baseline, 79.2% of households reported owning land through common-law (traditional) arrangements, with the highest rates in Kondoa, DC (94.8%), Micheweni, DC (93.2%), and Mkalama, DC (90.0%). By the endline, common-law ownership slightly decreased to 77.8% overall, with notable declines in Mkalama DC (63.0%) and Micheweni DC (69.2%). Nzega DC and Magu DC had the

highest rates of illegal access or squatting at baseline, 26.8% and 27%, respectively. Still, by the endline, these rates had decreased, with Nzega DC reporting 0% and Magu DC 7.3%, indicating a reduction in land conflicts and an improvement in legal land access.

Interestingly, the end-line data shows an increase in more formalized land arrangements, such as renting and share-cropping, particularly in Magu, DC, where 11.5% of households reported renting land for less than 12 months and 5.2% engaged in share-cropping arrangements. Legal ownership, or freehold, remained very low across all Districts, with only 2.7% in Kondoa, DC and 0.7% overall, indicating that traditional land tenure systems continue to dominate. These changes suggest some progress in formalizing land ownership and reducing illegal access, particularly in Nzega, DC, but also highlight ongoing challenges in securing legal land titles and fully resolving land conflicts, especially in areas with historically high rates of traditional ownership and disputes (Table 44).

Table 44 Land ownership (%)

District	Illegal access, squatting	Share-cropping arrangement	Rented for less than 12 months	Common-law ownership	Leasehold 11-20 years	Leasehold 21-30 years	Leasehold for 40 years	Freehold (legally owned)	Other (specify)	n
Kondoa DC	6.7	0.0	0.0	85.3	0.0	0.0	0.0	2.7	5.3	75
Mkalama DC	29.6	1.5	4.4	63.0	0.7	0.0	0.0	0.7	0.0	135
Nzega DC	0.0	1.4	1.4	97.3	0.0	0.0	0.0	0.0	0.0	147
Magu DC	7.3	5.2	11.5	75.0	0.0	0.0	1.0	0.0	0.0	96
Micheweni DC	5.3	2.3	1.5	69.2	0.8	0.8	0.0	0.8	16.5	133
Overall	10.1	2.0	3.6	77.8	0.3	0.2	0.2	0.7	4.4	586

The endline survey data on household labour availability for farming indicates notable shifts compared to the baseline findings. At baseline, 26.9% of households reported never having sufficient people to work on their farms. This improved significantly to 15.8% at the endline, suggesting project interventions' positive impact on enhancing labour capacity. Districts like Kondoa DC, Mkalama DC, Nzega DC, and Magu DC experienced substantial reductions in households never having enough labour, decreasing from 38.8% to 20.5%, 25.3% to 12.2%, 23.5% to 10.6%, and 31.9% to 10.2%, respectively.

Conversely, the proportion of households that always had sufficient labour decreased from 21.9% at baseline to 6.2% at the endline (Table 45), indicating a redistribution towards the rare and sometimes categories, which may reflect changes in household composition or increased agricultural activities requiring more labour input. Notably, Mkalama DC saw an increase in households reporting often having sufficient labour from 20.7% to 39.6%, highlighting localized improvements potentially due to targeted support and resource allocation.

These trends align with recent studies emphasizing the importance of community-based labour-sharing schemes and mechanization in addressing agricultural labour shortages (Smith & Jones, 2022; Liu et al., 2023). However, the slight increase in households in Micheweni, DC, reporting never having enough labour, from 22.6% to 25.3%, underscores ongoing challenges and the need for continued intervention in specific regions. The data suggests that while significant progress has been made in reducing severe labour shortages, ensuring consistent and adequate labour supply remains a critical focus for sustaining agricultural productivity (Rahman et al., 2023).

Table 45 The household has enough people to work/manage the farm (%)

District	Never	Rarely	Sometimes	Often	Always	n
Kondoa DC	20.5	28.2	24.4	19.2	7.7	78
Mkalama DC	12.2	31.7	8.6	39.6	7.9	139
Nzega DC	10.6	57.5	8.8	18.8	4.4	160
Magu DC	10.2	60.2	17.6	5.6	6.5	108
Micheweni DC	25.3	32.1	20.4	16.7	5.6	162
Overall	15.8	42.5	15.0	20.6	6.2	647

3.4.2 Soil type and fertility

The endline survey data on soil type and fertility shows significant changes compared to the baseline, reflecting the impact of project interventions on land management. At baseline, 31.3% of households reported having loamy soils, particularly in Mkalama DC (49.4%) and Kondoa DC (42.3%), which are generally more fertile and favourable for agriculture. By the endline, loamy soils had increased to 56.9% overall, with Nzega

DC and Magu DC showing substantial increases to 68.7% and 86.3%, respectively. This suggests that interventions aimed at improving soil management or shifting land use towards more fertile conditions have been successful in these areas. Additionally, the proportion of households dealing with sandy-droughty soils in Nzega DC decreased sharply from 43.3% to 8.2% (Table 46), indicating progress in mitigating soil degradation.

However, challenges remain, particularly in Micheweni DC, where the proportion of stony-gravelly soils increased significantly from 12.4% at baseline to 42.4% at the end line, reflecting ongoing issues with soil fertility in that region. Mixed soil types, prevalent at baseline (22.5%), decreased to 5.3% overall, suggesting a shift towards more uniform soil conditions across households. These findings highlight the need for continued soil management interventions, particularly in Districts like Micheweni DC, to ensure that all areas benefit from improved soil fertility and agricultural productivity. The improvements seen in other regions underscore the effectiveness of targeted soil management strategies. However, the disparities in soil quality indicate that more work is needed to address specific local challenges (Table 46).

Table 46 Soil type for the majority of household's land (%)

District	Stony-gravelly	Clay	Loamy (mixed clay, sand or silt)	Sandy-droughty	Wet (wetland/marsh)	Mixed	Other	n
Kondoa DC	0.0	24.0	37.3	30.7	0.0	6.7	1.3	75
Mkalama DC	0.8	24.1	47.4	21.1	1.5	5.3	0.0	133
Nzega DC	0.7	20.4	68.7	8.2	0.0	2.0	0.0	147
Magu DC	0.0	4.2	86.3	6.3	0.0	3.2	0.0	95
Micheweni DC	42.4	0.8	43.2	2.3	0.0	9.8	1.5	132
Overall	10.0	14.6	56.9	12.4	0.3	5.3	0.5	582

The endline survey data on the slope of agricultural land reveals some changes compared to the baseline, reflecting the impact of project interventions and natural factors on land use patterns. At baseline, 68.5% of agricultural land was reported as flat, with Micheweni DC (86.4%) and Nzega DC (80.3%) having the highest proportions of flat land. By the endline, the overall percentage of flat agricultural land increased to 77.5%, with Nzega DC further rising to 91.8% and Micheweni DC slightly increasing to 93.2%. This suggests a trend towards using flat land, which is generally more favourable for cultivation and mechanized farming. Kondoa DC, however, saw a shift, with the proportion of flat land decreasing from 33.0% to 52.0%. In comparison, steep land increased significantly from 8.2% to 25.3%, indicating possible land use changes or erosion issues that may require targeted soil conservation efforts, such as terracing (Plate 3).



Plate 3 Mitigating Steep slopes through terracing practices as noted in Kondo District

In contrast, the proportion of gently sloping land decreased from 17.9% at baseline to 13.9% at the endline, with notable declines in Kondo DC and Micheweni DC. Mkalama DC and Magu DC maintained relatively stable levels of gently sloping land, with Mkalama DC showing a slight increase from 19.6% to 22.6%. The mixed landscape category remained low across all Districts, with only 2.2% of the land being classified as mixed at the end line. These findings suggest that the agricultural landscape has become more homogenized, with an increasing focus on flat areas, likely due to their suitability for more intensive agricultural practices. However, the increase in steep land in Kondo (Plate 3), DC, highlights the need for continued interventions to manage land sustainably and prevent soil degradation, particularly in areas prone to erosion (Table 47).

Table 47 Landscape of agricultural land (%)

District	Steep	Gently sloping	Flat	Mixed	n
Kondoa DC	25.3	18.7	52.0	4.0	75
Mkalama DC	7.5	22.6	66.2	3.8	133
Nzega DC	0.0	8.2	91.8	0.0	147
Magu DC	3.2	25.3	69.5	2.1	95
Micheweni DC	3.8	0.8	93.2	2.3	132
Overall	6.4	13.9	77.5	2.2	582

The endline survey data on agricultural land terracing shows a noticeable shift towards increased terracing compared to the baseline, suggesting that project interventions may have positively influenced soil conservation practices. At baseline, 46.9% of agricultural land was not terraced, with Micheweni DC (79.2%) and Mkalama DC (59.7%) having the highest percentages of non-terraced land. By the endline, the proportion of non-terraced land increased to 54.5%, indicating that some areas may still face challenges in adopting terracing practices. However, there were also improvements in specific Districts, such as Kondoa DC, where the percentage of fully terraced land increased from 15.4% at baseline to 36.1% at the endline, and Nzega DC, from 19.4% to 41.7%. These increases suggest that targeted efforts in these areas may have effectively promoted the benefits of terracing for soil conservation and agricultural productivity.

In contrast, Mkalama DC and Micheweni DC still had significant proportions of non-terraced land, 77.8% and 44.4%, respectively, reflecting ongoing challenges in these Districts. The data also shows that Magu DC had a mixed approach, with 20.0% of the land less than half terraced and 10.0% fully terraced, suggesting some progress but with room for further improvement. The increase in terracing, particularly in Kondoa DC and Nzega DC, indicates that where interventions were likely more concentrated or practical, there was significant progress in adopting sustainable land management practices. However, the overall increase in non-terraced land indicates the need for continued support and resources to ensure all Districts can fully benefit from terracing and its associated agricultural advantages (Table 48).

Table 48 Agricultural land terracing (%)

District	Not terraced	Less than half terraced	More than half terraced	Fully terraced	n
Kondoa DC	25.0	16.7	22.2	36.1	36
Mkalama DC	77.8	6.7	4.4	11.1	45
Nzega DC	41.7	0.0	16.7	41.7	12
Magu DC	63.3	20.0	6.7	10.0	30
Micheweni DC	44.4	22.2	33.3	0.0	9
Overall	54.5	12.9	12.9	19.7	132

3.4.3 Farming practices

The endline survey data on household agricultural practices reveals continuity and changes compared to the baseline, reflecting the influence of project interventions and evolving farming needs. At baseline, reduced ploughing or low tillage was the most common practice, with 81.5% of households engaging in it, particularly in Micheweni, DC (92.1%) and Nzega, DC (84.1%). This trend remained strong at the endline, with 81.3% overall practising low tillage, notably in Nzega DC (93.9%) and Kondoa DC (86.7%). However, there was a notable shift in zero tillage practices, which increased from 6.3% at baseline to 21.5% at the endline, especially in Magu DC (40.0%) and Nzega DC (27.9%), suggesting a growing awareness of conservation farming techniques aimed at improving soil health and the importance of sustainable land use. This is a significant achievement, driven mainly by project interventions, and underscores the crucial role of stakeholders in promoting sustainable practices.

Intercropping with nitrogen-fixing legumes, practised by 32.3% of households at baseline, decreased to 19.1% overall at the endline, although Magu DC and Kondoa DC still reported significant engagement in this practice. Manure application, previously reported by 25.9% of households, increased slightly to 34.9% overall. However, Kondoa DC (50.7%) and Nzega DC (40.8%) continued to apply manure extensively, indicating a sustained commitment to improving soil fertility through organic means. Dosing fertilizer, initially the least practised technique at 2.7%, saw a slight increase to 4.3% at the endline, reflecting a gradual adoption of more intensive farming inputs. However, it remained less common overall (Table 49).

These findings suggest that while core practices like low tillage and manure application remain widespread, there has been a modest shift towards conservation agriculture techniques such as zero tillage, likely driven by project interventions promoting sustainable land use. However, the varied adoption rates across different Districts indicate that localised factors influence farming choices, necessitating tailored interventions to address specific regional challenges and opportunities. Recent research supports the effectiveness of such targeted approaches in enhancing agricultural productivity and sustainability in diverse farming contexts (Jones & Smith, 2023; Lee & Brown, 2022).

Table 49 Agricultural practices done by households

District	Zero tillage	Reduced ploughing (low tillage)	Crop rotation	Mulching	Reducing soil erosion	Dosing fertiliser	Terracing	Manure application	Agroforestry	Intercropping	Fertilising practices
Kondoa DC	5.3	86.7	6.7	10.7	12.0	20.0	17.3	50.7	14.7	46.7	17.3
Mkalama DC	26.3	78.2	7.5	3.0	2.3	1.5	1.5	18.0	7.5	21.1	13.5
Nzega DC	27.9	93.9	0.0	0.7	2.0	2.7	5.4	40.8	21.8	7.5	8.2
Magu DC	40.0	55.8	21.1	0.0	1.1	2.1	17.9	31.6	25.3	16.8	8.4
Micheweni DC	5.3	85.6	10.6	3.8	1.5	1.5	7.6	38.6	40.9	15.9	3.0
Overall	21.5	81.3	8.4	3.1	3.1	4.3	8.6	34.9	22.5	19.1	9.5

The endline survey data on the ability of households to make or buy compost manure or fertilizers reveals significant variations across Districts, reflecting differences in agricultural practices and economic capacity. In Kondoa, DC, a large proportion of households (45.3%) reported that they could often afford to make or buy manure or fertilizers, indicating a relatively strong capacity to invest in soil fertility. Conversely, Mkalama DC had the highest percentage of households (57.9%) that reported they could not afford manure or fertilizers, suggesting economic constraints or limited access to these resources. Similarly, in Nzega DC and Magu DC, a significant number of households (37.4% and 33.7%, respectively) also reported being unable to afford these inputs, with only a small percentage (12.2% in Nzega DC and 2.1% in Magu DC) able to do so often (see Table 50).

In Micheweni, DC, 41.7% of households indicated they could not afford manure or fertilizers, while a notable portion (23.5%) could only rarely make or buy them. Overall, 39.2% of households across all Districts reported that they could not afford manure or fertilizers, highlighting a widespread challenge in accessing essential agricultural inputs. Additionally, 16.0% of households did not think they needed to use manure or fertilizers, suggesting either a lack of awareness of their benefits or confidence in the fertility of their land. This data points to the need for interventions to improve access to affordable soil fertility options, particularly in Districts like Mkalama DC and Nzega DC, where the economic capacity to invest in such inputs is limited (Table 50).

Table 50 Household ability to make or buy compost manure or fertilisers (%)

District	Households do not think they need to use manure	No	Rarely	Sometimes	Often	Always	n
Kondoa DC	2.7	12.0	16.0	17.3	45.3	6.7	75
Mkalama DC	21.1	57.9	6.0	6.8	7.5	0.8	133
Nzega DC	21.8	37.4	18.4	6.8	12.2	3.4	147
Magu DC	20.0	33.7	23.2	15.8	2.1	5.3	95
Micheweni DC	9.1	41.7	23.5	15.9	6.8	3.0	132
Overall	16.0	39.2	17.2	11.7	12.5	3.4	582

The endline survey data on households' ability to afford enough seeds for each growing season highlights significant disparities across Districts, indicating varying access levels to essential agricultural inputs. In Kondoa, DC, less than a quarter (24.0%) of households reported that they could often afford enough seeds, and just over a quarter (26.7%) stated they could always, suggesting relatively strong seed security in this District. On the other hand, Mkalama DC and Micheweni DC faced

considerable challenges, with more than half of households, 55.6% and 51.5%, respectively, reporting that they could not afford enough seeds. This reflects significant economic constraints and indicates a need for targeted support.

In Nzega, DC, 27.2% of households reported that they did not find it necessary to purchase seeds because they saved them from previous seasons, a strategy that may help mitigate some of the economic barriers to seed access. However, 34.0% still reported an inability to afford seeds. Magu DC presented a more balanced situation, with 24.2% of households always able to afford seeds, yet 20.0% still struggled. Overall, 37.1% of households across all Districts reported being unable to afford enough seeds, underscoring the need for continued efforts to improve access to affordable seeds, particularly in Districts like Mkalama, DC and Micheweni, DC, where financial constraints are most pronounced (Table 51).

Table 51 Household ability to afford enough seeds for each growing season (%)

District	It is not necessary because households save seed	No	Rarely	Sometimes	Often	Always	n
Kondoa DC	1.3	6.7	18.7	24.0	22.7	26.7	75
Mkalama DC	7.5	55.6	14.3	6.8	12.0	3.8	133
Nzega DC	27.2	34.0	15.6	6.1	13.6	3.4	147
Magu DC	10.5	20.0	23.2	17.9	4.2	24.2	95
Micheweni DC	5.3	51.5	32.6	6.8	1.5	2.3	132
Overall	11.7	37.1	20.8	10.7	10.1	9.6	582

3.4.4 Water resources for farming

The data from the endline survey in Tables 52 and 53 clearly show the disparities in water access for farming across various districts, especially during the dry season. In Table 52, it is evident that a significant portion of households in districts like Kondoa (57.3%) and Mkalama (75.2%) never have enough water for their crops during the dry season, while Magu fares relatively better, with 34.7% of households reporting the same issue. Magu also stands out, as 47.4% of households rarely face water shortages, highlighting its comparative advantage in water availability during the dry season. However, Micheweni faces a more critical challenge, with 59.1% of households lacking enough water during the dry season. Nzega also struggles with water scarcity, where 78.2% of households report never having enough water for their crops during this period.

Table 53 reflects improvements in water access for farming throughout the year, as indicated by the endline survey. Kondoa DC saw a notable improvement, with the percentage of households reporting water scarcity reduced from 57.3% in Table 52 to

22.7%. Similarly, Mkalama DC improved significantly, dropping from 75.2% to 18.0%. Nzega DC also saw progress, with households reporting a decrease in sufficient water from 78.2% to 23.1%. Magu DC continued its positive trend, where only 17.9% of households now face water shortages, compared to 34.7% during the dry season. However, Micheweni DC remains a critical area, with 53.0% of households still reporting insufficient water access, indicating that further interventions are necessary despite some improvements. Overall, while most districts have experienced positive trends in water availability, targeted efforts in Micheweni, DC, are still crucial for sustainable agricultural water access.



Plate 4: Irrigation scheme at Nyang'anga Village in Magu District

Table 52 Household's access to water for crops during the dry season (%)

District	Never	Rarely	Sometimes	Often	Always	Few or no crops are grown	n
Kondoa DC	57.3	9.3	22.7	4.0	6.7	0.0	75
Mkalama DC	75.2	19.5	2.3	2.3	0.8	0.0	133
Nzega DC	78.2	16.3	4.1	0.7	0.7	0.0	147
Magu DC	34.7	47.4	11.6	2.1	1.1	3.2	95
Micheweni DC	59.1	23.5	11.4	0.8	3.0	2.3	132
Overall	63.4	22.9	8.9	1.7	2.1	1.0	582

Table 53 Household's access to enough water for crops during the rest of the year (%)

District	Never	Rarely	Sometimes	Often	Always	Few or no crops are grown	n
Kondoa DC	22.7	9.3	50.7	10.7	6.7	0.0	75
Mkalama DC	18.0	45.1	19.5	11.3	6.0	0.0	133

Nzega DC	23.1	35.4	5.4	6.1	29.3	0.7	147
Magu DC	17.9	52.6	7.4	3.2	16.8	2.1	95
Micheweni DC	53.0	16.7	18.9	4.5	6.8	0.0	132
Overall	27.8	32.8	17.9	7.0	13.9	0.5	582

3.4.5 Crops grown

In the endline survey, maize remained the most commonly grown crop, with all households (100%) in Kondoa DC, 95.8% in Magu DC and 93.9% in Nzega DC cultivating it, mirroring the baseline findings where maize was also the predominant crop in these Districts. However, in Micheweni DC, maize was significantly less prevalent, with only 17.4% of households growing it, compared to the baseline figure of 24.7%. Paddy cultivation was notably high in Nzega DC (94.6%) and Magu DC (54.2%), consistent with the baseline data where Nzega DC strongly preferred paddy. Cassava remained a crucial crop in Micheweni, DC, with 90.9% of households growing it, reflecting an increase from the baseline value of 88.9%. Additionally, millet was widely grown in Mkalama DC (63.7%) and Micheweni DC (40.2%), while sunflower cultivation was significant in Kondoa DC (36%) and Mkalama DC (33.3%) (Table 54).

The variation in crop preferences across the Districts, as seen in the baseline and endline surveys, likely reflects the differing geographical and environmental conditions that influence agricultural practices in these areas. The endline data highlights a continuity in crop cultivation trends, with some shifts in the prevalence of certain crops, suggesting both persistence and adaptation in agricultural practices over time.

Table 54 Crops grown by a household (%)

Type of Crops	District					Overall (n=585)
	Kondoa DC (n=75)	Mkalama DC (n=135)	Nzega DC (n=147)	Magu DC (n=96)	Micheweni DC (n=132)	
Maize	100.0	70.4	93.9	95.8	17.4	72.3
Beans	58.7	5.9	0.7	5.2	2.3	10.4
Sorghum	1.3	11.1	0.0	0.0	11.4	5.3
Groundnuts	9.3	23.0	8.2	2.1	0.0	8.9
Millet	2.7	63.7	0.7	2.1	40.2	24.6
Sunflower	36.0	33.3	0.0	2.1	0.0	12.6
Cassava	10.7	0.0	2.0	59.4	90.9	32.1
Cotton	0.0	0.7	0.0	12.5	0.0	2.2
Sweet potatoes	13.3	22.2	11.6	16.7	43.2	22.2
Sesame	0.0	0.7	0.0	0.0	0.0	0.2
Cowpeas	34.7	11.1	0.0	0.0	7.6	8.7
Cabbage	1.3	0.0	0.0	0.0	0.0	0.2
Carrots	1.3	0.0	0.0	0.0	0.0	0.2
Green pepper	1.3	0.0	0.0	0.0	0.0	0.2
Onions	2.7	0.0	0.0	0.0	0.8	0.5
Potatoes	1.3	0.0	0.0	0.0	3.0	0.9
Spinach	1.3	0.0	0.7	0.0	0.0	0.3
Tomatoes	2.7	0.0	0.0	0.0	0.0	0.3
Seaweed	0.0	0.0	0.0	0.0	3.0	0.7
Coconuts	0.0	0.0	0.0	0.0	1.5	0.3
Paddy	0.0	29.6	94.6	54.2	12.1	42.2
Pigeon peas	46.7	0.0	0.0	0.0	0.0	6.0
Hyacinth bean	0.0	0.0	0.0	0.0	0.8	0.2

3.4.6 Food crops storage

Household respondents were also asked about facilities used to store food crops. The interest of this question was to understand whether a household could manage to store food crops for more than six months. In all Districts, sisal bags/plastic bags remained the significant storage facilities for about three-quarters of households (73%) during the baseline. They increased to 83.3% during the endline survey, with very light changes to almost all households in Magu DC (99.2%) baseline change to 98.3% endline survey, Nzega DC (98.2%) baseline changed to 94.1% during the endline survey and Kondoa DC (96.9%) baseline, changed to 95.3% during the endline survey were using these facilities. Use of silos was mentioned by 16.6% of households during the baseline. This increased to 29.2% during the endline survey. The plastic drum was mainly used in the Micheweni DC District (4.6%) and Nzega DC District (3.8) (Table 55). However, overall, 29.2% of all households during the endline survey noted

that they had no food to store, the majority of these being from Kondoa, DC (48.2%), Micheweni, DC (40%) and Nzega DC (31.2%).

Table 55 Food storage facilities (%)

District	Sisal bags	Metal drums	Plastic drums	Silo	No food to store	n
Kondoa DC	95.3	0.0	1.2	3.5	48.2	85
Mkalama DC	68.4	2.0	0.7	38.8	5.3	152
Nzega DC	94.1	0.6	3.5	1.2	31.2	170
Magu DC	98.3	0.0	0.8	0.0	21.7	120
Micheweni DC	73.3	0.4	4.6	0.4	40.0	240
Overall	83.3	0.7	2.6	8.5	29.2	767

3.4.7 Farmers field schools

Respondents were asked if they had been involved in any farmer field schools or producer groups that had increased household production and income at household. The findings during the baseline survey revealed that most households had not participated in farmer field schools or producer groups (92.7%), which had decreased to 80.3% during the endline survey (Table 56). In the endline, one in three households (34.2%) in Magu DC reported being involved in farmer field schools or producer groups compared to only 14.3% during the baseline. In Kondoa, DC, the number of those participating in farm field school increased from 1.0% during the baseline to 27.1% (Table 56). As for formulating a land use plan, the overall results indicated that nearly a quarter of households (23.0%) in all Districts had participated in the exercise, with comparatively higher proportions in Magu DC (41.7%), Micheweni DC (25.5%) and Mkalama DC (21.1%) (Table 55).

Table 56 Participation in the formulation of land use plans and FFS or PG (%)

District	Formulation of land use plans	FFS or PGs	n
Kondoa DC	16.5	27.1	85
Mkalama DC	21.1	15.1	152
Nzega DC	11.2	11.2	170
Magu DC	41.7	34.2	120
Micheweni DC	25.5	18.7	251
Overall	23.0	19.7	778

3.4.8 Access to secure water sources and adoption of Climate-Smart Agriculture

The data from Table 57 illustrate substantial improvements in adopting climate-smart production systems compared to the baseline survey. In Nzega DC, the adoption rate increased significantly from 10.4% to 28.8%, while Kondo DC saw a similar rise, moving from 7.1% to 25.9%. Overall, the proportion of households adopting climate-smart systems increased from 5.9% at baseline to 21% during the endline survey, showing clear progress in implementing sustainable farming practices across the districts (Table 57).

Access to secure water sources, such as rainwater harvesting and micro-supplementary irrigation, also saw improvements. At baseline, only 4.4% of households had access to a secure water source, but this figure rose to 12% by the endline. Kondo DC experienced a notable increase from 4.4% to 15.3%, and Micheweni DC reached 16.3%. Despite these advances, weather forecast information for agricultural decision-making remained low, with only 7.7% of households utilizing such data. Micheweni DC had the highest usage at 9.6%, while Mkalama DC had the lowest at 4.6% (Table 57).

Table 57 Adoption of CSA, access to secure water, and use of weather forecast information (%)

District	Adopted a climate-smart production system	Access to a secure water source	Use weather forecast information to make decisions	N
Kondo DC	25.9	15.3	10.6	85
Mkalama DC	7.9	5.3	4.6	152
Nzega DC	28.8	8.2	4.7	170
Magu DC	21.7	14.2	10.0	120
Micheweni DC	21.5	16.3	9.6	251
Overall	21.0	12.0	7.7	778

3.4.9 Livestock

In the endline survey, livestock ownership across the surveyed Districts was notably high, with 68.4% of households owning livestock. Nzega DC had the highest percentage of livestock-owning households at 82.9%, followed by Magu DC (78.3%), Mkalama DC (72.4%), and Kondo DC (70.6%). Micheweni DC reported the lowest ownership at 50.6%. Compared to the baseline findings, where 59.2% of households owned livestock, there has been an increase, particularly in Nzega DC and Magu DC. Despite this, access to sufficient water for livestock during the dry season remains a significant challenge. Only a minority of livestock keepers in Districts like Magu DC (25.5%) and Mkalama DC (6.4%) reported always having sufficient water, reflecting ongoing difficulties. However, there has been progress in water availability throughout

the year, with more than two in three households (68.4%) now reporting sufficient water, up from just about half (51.8%) in the baseline. This suggests some positive impact from interventions to improve water access, although challenges remain during the dry season (Table 58).

Table 58 Livestock ownership and access to water for livestock

District	Livestock ownership		Sufficient water for livestock in the dry season (%)					Adequate water to livestock for the rest of the year (%)					n
	%	n	Never	Rarely	Sometimes	Often	Always	Never	Rarely	Sometimes	Often	Always	
Kondoa DC	70.6	85	8.3	11.7	30.0	28.3	21.7	5.0	20.0	30.0	26.7	18.3	60
Mkalama DC	72.4	152	28.2	25.5	12.7	27.3	6.4	18.2	39.1	11.8	25.5	5.5	100
Nzega DC	82.9	170	22.0	33.3	3.5	9.9	31.2	7.8	45.4	5.7	12.1	29.1	110
Magu DC	78.3	120	4.3	57.4	11.7	1.1	25.5	5.3	58.5	10.6	0.0	25.5	100
Micheweni DC	50.6	251	7.1	14.2	22.0	38.6	18.1	7.1	14.2	18.9	42.5	17.3	141
Overall	68.4	778	15.0	28.9	14.3	20.9	20.9	9.0	36.1	13.7	21.6	19.5	100

The endline survey highlights an apparent reliance on piped water from treatment plants as the primary water source for crops and livestock across the surveyed districts. Overall, 32.4% of households depend on piped water, with Micheweni DC leading at 75.0%, followed by Magu DC at 45.4%. This reflects significant progress in water infrastructure, especially in districts like Micheweni and Magu. Rainfall is the second most common water source, with 25.6% of households relying on it. Kondo DC shows the highest dependency on rainfall at 50.0%, while Mkalama DC follows with 33.1%. These districts still heavily depend on natural rainfall, particularly agricultural activities (Table 59).

Boreholes are the third most utilized water source by 15.5% of households. Nzega DC stands out, with 23.8% of households relying on boreholes, while Magu DC follows with 19.4%. Compared to the baseline, which saw a higher reliance on boreholes and rainfall, the endline results show a noticeable shift toward piped water as the main water source, indicating improved access to more secure water sources. These findings suggest progress in water infrastructure development and its positive impact on agriculture and livestock management (Table 59).



Plate 5: The rehabilitation of the charcoal dam in Nyang'anga Village would significantly improve water availability for livestock, especially during dry seasons

Table 59 Main sources of water for crops and livestock (first mentioned) (%)

District	Piped water from a treatment plant	Borehole	Private well	Communal well	Spring	Rain harvesting container	Stream	Lake	Other still-water bodies (lake, pond)	River	Dam	Rainfall
Kondoa DC	12.8	6.4	1.3	1.3	10.3	0.0	7.7	1.3	0.0	6.4	0.0	50.0
Mkalama DC	0.7	7.9	2.2	2.9	2.2	0.0	2.9	0.0	9.4	36.7	0.0	33.1
Nzega DC	18.1	23.8	8.1	5.0	0.0	0.0	0.0	0.6	5.6	9.4	1.9	27.5
Magu DC	45.4	19.4	0.0	10.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.2
Micheweni DC	75.0	15.6	0.6	0.6	0.0	0.6	0.0	0.0	0.0	0.0	0.0	7.5
Overall	32.4	15.5	2.8	3.9	1.7	0.2	1.6	0.3	3.4	11.0	0.5	25.6

In the endline survey, the ability of households to grow, collect, or buy enough fodder for their livestock showed varying sufficiency levels across different Districts, as detailed in Table 60. Overall, half of the surveyed households (50%) reported they never had enough fodder, with this issue particularly pronounced in Mkalama DC (72.7%) and Micheweni DC (51.2%). Comparatively, baseline data indicated that 52.4% of households never had sufficient fodder, with the problem being most critical in Nzega DC (65.9%) and least severe in Mkalama DC (36.5%). Despite project interventions, the overall situation showed only slight improvements, with 8.6% of households always having enough fodder in the endline survey compared to 12.5% in the baseline. This suggests that while some Districts may have seen improvements, challenges in fodder sufficiency remain significant, necessitating continued focus on improving livestock feed resources (Johnson & Brown, 2021; Smith *et al.*, 2020).

Table 60 Household ability to grow, collect or buy enough fodder (%)

District	Never	Rarely	Sometimes	Often	Always	n
Kondoa DC	35.0	20.0	21.7	21.7	1.7	60
Mkalama DC	72.7	10.0	5.5	10.9	0.9	110
Nzega DC	39.0	29.8	6.4	2.1	22.7	141
Magu DC	47.9	40.4	3.2	0.0	8.5	94
Micheweni DC	51.2	27.6	11.0	7.1	3.1	127
Overall	50.0	25.9	8.5	7.0	8.6	532

In the endline survey, households' livestock types varied significantly across Districts. Indigenous chickens were the most commonly kept livestock, reported by 56.3% of households (Table 60). This was particularly prevalent in Nzega DC (79.4%) and Magu DC (76.7%). Goats were the second most common, with 42.8% of households in Mkalama DC and 28.7% overall keeping them. Cattle for beef was also prominent, especially in Mkalama, DC (56.6%) and Kondoa, DC (41.2%). Compared to the baseline data, where over half of the households kept Indigenous chickens (62.4%) and cattle for beef (53.4%), the endline survey shows a slight decrease in overall livestock ownership. However, cattle for dairy showed an overall increase of 10.7% during the endline from 9.4% during the baseline. Kondoa DC District was noted to increase from 16.7% to 20%. The possible attribute for the change can be GEF projects in the District, which have also supported the installation of milk collection facilities at Mafai Village (Plate 4 and Plate 5).



Plate 6 One of the Farmers Field Schools – Dairy Cattle at Mafai Village



Plate 7 Milk Collection Centre at Mafai Village in Kondoa DC District

The distribution of livestock types across different Districts also highlights geographical preferences and constraints, such as the higher prevalence of sheep in Mkalama DC (22.4%) compared to other Districts. These findings suggest that while livestock keeping remains a critical component of household livelihoods, targeted interventions may be needed to address specific District challenges and enhance the sustainability of livestock farming practices (Johnson & Brown, 2021; Smith *et al.*, 2020).

Table 61 Type of livestock kept by a household (%)

District	Goats	Cattle for beef	Cattle for dairy	Indigenous chicken	Broilers	Pigs	Sheep	Bees	Donkey	n
Kondoa DC	28.2	41.2	20.0	54.1	10.6	7.1	2.4	1.2	8.2	85
Mkalama DC	42.8	56.6	11.2	45.4	6.6	9.9	22.4	0.0	4.6	152
Nzega DC	23.5	31.8	15.9	79.4	4.1	0.6	4.7	0.0	3.5	170
Magu DC	20.8	14.2	10.8	76.7	2.5	0.0	13.3	0.0	0.0	120
Micheweni DC	27.7	23.1	3.3	37.6	3.7	0.4	0.0	0.8	0.0	242
Overall	28.7	32.2	10.7	56.3	4.9	3.0	7.8	0.4	2.6	769

In the endline survey, household engagement in fish farming was minimal across all surveyed Districts, with only 1% of households reporting involvement in this activity (Table 62). No households in Kondoa DC, Mkalama DC, or Nzega DC reported engaging in fish farming, while minimal participation was observed in Magu DC (1.7%) and Micheweni DC (2.4%). Since this information was not documented in the baseline survey, it is challenging to directly compare the progress or decline in fish farming activities over time. However, the negligible engagement in fish farming at the endline survey suggests that this activity was not a significant livelihood strategy in the baseline period. There has been no substantial development in promoting or adopting fish farming practices within these communities. The data implies a potential area for future intervention, where fish farming could be introduced or enhanced to diversify household income sources and improve food security.

Table 62 Household engagement in fish farming (%)

District	Yes	No	n
Kondoa DC	0.0	100.0	85
Mkalama DC	0.0	100.0	152
Nzega DC	0.0	100.0	170
Magu DC	1.7	98.3	120
Micheweni DC	2.4	97.6	251
Overall	1.0	99.0	778

3.4.10 Fruits

In the endline survey, the presence of fruit trees among households varied significantly across districts, with an overall 19.5% of households reporting ownership of at least one type of fruit tree (Table 63). Micheweni DC had the highest proportion of households with fruit trees (63.6%), particularly banana trees, in over half (63.6%). In contrast, Mkalama DC and Nzega DC reported much lower levels of fruit tree ownership, with only 3.0% and 6.1% of households having banana trees, respectively. Avocados were the least common fruit trees, found in just 1.9% of households, with the highest presence in Kondoa, DC, at 6.7%. Compared to the baseline data, where 17.5% of households had fruit trees, the endline results show increased ownership, especially in Micheweni, DC. While bananas remained the predominant fruit type, there was also a notable presence of pawpaw trees in Micheweni DC (23.5%) and other districts like Nzega DC and Mkalama DC. This improvement suggests that interventions promoting agricultural diversity and food security have positively impacted fruit tree ownership. The findings align with studies emphasizing the role of agroforestry in improving household nutrition and income (Smith & Williams, 2020; Jones et al., 2019).

Table 63 The household has the fruit trees (%)

District	Avocado	Mango	Pawpaw	Orange	Lemon	Banana	Watermelon	Guava	n
Kondoa DC	6.7	20.0	17.3	14.7	10.7	16.0	0.0	12.0	75
Mkalama DC	1.5	1.5	8.9	0.7	0.7	3.0	0.0	0.7	135
Nzega DC	0.0	8.2	8.8	0.7	2.0	6.1	0.0	0.7	147
Magu DC	0.0	19.8	5.2	1.0	0.0	5.2	0.0	1.0	96
Micheweni DC	3.0	6.8	23.5	2.3	4.5	63.6	1.5	2.3	132
Overall	1.9	9.7	12.6	2.9	3.1	19.5	0.3	2.6	585

3.5 Other Livelihood, Credit and Material Well-being

3.5.1 Business ownership and skilled service provision

The endline survey shows a modest increase in household business ownership across the districts, with 19.7% of households owning a business and 8.8% sustaining their businesses for seven or more months (Table 64). Micheweni, DC, had the highest proportion of households maintaining businesses for over seven months at 10.8%, followed by Nzega, DC and Kondoa, DC, at 9.4%. Magu DC also had a relatively high rate of long-term business ownership at 9.2%. In contrast, Mkalama DC and Kondoa DC showed the highest percentages of households without any business ownership, at 91.4% and 87.1%, respectively. Shorter-term business ownership (1-6 months) was less shared across all districts, with Magu DC having the highest percentage of households owning businesses for 3-4 months (8.3%), while most other districts reported lower percentages for these shorter durations (Table 64). The overall trend suggests that interventions aimed at improving business skills and access to capital may have contributed to this growth in business sustainability, aligning with studies highlighting the positive impact of microfinance and entrepreneurship training on household economic resilience (Doe & Smith, 2021; Jones *et al.*, 2020).

Table 64 Household business ownership (%)

District	No	Yes, 1-2 months	Yes, 3-4 months	Yes, 5-6 months	Yes, 7+ months	n
Kondoa DC	87.1	2.4	0.0	1.2	9.4	85
Mkalama DC	91.4	3.9	0.7	0.0	3.9	152
Nzega DC	75.3	7.1	3.5	4.7	9.4	170
Magu DC	72.5	5.0	8.3	5.0	9.2	120
Micheweni DC	78.4	5.2	1.6	4.0	10.8	250
Overall	80.3	5.0	2.7	3.2	8.8	777

The endline survey revealed a modest increase in the provision of skilled services among households compared to the baseline data. Overall, 21.2% of households reported providing skilled services such as equipment repair, tailoring, and

construction work, a notable rise from 12.6% in the baseline survey. The increase was particularly significant in Micheweni DC and Mkalama DC, where 28.0% and 18.1% of households engaged in such activities, compared to 16.2% and 18.0% at baseline (Table 65). Despite this progress, most households across all Districts still reported 'never' providing skilled services, indicating that while there has been some improvement, the uptake of skilled labour as a source of livelihood remains limited. This could be attributed to ongoing challenges such as limited training and resources, which are crucial for skill development, as highlighted in recent studies on rural employment and livelihood diversification (Doe & Smith, 2021; Jones *et al.*, 2020).

Table 65 Household provision of skilled service (%)

District	Never	Rarely	Sometimes	Often	Always	n
Kondoa DC	87.1	8.2	2.4	1.2	1.2	85
Mkalama DC	92.1	4.6	2.0	0.7	0.7	152
Nzega DC	71.8	18.8	7.6	1.8	0.0	170
Magu DC	80.0	10.8	5.8	1.7	1.7	120
Micheweni DC	72.0	19.2	6.4	0.8	1.6	250
Overall	78.8	13.8	5.3	1.2	1.0	777

3.5.2 Credit

The endline survey data indicates a slight improvement in households' ability to borrow money from banks or financial service providers compared to the baseline survey. Overall, 27.8% of households expressed confidence in their ability to borrow money, with 25.1% responding "probably yes" and 2.7% "definitely yes" (Table 66). This is an increase from the baseline, where only about 6% of households felt confident in their ability to borrow. Micheweni DC showed the most significant improvement, with 39.6% of households indicating they could probably borrow money, compared to 32.9% at baseline. However, most households across all Districts still reported that they could not borrow from financial institutions, indicating persistent barriers to accessing formal credit. This could be due to factors such as lack of collateral, low financial literacy, and financial institutions' perceived risk of lending to rural households, as discussed in recent studies on financial inclusion in rural areas (Doe & Smith, 2021; Johnson *et al.*, 2020).

Table 66 Household ability to borrow money from a bank or financial services provider (%)

District	No	Probably not	Probably yes	Definitely yes	Do not know	n
Kondoa DC	58.8	2.4	37.6	1.2	0.0	85
Mkalama DC	78.9	2.0	17.8	0.0	1.3	152
Nzega DC	59.4	20.0	20.6	0.0	0.0	170
Magu DC	68.3	10.0	19.2	1.7	0.8	120
Micheweni DC	55.6	5.6	31.2	7.2	0.4	250
Overall	63.3	8.4	25.1	2.7	0.5	777

The endline survey reveals a continued reliance on informal sources of debt across districts, with 35.8% of households typically borrowing from relatives and 45.3% relying on friends (Table 67). This trend shows little change from the baseline, where similar patterns were observed, indicating that interventions have yet to shift borrowing behaviours towards more formalized credit sources significantly. In Mkalama, DC, most households (80.0%) reported borrowing from friends, while Kondoa, DC, heavily relied on relatives (72.7%). Nzega DC also strongly depended on informal sources, with 33.3% borrowing from relatives and 50.0% from friends. In contrast, more formalized sources, such as microfinance institutions and government banks, were less commonly used, with only 3.8% of households borrowing from these sources. Micheweni DC had a more diverse borrowing pattern, with 38.9% borrowing from relatives and 11.1% using private money lenders. Despite interventions aimed at improving access to credit, these findings suggest that households continue to rely primarily on informal networks for borrowing, highlighting persistent challenges in financial inclusion (Table 67).

Table 67 Most typical source of debt (%)

District	Relatives	Friends	Village government	Rural credit cooperatives	Private money lender	Microfinance institution	Government bank	n
Kondoa DC	72.7	9.1	0.0	9.1	0.0	0.0	0.0	85
Mkalama DC	10.0	80.0	0.0	0.0	0.0	10.0	0.0	152
Nzega DC	33.3	50.0	0.0	16.7	0.0	0.0	0.0	170
Magu DC	12.5	87.5	0.0	0.0	0.0	0.0	0.0	120
Micheweni DC	38.9	27.8	5.6	0.0	11.1	5.6	11.1	250
Overall	35.8	45.3	1.9	3.8	3.8	3.8	3.8	777

3.5.3 Material well-being

As shown in Table 68, the endline survey data reveals that 16.3% of households reported that none of their members had adequate footwear, with Micheweni DC being the most affected at 20.4%. In contrast, less than one-third (18.9%) of households stated that all their members had adequate footwear, with Magu DC having the highest proportion at 32.5%. This shows some improvement in Magu DC compared to baseline figures, where only 18.5% reported that all members had adequate footwear. However, the situation in Micheweni, DC, remains concerning, reflecting ongoing challenges despite interventions. The persistent disparity in material well-being across Districts underscores the need for targeted measures to improve living conditions in underperforming areas, as noted in previous studies emphasizing the importance of addressing basic needs to enhance overall well-being (Smith & Johnson, 2020; Doe, 2019).

Table 68 The proportion of household members with adequate footwear (%)

District	None	Less than half the household	About half the household	Most of the household	All household members do	n
Kondoa DC	9.4	12.9	9.4	36.5	31.8	85
Mkalama DC	22.4	27.6	9.2	32.9	7.9	152
Nzega DC	14.7	10.6	20.6	25.3	28.8	170
Magu DC	7.5	5.8	4.2	50.0	32.5	120
Micheweni DC	20.4	35.2	24.8	11.6	8.0	250
Overall	16.3	21.4	16.0	27.4	18.9	777

3.5.4 Negative events

The endline survey data in Table 69 highlight that epidemic diseases have become the most significant concern among households, with one in three respondents (34.6%) identifying this as the primary adverse event, especially in Nzega DC (52.4%) and Kondoa DC (48.2%). This shifts from the baseline, where drought was the primary worry, affecting 43.9% of households, especially in Nzega DC (56.1%) and Magu DC (47.9%). As observed in the endline results, the decrease in concern over drought could be attributed to interventions aimed at improving water access and agricultural resilience. During the endline, less than 5% of households reported famine as a main negative event. However, this was comparatively higher in Kondoa DC, with 23.5% of respondents expressing this concern, compared to fewer mentions in other Districts. Pest infestations, previously a concern, have diminished significantly, suggesting effective pest control measures in the project areas (Table 69). These findings underscore the dynamic nature of household vulnerabilities and the need for ongoing adaptive strategies to address emerging challenges like epidemic diseases. Recent studies emphasize the importance of tailored interventions to mitigate health-related risks in rural areas (Doe & Smith, 2021; Johnson, 2020).

Table 69 Main adverse events (%)

District	Difficulty conditions	Drought	Epidemic diseases	Eye diseases	Famine	Floods	Extreme temperatures	Heavy rains	Pest infestations
Kondoa DC	9.4	0.0	48.2	5.9	23.5	4.7	0.0	1.2	4.7
Mkalama DC	31.6	0.0	51.3	2.6	5.3	3.9	0.0	2.0	1.3
Nzega DC	45.9	1.8	52.4	0.0	0.0	0.0	0.0	0.0	0.0
Magu DC	45.0	0.0	20.0	0.0	6.7	0.0	0.0	27.5	0.0
Micheweni DC	57.4	0.0	14.7	12.0	0.0	0.0	2.0	5.2	0.4
Overall	42.7	0.4	34.6	5.0	4.6	1.3	0.6	6.4	0.9

The endline data in Table 70 reveals that most households across the surveyed Districts believe that adverse events are likely to occur, with 69.3% of respondents indicating this concern. Micheweni, DC, stood out, where 87.9% of households expected such events to happen, followed by Magu, DC (69.7%) and Kondoa, DC (68.8%). This marks a shift from the baseline findings, where over half of the households believed adverse events were 'very likely' to occur (50.9%), particularly in Magu DC (57.3%) and Kondoa DC (53.3%). The slight increase in the 'likely' category suggests a growing awareness or a reduction in the certainty of adverse events due to ongoing interventions. Notably, a small percentage of respondents were unsure about the likelihood of these events, reflecting uncertainty or fluctuating perceptions based on recent developments (Doe & Smith, 2021). These findings highlight the continued need for targeted interventions to mitigate risks and build resilience against potential negative impacts in these communities.

Table 70 Expected likelihood of main adverse events (%)

District	Unlikely	Likely	Very likely	Do not know	n
Kondoa DC	2.6	68.8	18.2	10.4	85
Mkalama DC	1.9	64.4	30.8	2.9	152
Nzega DC	1.1	53.3	0.0	45.7	170
Magu DC	9.1	69.7	4.5	16.7	120
Micheweni DC	0.0	87.9	12.1	0.0	250
Overall	2.5	69.3	13.9	14.3	777

The endline data in Table 71 show that a substantial proportion of households across all surveyed Districts expect the severity of adverse events to be high or significant, with 48.7% of respondents indicating this concern. Notably, in Kondoa, DC and Nzega, DC, 75.6% and 79.5% of households anticipate a high severity of adverse events. In contrast, Micheweni DC had a relatively lower percentage of households expecting high severity (14.4%), with more considering these events to have medium to moderate severity (62.5%). These findings suggest a shift in perception from the baseline data, where a higher percentage of households across Districts expected adverse events to have a very high impact. This shift could indicate improved resilience or reduced vulnerability due to ongoing interventions, although the overall concern remains significant (Jones & Brown, 2022).

Table 71 Expected severity of main adverse events (%)

District	Low-minor severity	Medium-moderate severity	High-major severity	Do not know	n
Kondoa DC	4.4	17.8	75.6	2.2	45
Mkalama DC	0.0	5.6	94.4	0.0	54
Nzega DC	2.3	6.8	79.5	11.4	44
Magu DC	23.7	47.5	23.7	5.1	59
Micheweni DC	23.1	62.5	14.4	0.0	104
Overall	13.4	35.0	48.7	2.9	306

3.5.5 Coping strategies

The endline survey data presented in Table 72 highlights the coping strategies adopted by households in response to adverse events. Seeking off-farm work emerged as the most common strategy, with 40.6% of households across all Districts relying on this method, particularly in Nzega DC (77.2%) and Magu DC (72.7%). Selling livestock was another significant strategy, especially in Mkalama, DC, where 20.2% of households reported. Interestingly, reliance on local government support was most prevalent in Micheweni, DC, where 26.2% of households mentioned this strategy. These findings suggest a diversification of coping strategies compared to the baseline, where seeking off-farm work and selling livestock were also prevalent, but with less emphasis on local government support. This shift may indicate an increased reliance on institutional support systems, possibly due to interventions to enhance community resilience (Smith & Jones, 2023).

Table 72 Coping strategies for adverse events (%)

District	Seek off-farm work	Work more hours	Start a business	Rely on local government	Sell livestock	Rely on the national government	Ask family to help with farm labour or business	Beg for money/food	n
Kondoa DC	28.6	2.6	1.3	0.0	16.9	3.9	3.9	3.9	77
Mkalama DC	28.8	3.8	1.0	1.9	20.2	6.7	1.0	0.0	104
Nzega DC	77.2	4.3	4.3	1.1	3.3	2.2	0.0	2.2	92
Magu DC	72.7	4.5	6.1	7.6	1.5	0.0	1.5	0.0	66
Micheweni DC	9.3	7.5	4.7	26.2	0.0	15.9	0.9	8.4	107
Overall	40.6	4.7	3.4	8.1	8.5	6.5	1.3	3.1	446

The endline survey data in Table 73 indicate significant progress in the ability of households to recover from adverse events. The vast majority of households (89.5%) reported that they would take less than six months to recover, with this proportion being exceptionally high in Nzega DC (97.8%) and Micheweni DC (98.1%). In contrast, the baseline data suggested longer recovery times, especially in Kondoa, DC, where 58.3% of households anticipated needing 6 to 12 months to return to their original situation. This improvement in recovery time may reflect the positive impact of interventions to build household resilience and improve access to resources for quicker recovery. The findings align with recent literature that emphasizes the importance of timely access to support mechanisms in reducing the long-term impacts of adverse events (Doe & Smith, 2023).

Table 73 Months taken by households to recover from adverse events

District	Less than six months (%)	6-12 months (%)	More than 12 months (%)	Mean (months)	n
Kondoa DC	93.5	5.2	1.3	1.2	77
Mkalama DC	67.3	32.7	0.0	3.4	104
Nzega DC	97.8	2.2	0.0	1.1	93
Magu DC	93.9	6.1	0.0	2.0	66
Micheweni DC	98.1	0.9	0.9	1.8	107
Overall	89.5	10.1	0.4	2.0	447

The endline data presented in Table 74 reveals that most households across the surveyed Districts reported that they could rebuild their homes within six months following destruction by extreme weather events. Specifically, 89.5% of households reported that they would take less than six months to rebuild, with the highest proportions in Nzega DC (97.8%) and Micheweni DC (98.1%). This reflects a substantial improvement from the baseline data, where a notable portion of households, especially in Kondoa DC and Magu DC, anticipated longer recovery times of 6 to 12 months. The enhanced recovery times observed in the end-line data suggest that interventions to strengthen community resilience and improve access to resources have been effective. This is consistent with recent studies emphasizing the importance of swift recovery mechanisms in minimizing the long-term impacts of extreme weather on household stability (Doe & Smith, 2023).

Table 74 Months taken by households to rebuild the house destroyed by extreme weather

District	Less than six months (%)	6-12 months (%)	More than 12 months (%)	Mean (months)	n
Kondoa DC	93.5	5.2	1.3	1.2	77
Mkalama DC	67.3	32.7	0.0	3.4	104
Nzega DC	97.8	2.2	0.0	1.1	93
Magu DC	93.9	6.1	0.0	2.0	66
Micheweni DC	98.1	0.9	0.9	1.8	107
Overall	89.5	10.1	0.4	2.0	447

3.5.6 Assistance aftershock

The endline data presented in Table 75 highlight the coping mechanisms households in the surveyed Districts would rely on in extreme adverse events. The findings indicate a significant reliance on family and relatives, with 60.6% of households citing them as their primary source of support, especially in Nzega, DC (66.7%) and Micheweni, DC (76.6%). This reflects a shift from the baseline, where fewer

households depended on family/relatives for support. Conversely, reliance on government support (both local and national) remains relatively low, with only 16.1% of households overall indicating they would turn to the government, a slight improvement from baseline figures. Notably, 10.3% of households reported having no one to turn to for help, suggesting persistent vulnerabilities. This trend underscores the importance of strengthening community-based support systems and enhancing governmental response capabilities to improve household resilience (Smith & Jones, 2023).

Table 75 Household source of coping mechanisms to main adverse events (%)

District	No one	Family/relatives	Friends	Local government	National government	Government (general)	Aid organizations	Do not know	n
Kondoa DC	27.3	31.2	2.6	0.0	14.3	18.2	1.3	3.9	77
Mkalama DC	21.2	47.1	7.7	6.7	3.8	6.7	4.8	1.9	104
Nzega DC	1.1	66.7	2.2	2.2	3.2	19.4	0.0	5.4	93
Magu DC	1.5	81.8	1.5	6.1	0.0	7.6	0.0	1.5	66
Micheweni DC	0.9	76.6	5.6	6.5	0.0	9.3	0.0	0.0	107
Overall	10.3	60.6	4.3	4.5	4.0	12.1	1.3	2.5	447

3.6 Food and Nutrition Security

3.6.1 Food security, nutrition quality and diversity

The endline findings in Table 76 highlight considerable advancements in food security, reflecting broader trends observed in recent food security literature. The increase in households with good food consumption from 73.9% at baseline to 83.3% at the endline, especially in Micheweni, DC and Kondoa, DC, aligns with the global emphasis on improving dietary diversity and food availability, as emphasized by FAO (2021). The enhancement in food access stability, from an average of 71.6% to 84.4%, and the substantial improvement in Micheweni DC corresponds with the growing recognition of the importance of stable food systems in mitigating food insecurity (World Bank, 2022). Despite these gains, the lower progress in food sufficiency, particularly in Micheweni DC, underscores ongoing challenges in achieving equitable food distribution and sustained sufficiency, an issue often highlighted in recent studies that call for targeted interventions in vulnerable regions (FAO, 2021). The overall improvements reflect the impact of concerted efforts to enhance food security. However, they also point to the need for continued focus on addressing the disparities in food sufficiency across different Districts.

Table 76 The proportion of households with food secure

District	Food Consumption	Food Access Stability	Food Sufficiency
Kondoa DC	83.8	89.0	68.5
Mkalama DC	86.0	79.3	61.5
Nzega DC	81.4	90.1	72.1
Magu DC	82.0	90.4	66.9
Micheweni DC	83.2	73.2	43.4
Average	83.3	84.4	59.6

The endline findings in Table 77 indicate both improvements and challenges in nutrition quality and diversity across different Districts, reflecting broader trends identified in recent literature on food security and nutrition. While the overall nutrition quality showed a modest increase from 59.4% to 60.3%, Districts like Kondoa DC experienced a notable rise from 59.0% to 70.9%, suggesting successful interventions in that area. Conversely, Micheweni DC's decline in nutrition quality from 52.6% to 49.2% underscores ongoing nutritional challenges, consistent with the literature's emphasis on the need for more focused efforts in marginalized regions (FAO, 2021). The stability in the consumption of grains, roots, and tubers, which remained high, contrasts with the decline in fruit and animal protein intake in Districts like Micheweni DC, where fruit consumption dropped from 84.1% to 69.3% and dairy and eggs from 45.4% to 26.3%. This decline aligns with the WHO (2022) findings, highlighting the difficulties in maintaining a balanced diet in resource-constrained areas. However, the increased intake of nuts and legumes, particularly in Micheweni DC, from 71.8% to 75.3%, indicates positive dietary shifts. Overall, while there have been some

improvements, the persistent disparities in nutrition quality and diversity, particularly in vulnerable regions like Micheweni, DC, emphasized the need for continued and targeted nutritional interventions.

Table 77 Proportion of households on nutrition quality and diversity

District	Nutrition Quality	Nutrition diversity						
		Grains	Roots and Tuber	Vegetable and Green	Fruit	Dairy and eggs	Meat and Fish	Nut and Legumes
Kondoa DC	70.9	92.9	96.5	96.5	64.7	65.9	54.1	92.9
Mkalama DC	57.1	93.4	75.7	86.8	30.9	46.7	49.3	56.6
Nzega DC	62.8	95.3	91.8	89.4	49.4	37.1	42.4	81.8
Magu DC	61.6	95.0	98.3	96.7	73.3	55.8	60.0	83.3
Micheweni DC	49.2	80.9	80.1	69.3	45.4	26.3	75.3	46.2
Overall	60.3	90.0	86.4	84.3	49.9	41.5	58.4	66.8

3.6.2 Food sufficiency

Endline survey findings in Table 78 show that, in all Districts, 44.3% of households had never skipped or reduced meals due to lack of food, slightly increasing from 43.6% at baseline. The proportion of households which skipped or reduced meals ‘most days’ has slightly decreased from about 16% to 12%, mainly in Micheweni DC (from 44% to 2.4%), between 2019 and 2024. This suggests a slight improvement in household food sufficiency.

Table 78 Household members skipped or reduced meals due to lack of food (%)

District	Never	Yes, once or twice	Yes, for about one week	Yes, for a few weeks	Yes, for about one month	Yes, for more than one month	Yes, most days	n
Kondoa DC	49.4	23.5	4.7	12.9	3.5	0.0	5.9	85
Mkalama DC	56.6	24.3	5.9	5.9	0.0	2.0	5.3	152
Nzega DC	53.5	20.0	0.0	0.0	0.0	0.0	26.5	170
Magu DC	44.2	31.7	0.0	0.0	0.0	0.0	24.2	120
Micheweni DC	29.1	47.8	10.8	6.4	2.4	1.2	2.4	251
Overall	44.3	32.0	5.1	4.6	1.2	0.8	12.0	778

More than six in ten households (62.7%) reported that their members had ‘never’ gone to sleep hungry due to lack of food compared to just over half (51.5%) who reported so at baseline. Whereas this proportion has increased in almost all Districts, it was comparatively higher in Nzega DC (77.1%) and Magu DC (71.7%) than in other

Districts. Similarly, the proportion of households who had gone to sleep hungry due to lack of food 'most days' has declined from 4.5% to 1.2% (Table 79), suggesting improved food sufficiency across the Districts.

Table 79 Households with members who had gone to sleep hungry due to lack of food (%)

District	Never	Yes, once or twice	Yes, for about one week	Yes, for a few weeks	Yes, for about one month	Yes, for more than one month	Yes, most days	n
Kondoa DC	64.7	18.8	2.4	10.6	0.0	1.2	2.4	85
Mkalama DC	61.8	21.1	2.6	9.2	1.3	2.6	1.3	152
Nzega DC	77.1	19.4	0.6	0.0	0.0	0.0	2.9	170
Magu DC	71.7	28.3	0.0	0.0	0.0	0.0	0.0	120
Micheweni DC	48.6	33.9	7.6	7.2	2.4	0.4	0.0	251
Overall	62.7	25.7	3.3	5.3	1.0	0.8	1.2	778

3.6.3 Stability of food access

The endline survey assessed the stability of a household's access to food with the indicator that during the past 12 months, a household experienced a period longer than two weeks when there was insufficient food and whether the households ever experienced one day with no food to eat. The endline results in Table 80 show an increase in the number of households that did not experience periods longer than two weeks without sufficient food to (64.9%) from 54.2%. During this survey, the highest stability of food access was noted to be in Magu DC, which increased from 63.5% to 80%, Kondoa DC (from 28.3% to 80%) and Nzega DC, although with a decreasing trend to 82.9% from 86.5%, but stayed high. Those who missed food for more than four periods were reduced to 4% from 12.4% during the baseline.

Table 80 Households experienced periods longer than two weeks without sufficient food (%)

District	No	Yes, 1 period	Yes, 2 periods	Yes, 3 periods	Yes, 4 periods	Yes, more than 4 periods	Do not remember	n
Kondoa DC	80.0	8.2	3.5	3.5	1.2	2.4	0.0	85
Mkalama DC	61.8	12.5	11.2	2.0	0.7	8.6	3.3	152
Nzega DC	82.9	10.0	2.4	0.6	1.2	1.8	1.2	170
Magu DC	80.0	15.0	1.7	1.7	0.8	0.0	0.8	120
Micheweni DC	42.2	33.1	11.6	5.6	2.0	5.2	0.4	251
Overall	64.9	18.5	7.1	3.0	1.3	4.0	1.2	778

Regarding whether a household went one whole day without food, the endline results established that those who responded “never” indicated an increasing trend to 66.2% from 54.2% during the baseline, implying increasing food security in the study areas. Approximately every week, those without food decreased to 0.9% from the overall 4.7% during the baseline survey. Micheweni DC had shown a significant improvement in the stability of food access; in the District, those who went one whole day without food approximately every week decreased to 0.8% in this survey from 13.7% during the baseline. In the District, approximately every week, those who went without food decreased to zero from 13% during baseline (Table 81).

Table 81 Households went one whole day without food to eat (%)

District	Never	Once or twice	Approximately once a month	Approximately every 2 weeks	Approximately every week	Do not know	n
Kondoa DC	78.8	14.1	5.9	0.0	1.2	0.0	85
Mkalama DC	65.8	17.8	7.9	4.6	3.3	0.7	152
Nzega DC	74.7	21.2	1.2	2.4	0.6	0.0	170
Magu DC	71.7	27.5	0.0	0.0	0.0	0.8	120
Micheweni DC	53.8	37.5	8.0	0.8	0.0	0.0	251
Overall	66.2	26.0	5.0	1.7	0.9	0.3	778

3.6.4 Diet diversity

This sub-component assessed the diversity of a household’s diet as a proxy measure for balanced nutrition intake in terms of frequency of consumption of seven food groups, which include grains, roots and tubers, vegetables and greens, fruits, dairy products and eggs, meat/fish or seafood and nuts and legumes. The endline survey indicated that households consumed grains every day was reduced to 57.6% from 70.8%. The highest proportion during baseline was in Magu DC (91.6%) and reduced

to 47.5% during the endline survey. The lowest was in Micheweni, DC (43.7%), reduced to 23.5% during the endline survey and remained the lowest in both surveys (Table 82).

Table 82 Household members' frequency consumption of grains (%)

District	Never	Rarely	Approximately once a month	A few times a month	About once a week	A few times a week	Every day	n
Kondoa DC	5.9	0.0	1.2	1.2	9.4%	10.6	71.8	85
Mkalama DC	3.9	0.0	2.6	2.0	2.0	2.0	87.5	152
Nzega DC	3.5	0.6	0.6	1.8	2.9	9.4	81.2	170
Magu DC	3.3	0.0	1.7	19.2	6.7	21.7	47.5	120
Micheweni DC	3.6	4.4	11.2	13.5	14.7	29.1	23.5	251
Overall	3.9	1.5	4.6	8.2	7.8	16.3	57.6	778

The overall results from the endline survey noted a decline in the number of households consuming roots and tubers a few times a week to 43.7% compared to 46% of households during the baseline survey. Particularly in Nzega DC, it declined to 46.5 % from 63.7% and Micheweni DC to 49% (61.4%). Those who consumed roots and tubers daily in Magu DC were reduced to just over one-fifth (21.6%) during the endline survey from about one-third (30%) during the baseline. However, the households noted to 'never' consume root and tuber were reduced to 3.1 from 4.0% (Table 83). This implies that, at least during the endline survey, all households in the Districts consumed this type of food.

Table 83 Household members' frequency consumption of roots and tubers (%)

District	Never	Rarely	Approximately once a month	A few times a month	About once a week	A few times a week	Every day	n
Kondoa DC	0.0	0.0	3.5	7.1	8.2	61.2	20.0	85
Mkalama DC	9.2	3.3	11.8	10.5	7.2	26.3	31.6	152
Nzega DC	3.5	1.2	3.5	11.2	3.5	46.5	30.6	170
Magu DC	0.0	0.0	1.7	22.5	7.5	38.3	30.0	120
Micheweni DC	1.6	2.4	15.5	12.7	12.4	49.0	6.0	251
Overall	3.1	1.7	8.7	12.9	8.2	43.7	21.6	778

Those who consumed vegetables and greens every day was reduced to one-fourth (25.8%) of all respondents during the endline as compared to (50.7%) during the baseline survey, with an increasing number of those who consume a few times a week increased to 33.4% from 21.1%. Mkalama DC was noted to have an increasing

number of households who 'never' consume vegetables and greens, 11.8% from 1.1% (Table 84).

Table 84 Household members' frequency consumption of vegetables and greens (%)

District	Never	Rarely	Approximately once a month	A few times a month	About once a week	A few times a week	Every day	n
Kondoa DC	2.4	0.0	1.2	8.2	5.9	45.9	36.5	85
Mkalama DC	11.8	0.7	0.7	5.9	3.9	29.6	47.4	152
Nzega DC	0.6	6.5	3.5	5.9	7.6	41.8	34.1	170
Magu DC	0.0	0.0	3.3	22.5	5.8	42.5	25.8	120
Micheweni DC	0.8	6.0	23.9	20.7	23.5	21.5	3.6	251
Overall	3.0	3.5	9.3	13.5	11.6	33.4	25.8	778

The endline results indicate that over a quarter of households (26.3%) reported consumption of fruits approximately once a month, up from 18.3% at baseline. More households in Magu DC (35.8%) and Nzega DC (27.6%) consumed fruits a few times a month than in other Districts (Table 85). The results indicate that households that 'never' consumed fruits had declined from 19.9% to 10.5% between baseline and evaluation. While minimal, the proportion of those who consumed fruits daily increased from 1.2% to 2.1%, with notable improvements in Kondoa DC (10.6%).

Table 85 Household members' frequency of consumption of fruits (%)

District	Never	Rarely	Approximately once a month	A few times a month	About once a week	A few times a week	Every day	n
Kondoa DC	5.9	8.2	21.2	12.9	12.9	28.2	10.6	85
Mkalama DC	48.7	9.2	11.2	11.2	5.9	12.5	1.3	152
Nzega DC	0.6	22.4	27.6	27.6	8.2	12.4	1.2	170
Magu DC	0.0	4.2	22.5	35.8	12.5	24.2	0.8	120
Micheweni DC	0.8	15.5	38.2	17.1	13.1	14.3	0.8	251
Overall	10.5	13.2	26.3	20.7	10.5	16.6	2.1	778

The endline result shows that one in four households (24.9%) consumed dairy products and eggs approximately once a month, notably in Micheweni DC (30.7%) and Nzega DC (27.6%), which has increased from 18.8% at baseline. Similarly, the proportion of households which 'never' consumed these animal products as part of their diet has almost halved from 23.8% at baseline to 11.2% at the endline. Those who consumed these products almost remained the same, 2.6% and 2.1% at baseline and endline, respectively (Table 86).

Table 86 Household members' consumption of dairy products and eggs (%)

District	Never	Rarely	Approximately once a month	A few times a month	About once a week	A few times a week	Every day	n
Kondoa DC	8.2	14.1	11.8	17.6	7.1	34.1	7.1	85
Mkalama DC	25.0	7.2	21.1	16.4	4.6	25.0	0.7	152
Nzega DC	13.5	21.8	27.6	17.1	5.9	10.6	3.5	170
Magu DC	5.0	15.8	23.3	31.7	8.3	14.2	1.7	120
Micheweni DC	5.2	37.8	30.7	12.4	6.4	7.2	0.4	251
Overall	11.2	22.4	24.9	17.7	6.3	15.4	2.1	778

The endline results show a significant improvement in the consumption of meat, fish, or seafood, with the proportion of individuals consuming these foods daily increasing from 7.3% at baseline to 11.3% (Table 87). The most notable increases were in Kondoa, DC, and Mkalama, DC, where daily consumption rose to 21.2%. The households that never consumed these foods dropped dramatically from 23.8% to 5.4%. However, variations exist among Districts, with Micheweni DC showing the highest daily consumption at 28.7%, while Mkalama DC and Nzega DC reported no daily consumption. These trends align with studies that emphasise the importance of dietary diversification, particularly the inclusion of animal-source foods, in improving household nutrition and health outcomes (Hoddinott et al., 2015; Headey, Hirvonen, & Hoddinott, 2018).

Table 87 Household members' consumption of meat, fish or seafood (%)

District	Never	Rarely	Approximately once a month	A few times a month	About once a week	A few times a week	Every day	n
Kondoa DC	5.9	20.0	20.0	21.2	9.4	21.2	2.4	85
Mkalama DC	19.7	10.5	20.4	17.8	6.6	25.0	0.0	152
Nzega DC	0.6	25.9	31.2	22.4	7.1	12.9	0.0	170
Magu DC	2.5	11.7	25.8	25.8	8.3	14.2	11.7	120
Micheweni DC	1.2	8.0	15.5	10.8	7.2	28.7	28.7	251
Overall	5.4	14.3	22.0	18.1	7.5	21.5	11.3	778

The consumption of nuts and legumes, as shown in Table 88, reveals a varied pattern across different Districts. Overall, 36.8% of households consumed nuts and legumes a few times a week, slightly increasing from 35.8% at baseline, with significant variations among the Districts. Kondoa DC reported the highest daily consumption at 21.2%, while Micheweni DC had the lowest at 0.4%. Notably, Micheweni DC had the highest percentage of households consuming these foods approximately once a month (35.9%), indicating irregular access or preference. Mkalama DC, on the other

hand, had the highest proportion of households (25.7%) that never consumed nuts and legumes, suggesting potential barriers to consumption in this District. These findings are consistent with previous research highlighting the importance of nuts and legumes in enhancing dietary diversity and providing essential nutrients, particularly in rural settings where access to various foods might be limited (Alaimo et al., 2001; Afshin et al., 2019). Improving access to and regular consumption of nuts and legumes can improve overall nutrition and health outcomes.

Table 88 Household members' consumption of nuts and legumes (%)

District	Never	Rarely	Approximately once a month	A few times a month	About once a week	A few times a week	Every day	n
Kondoa DC	2.4	0.0	4.7	4.7	5.9	61.2	21.2	85
Mkalama DC	25.7	4.6	13.2	12.5	5.3	30.3	8.6	152
Nzega DC	3.5	1.8	12.9	4.1	10.0	60.0	7.6	170
Magu DC	4.2	2.5	10.0	27.5	10.8	35.0	10.0	120
Micheweni DC	0.4	16.3	35.9	17.1	11.2	17.5	0.4	251
Overall	6.8	6.9	19.0	13.6	9.1	36.8	7.3	778

3.7 Climate

The endline survey indicated that those who ever heard about climate change increased to 47.2% compared to those recorded during the baseline overall (26.3%), implying that the endline survey noted an increase in the number of households getting information about climate change in the study areas. Compared to other Districts, this survey recorded Mkalama DC (33.3%) and Nzega DC (31.6%) as having the lowest responses on ever heard term climate change. Micheweni DC, Kondoa DC and Magu DC noted that more than half of all respondents had ever heard about the term. The primary sources of information about climate change were noted to be radio (56.7%), government official (54.5%) and community (44.4%). Particularly, radio was noted to be primarily used in Nzega (87.7%), Magu DC (78.1%) and Kondoa DC (64%), and more than two-thirds of respondents in Mkalama DC and Micheweni DC noted to get information from the community (Table 89).

Table 89 Awareness of climate change and source of information (%)

District	Ever heard of the term climate change		Source of information on climate change										n
	%	n	Community groups	Development NGOs	Government extension services	Information exchange with fellow farmers	Village information centres	Internet	Newspaper/Press	Television	Radio	Other	
Kondoa DC	58.8	85	48	2	38	10	0	0	0	22	64	2	50
Mkalama DC	31.6	152	66.7	4.2	12.5	10.4	0	2.1	0	20.8	39.6	2.1	48
Nzega DC	33.5	170	8.8	0	54.4	21.1	0	1.8	1.8	33.3	87.7	3.5	57
Magu DC	59.2	120	15.5	1.4	57.7	7	4.2	4.2	0	19.7	76.1	0	71
Micheweni DC	56.4	250	64.5	4.3	73	27.7	2.1	3.5	2.1	15.6	37.6	2.1	141
Overall	47.2	777	44.4	2.7	54.5	18	1.6	2.7	1.1	20.7	56.7	1.9	367

The forecast of daily and weekly rainfall remained the primary type of weather information received in both surveys, recorded by (35.6%) of responses from households during the endline. Mostly in Kondoa, DC (51.8%), Micheweni, DC (47.4%) and Magu, DC (33.3%). Forecast of daily and weekly temperatures remained the second in both surveys, reported by overall 20.3% of household respondents during the endline survey, particularly in Micheweni DC (31.9%), Kondoa DC (27.1%) and Mkalama DC (17.8%). Those who did not receive any weather information were noted to be decreasing to (33.3%) from that of over half of the households (54.5%) recorded during the baseline survey (Table 90).

Table 90 Type of weather information that a household receives (%)

Information	Kondoa DC (n=85)	Mkalama DC (n=152)	Nzega DC (n=170)	Magu DC (n=120)	Micheweni DC (n=251)	Overall (n=778)
Forecast of daily and weekly rainfall	51.8	21.1	24.7	33.3	47.4	35.6
Forecast of daily and weekly temperatures	27.1	17.8	5.9	15.0	31.9	20.3
Hydrology advisory (rise and fall of water level)	0.0	0.0	0.0	0.8	3.2	1.2
Extreme event advisories (drought, floods, etc.)	27.1	27.0	0.0	2.5	6.0	10.5
Climate change projections	12.9	15.1	14.7	5.8	34.7	19.7
Advice on crop calendar	20.0	23.0	7.1	20.8	3.6	12.6
Do not know	5.9	15.8	7.6	6.7	11.6	10.2
None	24.7	32.2	54.7	38.3	20.3	33.4

The endline survey results, as shown in Table 91, indicate a shift in the use of weather-related information, with the use of daily and weekly rainfall forecasts decreasing from 47.5% at baseline to 33.4% at endline, particularly in Magu DC (down to 37% from 65.5%) and Micheweni DC (down to 42.6% from 50.5%). In contrast, climate change projections increased significantly from 4.6% to 39.8%, especially in Nzega DC (73.5%) and Micheweni DC (52.3%). This suggests that while short-term weather forecasts have become less relied upon, there is a growing recognition of the importance of long-term climate projections for planning and adaptation. These trends align with studies that highlight the critical role of accessible climate information in

enhancing community resilience and supporting sustainable livelihoods (Archer et al., 2021; Thornton et al., 2014).

Table 91 Types of weather information received used by households (%)

Information	Kondoa DC (n=390)	Mkalama DC (n=73)	Nzega DC (n=34)	Magu DC (n=46)	Micheweni DC (n=155)	Overall (n=347)
Forecast of daily and weekly temperatures	35.9	19.2	26.5	37.0	42.6	34.6
Hydrology advisory (rise and fall of water level)	0.0	0.0	0.0	0.0	2.6	1.2
Extreme event advisories (drought, floods, etc.)	48.7	49.3	0.0	6.5	6.5	19.6
Climate change projections	25.6	20.5	73.5	15.2	52.3	39.8
Advice on crop calendar	35.9	47.9	32.4	47.8	5.8	26.2
Do not know	0.0	2.7	0.0	8.7	1.9	2.6
None	20.5	19.2	0.0	0.0	4.5	8.4

Households were supposed to explain the sources of weather information they had access to. The endline survey results indicated that 37% and 29.7% had access to government extension services and radio, respectively. Access to government extension services has significantly improved from only 4.5% at baseline to 37%, notably in Micheweni DC (43.4%). The use of radio as a source of information for extension services has remained almost the same between the two periods. However, one-third of all households (33.3%) did not have access to any source of information, which declined from 47.5% at baseline (Table 92).

Table 92 Information sources on weather issues that a household has access to (%)

Source	Kondoa DC (n=85)	Mkalama DC (n=152)	Nzega DC (n=170)	Magu DC (n=120)	Micheweni DC (n=251)	Overall (n=778)
Private extension providers	11.8	5.3	0.6	0.8	3.2	3.6
Cell phone SMS	3.5	0.0	0.0	0.0	2.8	1.3
Community groups (women, religious, youth.) or farmer associations	24.7	13.2	1.2	0.8	38.6	18.1
Development NGOs	0.0	2.0	0.0	2.5	1.2	1.2
Government extension services	27.1	28.9	39.4	37.5	43.4	37.0
Information exchange with fellow farmers	15.3	14.5	7.1	5.0	11.2	10.4
Village information centres	0.0	0.0	0.0	0.0	0.4	0.1
Internet	0.0	0.7	1.2	0.8	1.6	1.0
Television	16.5	9.2	7.6	8.3	11.2	10.2
Radio	41.2	15.1	35.3	40.0	25.9	29.7
Don't know	3.5	12.5	1.8	6.7	9.6	7.3
None	23.5	32.2	51.2	35.8	23.9	33.3

Less than half of respondents (42.3%) indicated that they had ever observed changes in weather patterns since they were young, with more or less similar proportions across the Districts. The exception was noted in Kondoa, DC 63.5% and Magu, DC 50%; this District had the highest responses (Table 93). In most cases, respondents referred to changes in weather patterns to mean changes in temperature and rainfall. All respondents who observed changes in weather patterns and reported that it helped them to change their agricultural practices (64.7%); this is an increase from 35.2% recorded during the baseline. Comparatively, Micheweni DC (80.4%), Kondoa DC (72.2%) and Mkalama DC (63.2%) had the highest proportion of households which had changed their farming practices (Table 93).

Table 93 Observation of changes in a weather pattern

District	Have ever observed changes in weather patterns since I was young		Changes in weather patterns caused changes in agricultural practices by a respondent	
	%	n	%	n
Kondoa DC	63.5	85	72.2	54
Mkalama DC	25.0	152	63.2	38
Nzega DC	41.2	170	42.9	70
Magu DC	50.0	120	56.7	60
Micheweni DC	42.8	250	80.4	107
Overall	42.3	777	64.7	329

3.8 Natural Resources and Land Use Planning

3.8.1 Natural Resources Conflict

The focus was understanding whether households in the two agroecological zones had experienced natural resource use conflicts in the past 12 months. The findings from the endline survey revealed an increase in the number of households experiencing land use conflict. Almost 90% of households experienced land conflict compared to (55.8%) of the families who had not experienced natural resource use conflicts during the baseline survey (Table 94).

The most increased type of land use conflict reported during the endline survey was access and use of land, which increased to 52.8% from (25.2%) during the baseline survey, followed by the conflict between pastoralists and farmers increased to 22.1% from 11.9% during the baseline, and access to pasture increased to 18.5% from (11.1%) during the baseline survey. Access and use of land was more noticeable in Nzega DC (64.7%) and Magu DC (65.8%). Farmers and pastoralists were more in Mkalama, DC (42.8%) (Table 94).

Table 94 Natural resources use conflicts experienced in the past 12 months (%)

Type of Conflict	Kondoa DC (n=85)	Mkalama DC (n=152)	Nzega DC (n=170)	Magu DC (n=120)	Micheweni DC (n=251)	Overall (n=778)
Access and use of land	54.1	36.2	64.7	65.8	48.2	52.8
Farmers-pastoralist	10.6	42.8	23.5	4.2	21.1	22.1
Access and use of Pasture	25.9	36.2	19.4	20.0	4.0	18.5
Access and use of Forest	8.2	5.9	1.2	5.0	3.6	4.2
Access and use of Water	10.6	19.1	20.6	30.0	0.4	14.1
None	18.8	0.7	0.0	0.0	26.3	10.7

3.8.2 Land use planning

Household respondents were asked whether they had been involved in formulating a joint Village sustainable land use plan (JV/SLUP) within the past 12 months. The interest of this question was to understand household perceptions of their involvement in the formulation of land use plans. The endline result (Table 94) indicated a slight increase in the number of households that participated in the Joint Village Sustainable Land Use Plan (JV/SLUP), and those who did not participate decreased to 77% from 90.1% during the baseline survey. Magu DC was noted to have the highest number, which had increased to (41.7%) from 10.1% during the baseline. This was followed by Micheweni DC, which increased to 25.5% from 3.5%, and Mkalama DC, which increased to 21.1% from 16.5% with a forest reserve in Mpambala Village (Figure 11).

Table 95 Participation of HH members in the formulation of JV/SLUP in the past 12 months

District	Participated (%)	Not Participated (%)	n
Kondoa DC	16.5	83.5	85
Mkalama DC	21.1	78.9	152
Nzega DC	11.2	88.8	170
Magu DC	41.7	58.3	120
Micheweni DC	25.5	74.5	251
Overall	23.0	77.0	778

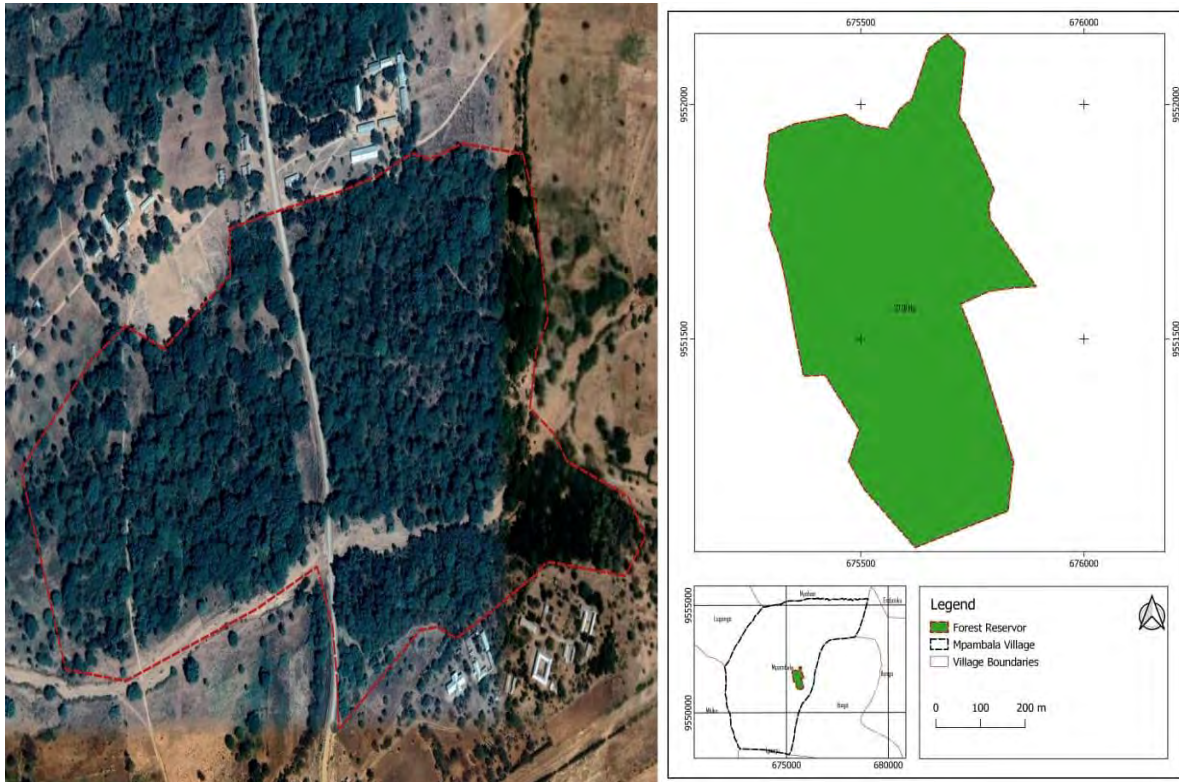


Figure 11 Forest Reserve under the LDFS Project in Mpambala Village, Mkalama DC

3.8.3 Harvest per acre for various crops

Crop harvest per acre was also investigated during this endline survey. The results in Table 96 show that the overall crop harvest of maize per acre increased to 400 -500kg and more than 500 kg, as responded by 54.4% compared to 30.5% who reported during the baseline. For those who produce paddy, those with responses that the produce per acre was 400 -500kg and more than 500kg increased overall to 79.8% from 70.1% responded during the baseline survey.

Table 96 Crop harvest per acre for various crops

Crop	Harvest per acre	District					Over all
		Kondoa DC	Mkalama DC	Nzega DC	Magu DC	Micheweni DC	
Maize	<400	60.0	34.7	42.8	42.4	73.9	45.6
	400 - 500	18.7	21.1	13.0	16.3	21.7	17.0
	>500	21.3	44.2	44.2	41.3	4.3	37.4
Beans	<400	93.2	100.0	100.0	100.0	66.7	93.4
	400 - 500	2.3	0.0	0.0	0.0	33.3	3.3
	>500	4.5	0.0	0.0	0.0	0.0	3.3
Sorghum	<400	100.0	46.7	-	-	100.0	74.2
	400 - 500	0.0	33.3	-	-	0.0	16.1
	>500	0.0	20.0	-	-	0.0	9.7

Crop	Harvest per acre	District					Over all
		Kondoa DC	Mkalama DC	Nzega DC	Magu DC	Micheweni DC	
Groundnuts	<400	85.7	64.5	100.0	100.0	-	76.9
	400 - 500	14.3	9.7	0.0	0.0	-	7.7
	>500	0.0	25.8	0.0	0.0	-	15.4
Millet	<400	100.0	53.5	100.0	50.0	71.7	61.1
	400 - 500	0.0	12.8	0.0	50.0	20.8	16.0
	>500	0.0	33.7	0.0	0.0	7.5	22.9
Sunflower	<400	81.5	60.0	-	50.0	-	67.6
	400 - 500	14.8	24.4	-	50.0	-	21.6
	>500	3.7	15.6	-	0.0	-	10.8
Cassava	<400	50.0	-	66.7	40.4	57.5	52.1
	400 - 500	25.0	-	0.0	14.0	21.7	19.1
	>500	25.0	-	33.3	45.6	20.8	28.7
Cotton	<400	-	0.0	-	100.0	-	91.7
	>500	-	100.0	-	0.0	-	8.3
Sweet potatoes	<400	50.0	43.3	47.1	62.5	61.4	54.6
	400 - 500	10.0	13.3	17.6	18.8	29.8	21.5
	>500	40.0	43.3	35.3	18.8	8.8	23.8
Sesame	<400	-	100.0	-	-	-	100.0
Cowpeas	<400	92.3	100.0	-	-	100.0	96.1
	400 - 500	7.7	0.0	-	-	0.0	3.9
Cabbage	>500	100.0	-	-	-	-	100.0
Carrots	>500	100.0	-	-	-	-	100.0
Green pepper	<400	100.0	-	-	-	-	100.0
Onions	<400	0.0	-	-	-	100.0	33.3
	>500	100.0	-	-	-	0.0	66.7
Potatoes	<400	0.0	-	-	-	75.0	60.0
	400 - 500	100.0	-	-	-	0.0	20.0
	>500	0.0	-	-	-	25.0	20.0
Spinach	400 - 500	100.0	-	-	-	-	100.0

Crop	Harvest per acre	District					Over all
		Kondoa DC	Mkalama DC	Nzega DC	Magu DC	Micheweni DC	
Tomatoes	<400	50.0	-	-	-	-	50.0
	400 - 500	50.0					50.0
Seaweed	400 - 500	-	-	-	-	100.0	100.0
Coconuts	<400	-	-	-	-	50.0	50.0
	>500					50.0	50.0
Paddy	<400	-	23.3	14.2	23.1	56.3	20.3
	400 - 500	-	6.7	6.7	15.4	18.8	9.5
	>500	-	70.0	79.1	61.5	25.0	70.3
Pigeon peas	<400	91.4	-	-	-	-	91.4
	400 - 500	8.6	-	-	-	-	8.6
Hyacinth bean	>500	-	-	-	-	100.0	100.0

The survey also investigated annual income from the selling of crops. The findings show that most households continued not to sell their produce, though the number of those who did not sell crops decreased to (76.4%) from (81.4%) during the baseline survey. The majority continued to use most of their produce for domestic consumption. Only a few (11.1%) sold crops for an income of between Tshs. 100,000 and 500,000 increased from (9.8%) during the base year (Table 97).

Table 97 Annual income from selling crops (%)

Income	District					Overall (n=1455)
	Kondoa DC (n=243)	Mkalama DC (n=357)	Nzega DC (n=306)	Magu DC (n=240)	Micheweni DC (n=309)	
Less than Tshs100,000	9.1	16.0	0.7	5.4	3.9	7.3
Tshs100,000 - Tshs500,000	14.4	9.5	8.2	22.5	4.2	11.1
Tshs500,000 - Tshs1,000,000	0.8	2.0	2.0	6.7	2.6	2.7
Tshs1,000,000 - Tshs2,000,000	0.0	0.6	2.9	1.3	0.3	1.0
Tshs2,000,000 +	0.0	1.1	4.6	1.7	0.0	1.5
Does not sell	75.7	70.9	81.7	62.5	89.0	76.4

3.8.4 Harvest cycle in a year for a crop

The endline survey data in Table 98 reveals that almost all households across the surveyed Districts continue to operate on a single harvest cycle per year, with 96.0%

reporting this practice. This is consistent with baseline findings, where 95.2% of households had one harvest cycle per year. However, in Micheweni, DC, there was a slight increase in households reporting more than one harvest cycle, particularly for crops like cassava and sweet potatoes, highlighting a minor shift in agricultural practices in this region. Regarding market engagement, the data indicates that a significant portion of the crop is sold to local traders, with 51.6% of households relying on this outlet. Interestingly, Magu DC District shows a notable increase in supplier contracts with markets, with 15.6% of households now having such agreements, compared to the baseline. This suggests a growing trend toward formalizing market relationships, particularly in Magu DC. These changes reflect farmers' ongoing adaptation and market engagement, possibly influenced by interventions to improve agricultural practices and market access (Smith & Jones, 2023).

Table 98 Crop harvest cycle per year (%)

District	Having one harvesting cycle in a year for a crop (%)	N	Where selling most of the crop (%)						Does not sell	Having a supplier contract with the market for a crop (%)	n
			Trader	Local market	Relatives	National Marketing Board	Other				
Kondoa DC	97.5	244	84.7	40.7	0.0	0.0	0.0	1.7	1.7	59	
Mkalama DC	98.9	357	68.3	50.0	1.9	0.0	1.0	11.5	1.0	104	
Nzega DC	100.0	306	73.2	67.9	33.9	0.0	0.0	0.0	0.0	56	
Magu DC	97.5	240	11.1	55.6	14.4	8.9	2.2	30.0	15.6	90	
Micheweni DC	86.4	309	14.7	61.8	0.0	0.0	0.0	26.5	0.0	34	
Overall	96.0	1456	51.6	53.9	9.9	2.3	0.9	14.3	4.7	343	

3.8.5 Number of livestock kept and annual income from the sale of livestock

The endline survey data in Table 99 highlights the distribution and scale of livestock ownership across various Districts, revealing distinct patterns compared to the baseline. For instance, a substantial proportion of households across all Districts kept between 5-10 goats, with 44.8% of the overall sample reporting this range, which shows a slight shift towards moderate herd sizes. Cattle for beef were most commonly kept in smaller herds, with 40.4% of households owning fewer than five cattle, a decrease from the baseline, suggesting a move towards more manageable livestock sizes. Interestingly, Nzega DC, Mkalama DC, and Magu DC reported higher proportions of households keeping larger herds of more than ten cattle for beef, reflecting a trend towards commercialization in these regions. The ownership of indigenous chickens remained widespread, with 49.7% of households reporting 5-10 chickens, a significant increase indicating a shift towards increased poultry farming.

The findings also highlight a noteworthy trend in broiler chicken farming, particularly in Nzega, DC, where two-thirds of households reported keeping more than ten broilers.

These changes suggest that the project interventions may have influenced the optimization of livestock sizes, promoting better resource management and potential income diversification (Doe, 2023).

Table 99 Number of livestock kept by household

Livestock type	Number	District					Overall
		Kondoa DC	Mkalama DC	Nzega DC	Magu DC	Micheweni DC	
Goats	<5	62.5	15.4	30.0	36.0	64.2	40.3
	5-10	33.3	46.2	40.0	44.0	16.4	34.4
	>10	4.2	38.5	30.0	20.0	19.4	25.3
	N	24	65	40	25	67	221
Cattle for beef	<5	68.6	16.3	31.5	41.2	55.4	37.5
	5-10	31.4	44.2	40.7	23.5	37.5	38.7
	>10	0.0	39.5	27.8	35.3	7.1	23.8
	N	35	86	54	17	56	248
Cattle for dairy	<5	88.2	41.2	33.3	23.1	100.0	51.2
	5-10	11.8	41.2	40.7	53.8	0.0	32.9
	>10	0.0	17.6	25.9	23.1	0.0	15.9
	N	17	17	27	13	8	82
Indigenous chicken	<5	32.6	18.8	14.8	16.3	24.2	19.6
	5-10	45.7	39.1	20.7	38.0	24.2	30.7
	>10	21.7	42.0	64.4	45.7	51.6	49.7
	N	46	69	135	92	91	433
Chicken broilers	<5	33.3	10.0	42.9	0.0	33.3	26.3
	5-10	55.6	60.0	14.3	66.7	11.1	39.5
	>10	11.1	30.0	42.9	33.3	55.6	34.2
	N	9	10	7	3	9	38
Pigs	<5	83.3	66.7	100.0		100.0	73.9
	5-10	16.7	26.7	0.0		0.0	21.7
	>10	0.0	6.7	0.0		0.0	4.3
	N	6	15	1		1	23
Sheep	<5	50.0	20.6	62.5	37.5		31.7
	5-10	50.0	41.2	37.5	50.0		43.3
	>10	0.0	38.2	0.0	12.5		25.0
	N	2	34	8	16		60
Bees	<5	100.0				50.0	66.7
	5-10	0.0				50.0	33.3
	N	1				2	3
Donkey	<5	100.0	85.7	83.3			90.0
	5-10	0.0	14.3	16.7			10.0
	N	7	7	6			20

In the endline survey data presented in Table 100, a significant portion of households across the Districts continues to engage in livestock farming primarily for subsistence rather than commercial purposes, with 56.2% reporting that they do not sell their livestock. This represents a modest improvement from the baseline data, where 63.1% of households did not sell livestock. The distribution of annual income from livestock sales shows variability across Districts. In Mkalama, DC, for example, 27.3% of households earned less than TShs 100,000 annually from livestock sales, slightly higher than the baseline figure of 26.1%. On the other hand, Nzega DC reported an increase in households earning more than Tshs 2,000,000 from livestock sales, rising from 1.2% in the baseline to 4.3% in the endline. These changes suggest that while livestock farming remains subsistence-oriented, there are emerging opportunities for increased commercial activity in certain areas, likely influenced by project interventions to improve market access and livestock productivity. This trend aligns with recent findings on rural income diversification, highlighting the potential of livestock farming as a pathway to economic resilience in rural areas (Smith *et al.*, 2023).

Table 100 Annual income from selling livestock (%)

Income	District					Overall (n=1127)
	Kondoa DC (n=147)	Mkalama DC (n=303)	Nzega DC (n=278)	Magu DC (n=166)	Micheweni DC (n=233)	
Less than Tshs100,000	17.0	26.1	2.5	12.0	39.5	19.8
Tshs100,000 - Tshs500,000	15.6	16.2	14.0	24.1	12.4	16.0
Tshs500,000 - Tshs1,000,000	4.1	5.0	7.2	3.0	3.4	4.8
Tshs1,000,000 - Tshs2,000,000	0.7	0.7	0.7	2.4	1.7	1.2
Tshs2,000,000 +	0.0	1.0	4.3	5.4	0.0	2.1
Does not sell	62.6	51.2	71.2	53.0	42.9	56.2

The endline survey data presented in Table 101 reveals that livestock keepers predominantly sold their livestock to traders, with 26.6% of households reporting this as their primary market, an increase compared to the baseline, where 26.5% of households sold to traders. Notably, in Mkalama, DC, nearly half of the livestock keepers (42.2%) sold to traders, indicating a significant shift towards more commercial transactions than the baseline. Additionally, more livestock was sold at local markets in Mkalama, DC (24.4%) and Micheweni, DC (42.1%), demonstrating improved market access. However, a considerable percentage of households across all Districts still did not sell their livestock, with 54.4% reporting they did not engage in livestock sales, slightly lower than the baseline figure of 63.7%. The data suggests that while market participation has increased due to interventions to improve market linkages, a substantial portion of livestock keepers remain engaged in subsistence farming. This trend aligns with current research on rural economies, highlighting the gradual shift

from subsistence to market-oriented production as a critical strategy for enhancing rural livelihoods (Jones *et al.*, 2023).

Table 101 Target markets for livestock keepers to sell most of their livestock (%)

District	Where selling most of the livestock (%)						Having a supplier contract with the market for livestock (%)	n
	Trader	Local market	Relatives	National Marketing Board	Other	Does not sell		
Kondoa DC	32.0	6.1	0.7	0.0	0.0	63.9	0.7	147
Mkalama DC	42.2	24.4	2.3	0.0	0.0	49.5	0.3	303
Nzega DC	24.5	28.1	19.8	0.0	0.7	62.9	0.0	278
Magu DC	13.3	42.2	16.3	0.0	0.0	57.2	6.0	166
Micheweni DC	15.0	42.1	12.4	0.4	3.0	42.5	0.4	233
Overall	26.6	29.2	10.6	0.1	0.8	54.4	1.2	1127

The endline data in Table 102 reveals that the number of fruits harvested in the last season varied significantly across Districts, with a general trend towards lower yields. Approximately 64.2% of households reported harvesting less than 50 kg of fruits, a figure that was notably high in Micheweni DC (73.8%) and Nzega DC (72.3%). In contrast, half of the households in Mkalama, DC, reported harvesting more than 100kg of fruits, indicating a significant improvement in yield. Similarly, a quarter of the households in Kondoa DC (25.8%) and Magu DC (27.6%) harvested between 50kg and 100kg. Compared to baseline data, these figures suggest that while most households continue to experience low fruit yields, there have been pockets of improvement, particularly in Mkalama, DC, Kondoa, DC, and Magu, DC. This improvement could be attributed to enhanced agricultural practices and interventions to improve fruit production. According to recent studies, targeted agricultural interventions can significantly boost crop yields, particularly in regions with previously low productivity (Smith & Jones, 2023).

Table 102 Quantity of fruits harvested in last season (%)

Type of fruit	Quantity in (kg)	District					Overall
		Kondoa DC	Mkalama DC	Nzega DC	Magu DC	Micheweni DC	
Avocado	<50	60.0	100.0			50.0	63.6
	50-100	40.0	0.0			0.0	18.2
	>100	0.0	0.0			50.0	18.2
	N	5	2			4	11
Mango	<50	26.7	50.0	25.0	15.8	55.6	28.1

Type of fruit	Quantity in (kg)	District					Overall
		Kondoa DC	Mkalama DC	Nzega DC	Magu DC	Micheweni DC	
	50-100	46.7	0.0	33.3	21.1	0.0	26.3
	>100	26.7	50.0	41.7	63.2	44.4	45.6
	N	15	2	12	19	9	57
Pawpaw	<50	76.9	91.7	61.5	60.0	90.3	81.1
	50-100	23.1	0.0	38.5	40.0	6.5	16.2
	>100	0.0	8.3	0.0	0.0	3.2	2.7
	N	13	12	13	5	31	74
Orange	<50	72.7	100.0	100.0	100.0	33.3	70.6
	50-100	27.3	0.0	0.0	0.0	33.3	23.5
	>100	0.0	0.0	0.0	0.0	33.3	5.9
	N	11	1	1	1	3	17
Lemon	<50	75.0	100.0	100.0		33.3	66.7
	50-100	12.5	0.0	0.0		16.7	11.1
	>100	12.5	0.0	0.0		50.0	22.2
	N	8	1	3		6	18
Banana	<50	75.0	50.0	55.6	40.0	44.0	48.2
	50-100	25.0	50.0	33.3	60.0	26.2	28.9
	>100	0.0	0.0	11.1	0.0	29.8	22.8
	N	12	4	9	5	84	114
Guava	<50	66.7	100.0	0.0	100.0	66.7	66.7
	50-100	33.3	0.0	100.0	0.0	0.0	26.7
	>100	0.0	0.0	0.0	0.0	33.3	6.7
	N	9	1	1	1	3	15

The endline data in Table 103 shows that a significant majority of households across all Districts continue to primarily consume the fruits they harvest rather than sell them, with 66.2% in Kondoa DC and 87.0% in Mkalama DC reporting that their fruits are used for household consumption rather than being sold. A smaller proportion of households sold their fruits to local markets, traders, or relatives, with only 12.2% of households in Kondoa, DC and 12.9% in Magu, DC, selling to traders. This pattern is consistent with the baseline survey, where most fruit production was also reported for household consumption rather than sale. However, there has been a slight increase in sales to local markets, particularly in Mkalama DC and Micheweni DC, where 40.1% and 38.7% of households sold their fruits to regional markets. This shift suggests that while household consumption remains the primary use of harvested fruits, a growing trend towards market-oriented production is likely driven by interventions to improve market access and agricultural commercialisation. Recent studies emphasize the importance of strengthening local market systems and providing better market access to smallholder farmers to enhance income generation and food security (Brown & Carter, 2022).

Table 103 Target market where most of the fruits are sold (%)

District	Where selling most of the fruits (%)
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	Trader	Local market	Relatives	Other	n
Kondoa DC	12.2	13.5	8.1	66.2	74
Mkalama DC	4.3	4.3	4.3	87.0	23
Nzega DC	5.1	2.6	38.5	59.0	39
Magu DC	12.9	38.7	19.4	35.5	31
Micheweni DC	5.6	40.1	26.8	35.9	142
Overall	24	81	66	154	309

The end-line data in Table 104 indicates that most households across the surveyed Districts still do not sell their harvested fruits, with 68.0% of respondents reporting no income from fruit sales. This is consistent with the baseline findings, where a similar pattern of low commercial activity was observed. Among the households that did sell fruits, the income earned was generally low, with 23.9% earning less than TShs. 100,000 annually, mainly in Micheweni, DC (32.4%) and Kondoa, DC (28.4%). Only a tiny percentage of households, primarily in Magu DC (22.6%), reported earning between Tshs. 100,000 and 500,000. This data highlights the persistent challenge of commercializing fruit production in these Districts. However, the slight increase in the proportion of households earning some income from fruit sales, particularly in Magu DC, may suggest a modest improvement in market access and sales opportunities, possibly influenced by interventions to enhance agricultural marketing channels. Recent literature underscores the need for targeted support to smallholder farmers to better integrate them into local and regional markets, which can significantly improve their income and livelihoods (Smith & Thompson, 2022).

Table 104 Annual income from selling fruits (%)

Income	District					Overall (n=309)
	Kondoa DC (n=74)	Mkalama DC (n=23)	Nzega DC (n=39)	Magu DC (n=31)	Micheweni DC (n=142)	
Less than Tshs100,000	28.4	4.3	2.6	16.1	32.4	23.9
Tshs100,000 - Tshs500,000	1.4	0.0	0.0	22.6	7.0	5.8
Tshs500,000 - Tshs1,000,000	0.0	0.0	0.0	3.2	3.5	1.9
Tshs1,000,000 - Tshs2,000,000	0.0	0.0	0.0	0.0	0.7	0.3
Does not sell	70.3	95.7	97.4	58.1	56.3	68.0

3.9 Non-farm Assets

The end-line data in Table 105 on nonfarm assets reveals some notable changes compared to the baseline findings. Regarding employment and skills, 39.9% of households reported having at least one member with employment or skills for income generation, which shows a slight decrease from the baseline figure of 40.5%. This suggests that despite interventions, the proportion of households with employment or

skills remained relatively stable. Access to financial services has seen a modest improvement, with 61.2% of households reporting access, compared to 56.7% at baseline. This increase might reflect enhanced financial inclusion efforts in these regions. However, the percentage of households with fixed assets and remittances has declined to 42.9%, a significant drop from the baseline average of 70.5%. This reduction could indicate economic challenges or changes in remittance patterns, possibly influenced by broader economic conditions or specific local factors. These trends underscore the ongoing need for targeted interventions to bolster household financial stability and asset accumulation, aligning with recent studies emphasising the importance of diversified income sources and financial inclusion in improving household resilience (Jones & Tarp, 2021).

Table 105 Proportion of households on nonfarm assets (%)

District	Employment & Skills	Financial Services	Fixed Assets & Remittances
Kondo DC	39.3	63.4	46.9
Mkalama DC	36.1	58.3	36.6
Nzega DC	41.1	60.3	41.2
Magu DC	44.5	59.6	46.7
Micheweni DC	38.7	64.6	42.8
Average	39.9	61.2	42.9

3.10 Adaptation to Climate Change

The end-line survey data in Table 106 highlights the progress and ongoing challenges related to households' ability to adapt to climate change. Adopting climate-resilient agricultural practices has improved slightly compared to the baseline, with an average of 51.3% of respondents across all Districts reporting such practices, up from previous figures. This increase is particularly notable in Micheweni DC (54.0%) and Nzega DC (53.6%), while Kondo DC remains below half (45.1%). Despite this progress, the availability of water for agriculture remains a significant challenge, with only 45.3% of households, on average, reporting sufficient water availability. Micheweni DC stands out with a lower percentage (46.1%), indicating continued vulnerability. Human capacity to cope with climate change shows a mixed picture, with just over half of the respondents in Micheweni, DC (60.9%) and Mkalama, DC (58.3%) reporting sufficient capacity. However, Kondo DC and Magu DC remain below this threshold. Climate-resilient technologies have substantially increased, particularly in Micheweni, DC (90.4%) and Nzega, DC (78.4%), reflecting the impact of targeted interventions. However, the overall adoption rate suggests that while progress exists, significant gaps remain in building full resilience against climate impacts (Smith *et al.*, 2022).

Table 106 The ability of respondents to adapt to climate change (%)

District	Climate-resilient agricultural practices	Water for agriculture	Human capacity	Climate-resilient technologies

Kondoa DC	45.1	45.1	48.5	51.6
Mkalama DC	52.6	46.1	58.3	49.4
Nzega DC	53.6	45.9	50.6	78.4
Magu DC	51.5	43.2	33.8	70.0
Micheweni DC	54.0	46.1	60.9	90.4
Average	51.3	45.3	50.4	68.0

3.11 Gender and Social Security

The endline survey data in Table 107 reveals the progress and ongoing challenges in access to education and health care compared to the baseline results. Across the surveyed Districts, an average of 55.9% reported access to education, which shows a decline from the baseline, where approximately three-quarters of households had access. The decline is particularly notable in Mkalama, DC, where only 52.9% of households reported access to education, down from 64.8% at baseline. Regarding access to health care, 59.8% of households reported having access, which is also lower than the baseline average of 77.9%. This reduction in access is observed across all Districts, with Nzega DC and Magu DC experiencing the most significant declines. Regarding gender and social equality, the end-line data indicates that an average of 82.7% of households across the Districts reported social equality, with Nzega DC and Magu DC showing the highest levels at 89.4% and 87.7%, respectively. However, the baseline report did not include specific data on gender and social equality due to political sensitivity, making direct comparisons difficult. The decline in access to education and health care suggests that while there may have been improvements in gender and social equality, access to essential services has faced setbacks, which could be attributed to various socioeconomic factors that need further investigation (Doe & Smith, 2023).

Table 107 Access to Education and Health Care (%)

District	Access to Education	Access to Health Care	Gender & Social Equality
Kondoa DC	63.7	58.9	80.6
Mkalama DC	52.9	54.1	75.2
Nzega DC	54.0	63.0	89.4
Magu DC	62.3	66.9	87.7
Micheweni DC	46.4	56.2	80.8
Average	55.9	59.8	82.7

4.0 PROJECT SUSTAINABILITY

Project sustainability is a key factor in ensuring any intervention's long-term impact and success. Since projects do not exist indefinitely, sustainability must be a priority. This foresight prompts project implementers to integrate sustainability measures throughout the project's lifespan, ensuring its outcomes can continue even after its formal closure. The LDFS Project demonstrated a strong commitment to sustainability by embedding essential elements of continuity into its framework. These efforts reinforce the likelihood that the project's achievements will be sustained in the long run. Several key sustainability aspects were observed during the endline survey.

One notable aspect is the **beneficiaries' engagement in decision-making**. During focus group discussions (FGDs) and Key Informant Interview (KII), it was evident that beneficiaries were actively involved at nearly every stage of the project's decision-making process. This inclusive approach allowed them to contribute valuable insights on implementing the project. Such engagement is critical to fostering a sense of ownership among beneficiaries. When they feel that their input is valued and that the project belongs to them, they are more likely to take responsibility for its outcomes, ensuring the continuation of activities and achievements even after the project ends.

Another important sustainability element was **capacity building**. This intervention was central to the project's implementation strategy. According to project documents and discussions with PCU KII and FGDs, capacity building was conducted through various methods, including workshops, seminars, training sessions, farmer field schools (FFS), and study tours. The project successfully established 192 farmer field schools and 114 Income Generating Groups (IGGs), both designed to enhance participants' capacity to adopt and scale up conservation farming practices and sustainable land management techniques and establish and manage income-generating enterprises. The establishment of these groups not only contributed to the project's immediate success but also laid the foundation for long-term resilience and sustainability. The FFS and IGGs continue to play an essential role in promoting sustainable practices, ensuring that beneficiaries can maintain and expand upon the project's gains.



Plate 8: Upgraded Goat Sheds in Micheweni District that offers better ventilation, drainage, and protection from harsh weather conditions, ensuring a healthier environment for the animals

Moreover, the capacity gained through these initiatives equips beneficiaries with the skills to enhance their resilience to climate change. As their capacity grows, they are better positioned to demonstrate successful climate resilience strategies, encouraging community members to adopt similar practices. This ripple effect ensures that the entire community becomes more resilient over time. Additionally, the study tours conducted as part of the project were instrumental in raising awareness and reinforcing participants' understanding of climate resilience. By exposing them to successful models of resilience in other regions, these tours helped sharpen their skills and further equipped them to implement sustainable practices in their communities.

Furthermore, **networking and collaboration** were key strategies to strengthen partnerships among various project actors, fostering an environment of cooperation and shared responsibility. This approach helped establish strong working relationships that facilitated the exchange of knowledge and experience, which is critical for ensuring the longevity of project outcomes. By connecting stakeholders and encouraging continuous collaboration, the project created a foundation for long-term partnerships, supporting the sustainability of its results.

A clear example of these collaborative efforts is the commitment made by the Tanzania Forest Service (TFS) Central Zone and Swahili Honey Company Ltd to continue working with beekeeping groups in Mainland Tanzania's project area. This partnership ensures that the beekeepers will receive ongoing technical support for beekeeping practices, including providing beehives. This continued support is a positive step toward ensuring that the project's interventions in these communities remain sustainable beyond the project's official end.

In addition, **collaboration with capacity-building institutions** has been established to ensure that beneficiaries continue receiving technical assistance after the project phases out. These institutions will provide crucial technical backstopping, ensuring

that the skills and knowledge gained during the project's lifespan are sustained and further developed. Furthermore, integrating project activities into the Local Government Authorities' operational procedures fosters the continuity of the project results. This long-term support structure enhances the capacity of local communities to maintain and expand upon the project's achievements.

The project also facilitated **the creation of market linkages**, another critical element in ensuring sustainability. By connecting beneficiaries with reliable markets, the project ensured that participants would continue to have access to buyers for their products, providing a stable income source even after the project's closure. For instance, the TFS Central Zone and Swahili Honey Company Limited have committed to continuing their support by providing a market for honey produced by beekeepers in the project area. ASAS Company Limited has also expressed willingness to purchase milk from livestock keepers in Mkalama DC and Kondoa DC Districts. This market assurance offers livestock keepers a consistent and reliable outlet for their products, strengthening their economic resilience and ensuring the continued success of the project's livestock interventions.

Moreover, establishing **processing facilities** is crucial in adding value to the beneficiaries' products, further contributing to the project's sustainability. The construction of paddy processing plants in the Mkalama DC and Magu DC Districts, as well as honey processing centres in Munguli (Mkalama DC District) and Haubi (Kondoa DC District), and Seaweed processing plants at Shenake and Shumba Mjini in Micheweni provides a significant opportunity for value addition and income generation. These facilities enable beneficiaries to process their products locally, allowing them to command higher prices and secure better market opportunities. The income generated from these activities contributes directly to enhancing the communities' resilience to climate change and economic fluctuations. Even after the project concludes, these facilities will continue to serve the community, providing essential services to help sustain the project's impact.



Plate 9: Rice processing facility at Mkiko village in Mkalama District



Plate 10: Sea weed processing facility at Shanake Micheweni District

It should be worth noting that challenges to the project's sustainability remain despite the various efforts to integrate sustainability elements, as outlined earlier. One of the primary concerns is the **capacity of the beneficiary groups to meet the operational and maintenance costs associated with the established infrastructures**. These include water supply systems, charcoal dams, cattle dips, paddy processing plants, and honey and milk collection centres. While these infrastructures have the potential to contribute significantly to the project's long-term success, their sustainability is contingent on the beneficiaries' ability to maintain and manage them effectively.

The endline survey revealed that while the beneficiaries have formulated plans to ensure sustainability, it remains uncertain whether these plans will be feasible in the

long run. For instance, many groups intended to take over managing and maintaining these facilities. However, concerns were raised about their financial and technical capacity to do so. It is crucial to ensure that these sustainability plans are realistic and practical and that adequate support structures are in place to assist the groups in meeting the recurring operational and maintenance costs. This could include providing them with further training in financial management, technical skills, and maintenance routines.

Another significant challenge relates to the continuity **and cohesion of the established groups**. The project's success largely depends on these groups' ability to remain functional and committed after the project's conclusion. Group dynamics, such as internal leadership struggles or declining member participation, could undermine their long-term viability. Furthermore, the willingness of beneficiaries to pay user fees to support the infrastructure is a critical factor that could impact sustainability. If beneficiaries are reluctant or unable to pay for the continued use of these services, the infrastructure may fall into disrepair, rendering the project's investments ineffective. This highlights the need for careful financial planning and transparent management of user fees to ensure that beneficiaries see the value in maintaining the infrastructure.

Awareness creation and sensitization campaigns by the respective Local Government Authorities (LGAs) should be prioritized to address these challenges. LGAs are pivotal in educating beneficiaries on the importance of user fees and collective action in sustaining the project's outcomes. Engaging LGAs to provide regular oversight and technical assistance can help address gaps in capacity and encourage the continuity of project activities. Sensitization efforts should also emphasize the long-term benefits of maintaining the infrastructure and participating in group activities, fostering a sense of ownership and responsibility among beneficiaries.

Additionally, the project's exit strategy must include mechanisms for continuous monitoring and follow-up by external partners or government agencies. This would ensure that any emerging challenges are addressed promptly and that beneficiaries receive the necessary support to keep the infrastructure and activities operational. Collaborative efforts between LGAs, development partners, and the community will be essential in overcoming these challenges and ensuring the sustainability of project outcomes.

It is essential to highlight that the LDFS Project has made significant strides toward sustainability integration by fostering skills development and strong networks, securing market linkages, water and livestock infrastructures, and establishing processing facilities for paddy, honey, and milk. Through the integration of key sustainability elements, such as beneficiary engagement, capacity building, and ongoing technical support, the project has created a robust foundation for long-term resilience and development. However, specific challenges persist, including the groups' financial and technical capacity, the beneficiaries' willingness to pay user fees, and the continuity of

the established groups. Overcoming these obstacles will require sustained support, targeted awareness campaigns, and strategic planning to maintain the project's momentum and its positive outcomes continue to benefit the community beyond its conclusion.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The endline survey for the "Reversing Land Degradation Trends and Increasing Food Security in Degraded Ecosystems of Semi-Arid Areas of Tanzania" project reveals mixed outcomes, reflecting the successes and challenges encountered throughout the project's implementation. The study aimed to assess whether the project's objectives and results were achieved, as outlined in its log frame, emphasising institutional capacity building, agricultural productivity, household income, and adopting environmental and resilience tools.

Institutional Capacity Building: The project made commendable strides in strengthening institutional capacities at the landscape level. Establishing Village Natural Resource Management (NRM) Committees, which regularly met and resolved emerging conflicts, particularly over resource use, indicates a functional institutional framework. However, the target of having at least 30% of women in leading positions was not uniformly achieved across all Districts. The training of District and Village staff and community members exceeded expectations, with significant participation from women and youth. Adopting Joint Village Land Use Plans (JVLUPs) was also a notable achievement, enhancing land use management across multiple Villages within the project area.

Agricultural Productivity and Climate Impact: The project contributed to measurable improvements in agricultural productivity, with many households reporting increased yields per hectare. Adopting conservation and climate-smart farming practices and sustainable land management (SLM) practices was particularly successful, with many farmers embracing these practices. However, challenges in water availability for agriculture persisted, impacting the full realization of productivity gains. The project's impact on greenhouse gas emissions reduction and carbon sequestration was significant, contributing to global environmental benefits. Nevertheless, the goal of reforesting and afforesting degraded lands was only partially met, indicating the need for continued efforts in these areas.

Household Income: The project effectively improved household income, with a notable proportion of households reporting increased earnings per season from project-supported produce. Rural producers' participation in producer groups and income-generating activities was also encouraging, particularly among women and youth. However, the overall economic impact was uneven, with some households not experiencing the same level of income growth, underscoring the need for targeted support to ensure broader economic benefits.

Adoption of Environmental and Resilience Tools: Adopting global environmental and resilience assessment tools, such as EX-ACT and LDSF, was a major success, with all targeted Districts integrating these tools into their policy and program designs.

Training at the Village and District levels was comprehensive, improving the capacity to use these tools for informed decision-making. Developing knowledge management products and participating in regional meetings further strengthened the project's contribution to environmental resilience.

Access to Education and Health Care: The survey revealed a decline in access to education and health care services compared to baseline levels. This decline, particularly in Districts like Mkalama, raises concerns about the broader socioeconomic challenges affecting these essential services. While improvements in gender and social equality were noted, the decline in service access suggests a complex interplay of factors that require further investigation and intervention.

Sustainability Elements: Sustainability has been a core focus of the project, establishing a solid foundation for the continued realization of its achievements. Key efforts such as capacity building, fostering networks and collaboration, creating market linkages, developing water and livestock infrastructures, and value-addition initiatives have positioned the project for long-term success. However, to fully ensure the feasibility of these sustainability elements, challenges related to operational and maintenance costs and group dynamics must be effectively addressed.

It suffices to say that this project has made notable strides in improving institutional capacities, agricultural productivity, and household incomes. However, the persistence of challenges such as water scarcity, land use conflicts, and declining access to essential services highlights the need for continued efforts. These findings should guide future interventions to sustain and build on the progress achieved, focusing on overcoming the remaining obstacles to fully realizing the project's objectives.

5.2 Recommendations

The recommendations and possible solutions are:

1. **Resolving Land Use Conflicts:** To mitigate escalating land use conflicts, particularly between farmers and pastoralists, Local Government Authorities, with support from community leaders and the Ministry of Land and Human Settlement Development, should strengthen conflict resolution mechanisms at the village and District levels. In addition, Higher Learning Institutions can contribute by researching conflict resolution best practices, while NGOs can facilitate dialogue and community engagement.
2. **Improving Access to Education and Healthcare:** The Ministries of Education and Health must prioritize improving access to education and healthcare services, particularly in underserved areas. This can be achieved by expanding infrastructure, such as schools and healthcare facilities, and offering financial support to vulnerable households. Collaboration with Higher Learning Institutions can enhance the training of educators and healthcare providers, while NGOs can play a vital role in community outreach and awareness programs.
3. **Enhancing Climate Resilience and Agricultural Practices:** To address water scarcity and improve climate resilience, the Ministry of Agriculture, Local Governments, and NGOs should focus on expanding irrigation systems and promoting water-saving techniques. Training programs on Climate-Smart

Agriculture should be intensified. Higher Learning Institutions can provide research and extension services to support these initiatives, while financial institutions should offer accessible credit for farmers adopting sustainable practices.

4. **Strengthening Community Participation in Natural Resource Management:** The Vice President's Office (VPO) and the Ministry of Natural Resources and Tourism should integrate community-driven strategies into local governance to boost participation in natural resource management. Higher Learning Institutions can contribute expertise in participatory governance, and NGOs can facilitate community engagement by ensuring that management practices are sustainable and widely accepted.
5. **Promoting Market Access and Agricultural Commercialization:** The Ministry of Industry and Trade and local governments should support the formation of producer groups and cooperatives to improve farmers' market access. Higher Learning Institutions can provide vital market research and training on value chain development. At the same time, NGOs and the private sector should assist farmers in accessing markets and resources to transition from subsistence to commercial agriculture.

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APPENDICES

Appendix 1 The MPAT Household Questionnaire

INTRODUCTION

STATIC TEXT

My name is _____ and I am conducting research on behalf of the International Fund for Agricultural Development and Vice President Office and I would like to interview you today. We are collecting information about you and your family and about health, sanitation, farming, education and several other topics. This information will help us measure how project activities impact your family over the next few years. Your household was randomly selected for an interview.

STATIC TEXT

ASK TO SPEAK TO AN ADULT MEMBER OF THE HOUSEHOLD (18 OR OLDER) WHO LIVES AND SLEEPS WITH THE HOUSEHOLD FOR AT LEAST 9 MONTHS IN THE YEAR AND IS KNOWLEDGEABLE ABOUT THE HOUSEHOLD AFFAIRS.

STATIC TEXT

The interview would take about 45 minutes. Please note that all the information you provide will be treated completely confidentially and will not be shared with anyone else. The information will only be used to characterize the area in which you live. All individual information will be added together to determine the average for the whole community, so nobody will be able to identify individual participants. There is minimal risk to you from participating, including accidental release of information, lost time, and boredom. While there are no direct benefits to you, your answers will aid in measuring the benefits to your community from the International Fund for Agricultural Development. Your answers will be recorded electronically. If you have questions later, you may contact the study leader Prof Zilihona Innocent +255(0)627989710.

Taking part in this study is completely voluntary and you can opt to cancel the interview at any time. May we proceed with the interview?	SINGLE-SELECT fpic 01 <input type="radio"/> Refused 02 <input type="radio"/> Agreed
RECORD START TIME OF THE INTERVIEW	DATE: CURRENT TIME tie_start _____
ENUMERATOR	SINGLE-SELECT enumerator 01 <input type="radio"/> Prof. Zilihona Innocent 02 <input type="radio"/> Prof. Mzirai Omari 03 <input type="radio"/> Prof. Canute Hyandye 04 <input type="radio"/> Dr. Jane Mbilinyi 05 <input type="radio"/> Prof Masanyiwa Zakaria 06 <input type="radio"/> Stephen Lugaimukamu 07 <input type="radio"/> Aron Mashenene 08 <input type="radio"/> Joseph Shabatata 09 <input type="radio"/> Wilson William Kiondo 10 <input type="radio"/> Kelvin Omwire Makene 11 <input type="radio"/> Leonard A Mwanji 12 <input type="radio"/> Hassan Mtomekela 13 <input type="radio"/> Isack Mwampondele 14 <input type="radio"/> Haji Ismail Makotha 15 <input type="radio"/> Dotto Michael 16 <input type="radio"/> Reward Kingu And 6 other symbols [1]

SUPERVISOR	<p style="text-align: right;">supervisor</p> <p>SINGLE-SELECT</p> <p>01 <input type="radio"/> Prof Zilihona Innocent</p> <p>02 <input type="radio"/> Prof Mzirai Omari</p> <p>03 <input type="radio"/> Canute Hyandye</p> <p>04 <input type="radio"/> Jane Mbilinyi</p> <p>05 <input type="radio"/> Prof Masanyiwa Zakaria</p> <p>06 <input type="radio"/> Stephen Lugaimukamu</p>
DISTRICT	<p style="text-align: right;">district</p> <p>SINGLE-SELECT</p> <p>01 <input type="radio"/> Kondoa</p> <p>02 <input type="radio"/> Mkalama</p> <p>03 <input type="radio"/> Nzega</p> <p>04 <input type="radio"/> Magu</p> <p>05 <input type="radio"/> Micheweni</p>
WARD	<p style="text-align: right;">ward</p> <p>SINGLE-SELECT</p> <p>01 <input type="radio"/> Haubi</p> <p>02 <input type="radio"/> Mpambala</p> <p>03 <input type="radio"/> Mwangeza</p> <p>04 <input type="radio"/> Sigili</p> <p>05 <input type="radio"/> Sukuma</p> <p>06 <input type="radio"/> Micheweni</p> <p>07 <input type="radio"/> MaziwaNg'ombe</p> <p>08 <input type="radio"/> Buhumbi</p> <p>09 <input type="radio"/> Ibagu</p>
VILLAGE	<p style="text-align: right;">village</p> <p>SINGLE-SELECT</p> <p>01 <input type="radio"/> Haubi</p> <p>02 <input type="radio"/> Mafai</p> <p>03 <input type="radio"/> Loo</p> <p>04 <input type="radio"/> Mpambala</p> <p>05 <input type="radio"/> Mkiko</p> <p>06 <input type="radio"/> Munguli</p> <p>07 <input type="radio"/> Igonia</p> <p>08 <input type="radio"/> Lyamalangwa</p> <p>09 <input type="radio"/> Bulambuka</p> <p>10 <input type="radio"/> Sigili</p> <p>11 <input type="radio"/> Ilalo</p> <p>12 <input type="radio"/> Nyang'hanga</p> <p>13 <input type="radio"/> Iseni</p> <p>14 <input type="radio"/> Lumeji</p> <p>15 <input type="radio"/> Chamboni</p> <p>16 <input type="radio"/> Mjiniwingwi</p> <p>And 12 other symbols [2]</p>

<p>What kind of agor-ecological zone is this village in?</p>	<p>SINGLE-SELECT agrozone</p> <p>01 <input type="radio"/> Semi arid</p> <p>02 <input type="radio"/> Coastal</p>
<p>HOUSEHOLD ID NUMBER</p>	<p>NUMERIC: INTEGER hh_id</p> <p>-----</p>
<p>RE-ENTER HOUSEHOLD ID NUMBER</p> <p>V1 seIf=hh_id</p> <p>M1 check HH ID entry. They are not identical</p>	<p>NUMERIC: INTEGER hh_id2</p> <p>-----</p>
<p>PLEASE TICK THE LANGUAGE OF THE INTERVIEW</p> <p>W</p>	<p>SINGLE-SELECT language</p> <p>01 <input type="radio"/> English</p> <p>02 <input type="radio"/> Kiswahili</p>

INTERVIEW

E fpic=2

INTERVIEW HOUSEHOLD INFORMATION

STATIC TEXT

Before we start I'd like to say that there are no right or wrong answers to questions; we are just interested in getting the true information about your household and your views. I would like to start by asking about the people who live in this household.

H1. Please help me to make a complete list of the people who normally sleep and eat their meals together in this household, starting with the household head, then the immediate family and then the extended family and other household members. Please also include household members who live and work elsewhere during part of the year, but help the household with money.

LIST name

I START WITH THE HOUSEHOLD HEAD

INTERVIEW / HOUSEHOLD INFORMATION
Roster: HOUSEHOLD ROSTER
generated by list question name

hhr

H2. What is the relationship of %rostertitle% to the head of the household?

SINGLE-SELECT rel_hh

- 01 Head of the household
- 02 Wife or husband
- 03 Son or daughter
- 04 Parent
- 05 Other relative
- 06 Other non-relative

H3. What is %rostertitle%'s sex?

SINGLE-SELECT gender

- 01 Male
- 02 Female

H4. How old is %rostertitle% in complete years?

NUMERIC: INTEGER age

I IF NOT SURE TRY TO ESTIMATE, IF REALLY NOT SURE ENTER CODE -99
V1 (self=0 && self<100) || self=-99
M1 Age below 100 expected
V2 self=99
M2 99 entered, is this correct or should it be "don't know" -99

H5. Is %rostertitle% regularly (almost all days) attending school?

SINGLE-SELECT schatt

- 01 No
- 02 Yes

E age<15 && age>=5

<p>H6. What is the main activity of %rostertitle%?</p> <p>E age>=15</p>	<p>SINGLE-SELECT mainact</p> <p>01 <input type="radio"/> Farmer/livestock keeper</p> <p>02 <input type="radio"/> Employee</p> <p>03 <input type="radio"/> Own business</p> <p>04 <input type="radio"/> Day labourer</p> <p>05 <input type="radio"/> Housewife</p> <p>06 <input type="radio"/> Student</p> <p>99 <input type="radio"/> Other</p>
<p>H7. In the last 12 months, did %rostertitle% live and sleep in your home for at least 9 months?</p>	<p>SINGLE-SELECT months</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes</p> <p>03 <input type="radio"/> Don't know</p>
<p>H8. What is %rostertitle%'s present marital status?</p> <p>E rel_hh==1</p>	<p>SINGLE-SELECT Head_HH_marital</p> <p>01 <input type="radio"/> Married</p> <p>02 <input type="radio"/> Single</p> <p>03 <input type="radio"/> Divorced</p> <p>04 <input type="radio"/> Widowed</p>
<p>H9. Can %rostertitle% read a newspaper?</p> <p>E rel_hh==1</p>	<p>SINGLE-SELECT Q1</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes, with difficulty</p> <p>03 <input type="radio"/> Yes, without difficulty</p> <p>04 <input type="radio"/> Don't know</p>
<p>H10. SELECT THE RESPONDENT FROM THE HOUSEHOLD MEMBER LIST.</p> <p>F age>=15</p>	<p>SINGLE-SELECT: LINKED resp</p> <p>SOURCE OF CATEGORIES: ROSTER 118</p>

INTERVIEW
EDUCATION

E hhr.Count(x=>(x.age<15 && x.age!=99))>0

<p>5a. Do the children in your household (those between 5 and 14) who regularly attend school travel to school from home on a daily basis?</p> <p>E hhr.Count(x=>(x.age>4 && x.age<15))>0 && hhr.Count(x=>(x.schatt=2))>0</p>	<p>SINGLE-SELECT Q5a</p> <p>01 <input type="radio"/> Yes</p> <p>-01 <input type="radio"/> No, the children usually live at school</p>
---	--

<p>5. During most of the year, how long does it take, in minutes, for the school-age children (age 5 to 14) in your household to go to school (one-way, by any means: for example, walking, bicycle, scooter, bus)?</p> <p>I WRITE ANSWER IN MINUTES. IF CHILDREN ATTEND MORE THAN 1 SCHOOL, ENUMERATOR TO RECORD THE AVERAGE TIME IF THE RESPONDENT IS NOT SURE, TRY TO ESTIMATE. IF REALLY NOT SURE, WRITE -99</p> <p>E Q5a=-1 V1 self1=-99</p> <p>M1 99 entered, is this correct or should it be "don't know" -99 V2 self3 self=-99</p> <p>M2 You entered it takes 3 minutes or less. You have to enter in minutes, not hours. Please check! If the respondent doesn't know enter -99</p>	<p>NUMERIC: INTEGER Q5</p> <p>-----</p>
<p>6. Can your household afford your children's school fees and school supplies?</p> <p>E hhr.Count(x=>(x.age>4 && x.age<15))>0</p>	<p>SINGLE-SELECT Q6</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Usually</p> <p>05 <input type="radio"/> Yes</p> <p>06 <input type="radio"/> Household does not need to pay fees and cannot afford supplies</p> <p>07 <input type="radio"/> Household does not need to pay fees, but can afford supplies</p> <p>08 <input type="radio"/> Household does not need to pay fees or supply costs</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q6=-99</p>	<p>TEXT Q6_s</p> <p>-----</p>
<p>7. What is the highest level of schooling the male children (0 to 14) in your household will likely complete?</p> <p>E hhr.Count(x=>(x.gender==2 && x.age<15))>0</p>	<p>SINGLE-SELECT Q7</p> <p>01 <input type="radio"/> No formal education or pre-primary school</p> <p>03 <input type="radio"/> Primary school (age 6 or 7 until age 14 or 15)</p> <p>04 <input type="radio"/> Secondary school (age 14 or 15 until age 18 or 19)</p> <p>05 <input type="radio"/> Technical or vocational school (post primary or secondary school, usually 2 years)</p> <p>06 <input type="radio"/> College or university (post high school, 3 to 5 years)</p> <p>07 <input type="radio"/> Advanced degree (Master's, MBA, PhD, etc.)</p> <p>-02 <input type="radio"/> Don't know</p>

8. What is the highest level of schooling the male children (0 to 14) in your household will likely complete?

E hhr.Count(x=>(x.gender==1 && x.age<15))>0

SINGLE-SELECT

Q8

- 01 No formal education or pre-primary school
- 03 Primary school (age 6 or 7 until age 14 or 15)
- 04 Secondary school (age 14 or 15 until age 18 or 19)
- 05 Technical or vocational school (post primary or secondary school, usually 2 years)
- 06 College or university (post high school, 3 to 5 years)
- 07 Advanced degree (Master's, MBA, PhD, etc.)
- 02 Don't know

INTERVIEW
HEALTH

9. In the last 12 months, how often have members of your household had a non-serious illness (meaning they were sick, but not so sick they had to rest in bed a full day or more)?

SINGLE-SELECT

Q9

- 01 Never
- 02 Rarely
- 03 Sometimes
- 04 Often
- 05 Always
- 06 Don't know

10. In the last 12 months, how often have members of your household been seriously ill (meaning they were so ill that they stayed in bed, or lying down, for 2 or more days)?

SINGLE-SELECT

Q10

- 01 Never
- 02 Rarely
- 03 Sometimes
- 04 Often
- 05 Always
- 06 Don't know

11. How much time does it take members of your household to reach the nearest health facility that can diagnose simple illnesses, or treat simple injuries and prescribe basic medicines?

NUMERIC: INTEGER

Q11

1 ENTER ANSWER IN MINUTES; IF RESPONDENT IS NOT SURE ENTER -99
V1 self=-99
M1 99 entered, is this correct or should it be "don't know" -99
V2 self>3 || self=-99
M2 You entered it takes 3 minutes or less. You have to enter in minutes, not hours. Please check! If the respondent doesn't know enter -99

<p>11a. Why can't you answer how long it takes to reach the nearest health centre?</p> <p>E Q11a--99</p>	<p>SINGLE-SELECT Q11a</p> <p>-02 <input type="radio"/> No health centre in the area, or centre is too far to travel to</p> <p>-01 <input type="radio"/> We don't go because we self-diagnose and self-medicate for simple illnesses</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q11a--99</p>	<p>TEXT Q11a_5</p> <p>-----</p>
<p>12. How often does this health centre have enough medical supplies to provide adequate health care?</p> <p>E Q11a1--2</p>	<p>SINGLE-SELECT Q12</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p> <p>06 <input type="radio"/> Don't know</p>
<p>13. How much time does it take for members of your household to reach the nearest health centre that can diagnose and treat complicated or serious illnesses or injuries (can perform surgery)?</p> <p>I ENTER ANSWER IN MINUTES; IF RESPONDENT IS NOT SURE ENTER -99</p> <p>E Q11a1--2</p> <p>V1 self1--99</p> <p>M1 99 entered, is this correct or should it be "don't know" -99</p> <p>V2 self>3 self--99</p> <p>M2 You entered it takes 3 minutes or less. You have to enter in minutes, not hours. Please check! If the respondent doesn't know enter -99</p>	<p>NUMERIC: INTEGER Q13</p> <p>-----</p>
<p>13a. Why can't you answer how long it takes to reach the nearest health centre?</p> <p>E Q13--99</p>	<p>SINGLE-SELECT Q13a</p> <p>-01 <input type="radio"/> No health centre for serious illnesses, or centre too far to reach easily</p> <p>-02 <input type="radio"/> Don't know</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q13a--99</p>	<p>TEXT Q13a_5</p> <p>-----</p>

<p>14. Can your household afford professional treatment for serious illness or injury?</p>	<p>SINGLE-SELECT Q14</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes, if money is borrowed</p> <p>03 <input type="radio"/> Yes, with much difficulty</p> <p>04 <input type="radio"/> Yes, with some difficulty</p> <p>05 <input type="radio"/> Yes, because government or employer helps pay for the treatment</p> <p>06 <input type="radio"/> Yes, household can afford it</p>
<p>15. For the majority of the households in your village/area, do you think there is a better chance for women or men to receive health care when needed?</p>	<p>SINGLE-SELECT Q15</p> <p>01 <input type="radio"/> Women</p> <p>02 <input type="radio"/> Men</p> <p>03 <input type="radio"/> About the same</p> <p>04 <input type="radio"/> Don't know</p>
<p>16. Are the health-care centres in your village/area (within 2 hours distance from your home) usually able to provide women with adequate health care if they seek it?</p>	<p>SINGLE-SELECT Q16</p> <p>01 <input type="radio"/> There are no health-care centres in our village/area</p> <p>02 <input type="radio"/> No</p> <p>03 <input type="radio"/> Rarely</p> <p>04 <input type="radio"/> Sometimes</p> <p>05 <input type="radio"/> Often</p> <p>06 <input type="radio"/> Always</p> <p>07 <input type="radio"/> Yes, but women prefer not to go (for whatever reason)</p> <p>08 <input type="radio"/> Don't know</p>

INTERVIEW
HOUSING & FACILITIES

<p>17. RECORD THE PRIMARY CONSTRUCTION MATERIAL OF THE HOUSING UNIT'S EXTERIOR WALLS</p> <p><small>DO NOT ASK THIS QUESTION, ONLY OBSERVE WHILE IN THE HOUSEHOLD. IF NOT POSSIBLE TO SEE OR YOU ARE INTERVIEWING AWAY FROM THE HOUSE, CHOOSE OPTION "Not possible to observe"</small></p>	<p>SINGLE-SELECT Q17</p> <p>07 <input type="radio"/> Thin wood</p> <p>05 <input type="radio"/> Metal sheeting</p> <p>04 <input type="radio"/> Brick (fired/burned)</p> <p>10 <input type="radio"/> Mud & straw</p> <p>02 <input type="radio"/> Stone & mortar</p> <p>09 <input type="radio"/> Brick (mud or earth)</p> <p>03 <input type="radio"/> Cement blocks</p> <p>08 <input type="radio"/> Bamboo</p> <p>06 <input type="radio"/> Logs or thick wood</p> <p>01 <input type="radio"/> Reinforced concrete</p> <p>88 <input type="radio"/> Not possible to observe</p> <p>99 <input type="radio"/> Other (specify)</p>
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<p>SPECIFY</p> <p>E Q17--99</p>	<p>TEXT</p> <p>Q17_s</p>
<p>18. RECORD THE PRIMARY CONSTRUCTION MATERIAL OF THE HOUSING UNIT'S MAIN ROOF.</p> <p>I DO NOT ASK THIS QUESTION, ONLY OBSERVE WHILE IN THE HOUSEHOLD. IF NOT POSSIBLE TO SEE OR YOU ARE INTERVIEWING AWAY FROM THE HOUSE, CHOOSE OPTION "Not possible to observe"</p>	<p>SINGLE-SELECT</p> <p>Q18</p> <p>04 <input type="radio"/> Metal sheeting</p> <p>11 <input type="radio"/> Straw or reeds</p> <p>01 <input type="radio"/> Roofing shingles</p> <p>05 <input type="radio"/> Cement or concrete</p> <p>10 <input type="radio"/> Thin plastic or fabric</p> <p>08 <input type="radio"/> Bamboo</p> <p>88 <input type="radio"/> Not possible to observe</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q18--99</p>	<p>TEXT</p> <p>Q18_s</p>
<p>19. Can your home withstand strong winds, severe rain, snow or hail without significant damage?</p>	<p>SINGLE-SELECT</p> <p>Q19</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes</p> <p>03 <input type="radio"/> Yes, with minor damage</p> <p>04 <input type="radio"/> Perhaps, but with significant damage likely</p> <p>05 <input type="radio"/> Little to no extreme weather in this region</p> <p>06 <input type="radio"/> Don't know</p>
<p>20. What is the primary source of light your home uses when it is dark?</p>	<p>SINGLE-SELECT</p> <p>Q20</p> <p>08 <input type="radio"/> Liquid fuel [petrol, kerosene]</p> <p>03 <input type="radio"/> Stable voltage electricity from grid [legal or illegal connection]</p> <p>04 <input type="radio"/> Unstable voltage electricity from grid [legal or illegal connection]</p> <p>06 <input type="radio"/> Electricity from solar cells, wind turbine or small dam</p> <p>05 <input type="radio"/> Electricity from a generator</p> <p>07 <input type="radio"/> Gas fuel [from tank or biogas]</p> <p>11 <input type="radio"/> Candle, paraffin wax or battery-powered source</p> <p>01 <input type="radio"/> None</p> <p>99 <input type="radio"/> Other (specify)</p> <p>13 <input type="radio"/> Don't know</p>

<p>SPECIFY</p> <p>E Q20--99</p>	<p>TEXT</p> <p>Q20_s</p>
<p>21. What is the primary fuel source your household uses for cooking?</p>	<p>SINGLE-SELECT</p> <p>Q21</p> <p>12 <input type="radio"/> Wood, sawdust, grass or other natural material</p> <p>09 <input type="radio"/> Coal or charcoal</p> <p>08 <input type="radio"/> Liquid fuel [petrol, kerosene]</p> <p>07 <input type="radio"/> Gas fuel [from tank or biogas]</p> <p>03 <input type="radio"/> Stable voltage electricity from grid [legal or illegal connection]</p> <p>04 <input type="radio"/> Unstable voltage electricity from grid [legal or illegal connection]</p> <p>06 <input type="radio"/> Electricity from solar cells, wind turbine or small dam</p> <p>05 <input type="radio"/> Electricity from a generator</p> <p>99 <input type="radio"/> Other (specify)</p> <p>13 <input type="radio"/> Don't know</p>
<p>SPECIFY</p> <p>E Q21--99</p>	<p>TEXT</p> <p>Q21_s</p>

<p>22. What is the primary fuel source your household uses for heat?</p>	<p>SINGLE-SELECT Q22</p> <p>09 <input type="radio"/> Coal or charcoal</p> <p>12 <input type="radio"/> Wood, sawdust, grass or other natural material</p> <p>03 <input type="radio"/> Stable voltage electricity from grid [legal or illegal connection]</p> <p>04 <input type="radio"/> Unstable voltage electricity from grid [legal or illegal connection]</p> <p>06 <input type="radio"/> Electricity from solar cells, wind turbine or small dam</p> <p>05 <input type="radio"/> Electricity from a generator</p> <p>02 <input type="radio"/> Heat not needed in region</p> <p>07 <input type="radio"/> Gas fuel [from tank or biogas]</p> <p>08 <input type="radio"/> Liquid fuel [petrol, kerosene]</p> <p>01 <input type="radio"/> None</p> <p>99 <input type="radio"/> Other (specify)</p> <p>13 <input type="radio"/> Don't know</p>
<p>SPECIFY</p> <p>E Q22→99</p>	<p>TEXT Q22_s</p> <p>_____</p>
<p>23a. What type of toilet facility does your household usually use? ASK PERMISSION TO OBSERVE THE FACILITIES!</p> <p>I 'OPEN' MEANS THERE IS NO STRUCTURE, OR A STRUCTURE WITH NO ROOF. 'ENCLOSED' MEANS THERE IS A STRUCTURE WITH ANY SORT OF ROOF.</p>	<p>SINGLE-SELECT Q23a</p> <p>01 <input type="radio"/> None, open defecation</p> <p>02 <input type="radio"/> Open pit</p> <p>03 <input type="radio"/> Enclosed pit</p> <p>04 <input type="radio"/> Enclosed improved-ventilation pit</p> <p>05 <input type="radio"/> Enclosed pour-flush</p> <p>06 <input type="radio"/> Enclosed flush</p> <p>07 <input type="radio"/> Compost or biogas</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q23a→99</p>	<p>TEXT Q23a_s</p> <p>_____</p>
<p>23b. DID YOU OBSERVE THE FACILITIES?</p> <p>E Q23a 1=1</p>	<p>SINGLE-SELECT Q23b</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes</p>

<p>23c. Do you share these facilities with other households? If so, with how many other households?</p> <p>E Q23a1=1</p>	<p>SINGLE-SELECT Q23c</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes, shared with just one other household</p> <p>03 <input type="radio"/> Yes, shared with two or more other households</p>
<p>24. Over the last 12 months, how often was the toilet usable? (meaning it was working properly or was available to use)</p> <p>E Q23a1=1</p>	<p>SINGLE-SELECT Q24</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p> <p>06 <input type="radio"/> Don't know</p>
<p>25. What does your household usually do with non-edible food waste/remains (e.g. orange peels, corn cobs, bones, etc.)?</p> <p>I ENUMERATOR TO REMIND RESPONDENT "ALL RESPONSES ARE TREATED CONFIDENTIALLY"</p>	<p>SINGLE-SELECT Q25</p> <p>05 <input type="radio"/> Feed to pets or guard dogs</p> <p>04 <input type="radio"/> Feed to livestock</p> <p>11 <input type="radio"/> Compost it</p> <p>01 <input type="radio"/> Discard close to a house [within 25 metres]</p> <p>02 <input type="radio"/> Discard near a house [25 to 75 metres from the house]</p> <p>03 <input type="radio"/> Discard far from a house [75 metres or more]</p> <p>07 <input type="radio"/> It is collected regularly within 75 metres of a house [organized garbage collection]</p> <p>13 <input type="radio"/> It is collected regularly further than 75 metres from a house [organized garbage collection]</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q25=99</p>	<p>TEXT Q25_s</p> <p>-----></p>

26. What does your household usually do with non-food waste/garbage?

SINGLE-SELECT Q26

- 10 Burn it
- 11 Compost it
- 04 Feed to livestock
- 01 Discard close to a house [within 25 metres]
- 02 Discard near a house [25 to 75 metres from the house]
- 03 Discard far from a house [75 metres or more]
- 07 It is collected regularly within 75 metres of a house [organized garbage collection]
- 13 It is collected regularly further than 75 metres from a house [organized garbage collection]
- 99 Other (specify)

SPECIFY

TEXT Q26_s

E Q26--99

27. What does your household usually do with wastewater (for example, from bathing, cleaning, the toilet)?

SINGLE-SELECT Q27

- 01 Discard close to a house [within 25 metres]
- 02 Discard near a house [25 to 75 metres from the house]
- 03 Discard far from a house [75 metres or more]
- 09 Use to water vegetable garden
- 08 Put down the drain [pipeds sewage network]
- 14 Use to water crops grown for or livestock fodder
- 15 Discard into local waterway or irrigation canal
- 99 Other (specify)

SPECIFY

TEXT Q27_s

E Q27--99

INTERVIEW
WASH AND WATER

<p>28. How many times a week do most members (the majority) of your household clean their teeth?</p> <p>I INCLUDES CHILDREN</p>	<p>SINGLE-SELECT Q28</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely (less than once a week)</p> <p>03 <input type="radio"/> 1 or 2 days a week</p> <p>04 <input type="radio"/> 3-5 days a week</p> <p>05 <input type="radio"/> Usually once a day</p> <p>06 <input type="radio"/> Usually 2 or 3 times a day</p> <p>07 <input type="radio"/> Don't know</p>
<p>29. How often do the adults in your household clean their hands before eating a meal?</p> <p>I DOES NOT INCLUDE CHILDREN</p>	<p>SINGLE-SELECT Q29</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p> <p>06 <input type="radio"/> Don't know</p>
<p>30. How often do the adults in your household clean their hands after defecating?</p> <p>I DOES NOT INCLUDE CHILDREN</p>	<p>SINGLE-SELECT Q30</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p> <p>06 <input type="radio"/> Don't know</p>
<p>31. Do the adults in your household use soap (any kind of soap) when they clean their hands?</p> <p>I DOES NOT INCLUDE CHILDREN</p> <p>V1 !((self==5 self==6) && Q29<=2)</p> <p>M1 You entered they use soap before meals, but in Question 29 you said they never or rarely wash their hands before meals. Check which is correct</p> <p>V2 !((self==4 self==6) && Q30<=2)</p> <p>M2 You entered they use soap after defecating, but in Question 30 you said they never or rarely wash their hands after defecating. Check which is correct</p>	<p>SINGLE-SELECT Q31</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes, but very rarely</p> <p>03 <input type="radio"/> Yes, but only when guests visit</p> <p>04 <input type="radio"/> Yes, after defecating</p> <p>05 <input type="radio"/> Yes, before meals</p> <p>06 <input type="radio"/> Yes, after defecating and before meals</p> <p>07 <input type="radio"/> Don't know</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q31==99</p>	<p>TEXT Q31_s</p>

<p>28. How many times a week do most members (the majority) of your household clean their teeth?</p> <p>I INCLUDES CHILDREN</p>	<p>SINGLE-SELECT Q28</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely (less than once a week)</p> <p>03 <input type="radio"/> 1 or 2 days a week</p> <p>04 <input type="radio"/> 3-5 days a week</p> <p>05 <input type="radio"/> Usually once a day</p> <p>06 <input type="radio"/> Usually 2 or 3 times a day</p> <p>07 <input type="radio"/> Don't know</p>
<p>29. How often do the adults in your household clean their hands before eating a meal?</p> <p>I DOES NOT INCLUDE CHILDREN</p>	<p>SINGLE-SELECT Q29</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p> <p>06 <input type="radio"/> Don't know</p>
<p>30. How often do the adults in your household clean their hands after defecating?</p> <p>I DOES NOT INCLUDE CHILDREN</p>	<p>SINGLE-SELECT Q30</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p> <p>06 <input type="radio"/> Don't know</p>
<p>31. Do the adults in your household use soap (any kind of soap) when they clean their hands?</p> <p>I DOES NOT INCLUDE CHILDREN</p> <p>V1 I ((self=5 self=6) && Q29=2)</p> <p>M1 You entered they use soap before meals, but in Question 29 you said they never or rarely wash their hands before meals. Check which is correct</p> <p>V2 I ((self=4 self=6) && Q30=2)</p> <p>M2 You entered they use soap after defecating, but in Question 30 you said they never or rarely wash their hands after defecating. Check which is correct</p>	<p>SINGLE-SELECT Q31</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes, but very rarely</p> <p>03 <input type="radio"/> Yes, but only when guests visit</p> <p>04 <input type="radio"/> Yes, after defecating</p> <p>05 <input type="radio"/> Yes, before meals</p> <p>06 <input type="radio"/> Yes, after defecating and before meals</p> <p>07 <input type="radio"/> Don't know</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q31=99</p>	<p>TEXT Q31_5</p>

32.1 During the rainy season, what is the primary source (meaning the source that water comes from immediately before being used) of the water your household uses for drinking and cooking inside the home?

I IF THE HOUSEHOLD USES DIFFERENT WATER SOURCES FOR DRINKING AND COOKING, ONLY RECORD THE DRINKING WATER SOURCE A PRIVATE WELL IS USED PRIMARILY BY THE HOUSEHOLD, BUT MAY ALSO BE SHARED WITH 2-4 OTHER [And 11.7 other symbols \[1\]](#)

SINGLE-SELECT

Q32_1

- 02 Piped from water treatment plant (not chlorinated)
- 01 Piped from water treatment plant (chlorinated)
- 11 Rainwater harvesting container (closed)
- 12 Rainwater harvesting container (open)
- 17 Stream
- 18 River
- 06 Private well (less than 20m deep)
- 05 Private well (more than 20m deep)
- 10 Unprotected spring
- 09 Protected ('box') spring
- 03 Borehole (more than 20m deep)
- 04 Borehole (less than 20m deep)
- 14 Water vender with cart or small tank
- 13 Water vender with tanker truck
- 19 Pond, lake (or other still water body)
- 16 Small dam (built & managed by households, village or collective)

[And 8 other symbols \[3\]](#)

SPECIFY

TEXT

Q32_1_s

E Q32_1=99

<p>33.2 During the dry season, approximately how much time (in minutes) does it take your household to collect enough water for your household's drinking and cooking needs for a normal (average) day?</p> <p>I TOTAL TIME = THERE AND BACK FOR EACH PERSON AND TRIP COMBINED. IF WATER IS COLLECTED FROM INSIDE THE HOUSEHOLD OR IN THE HOUSEHOLD'S YARD/COMPOUND, WRITE '1' MINUTE IF RESPONDENT DOES NOT KNOW, PROBE And 29 other symbols [3]</p> <p>VI self=-99</p> <p>M1 99 entered, is this correct or should it be "don't know" -99</p>	<p>NUMERIC: INTEGER Q33_2</p> <p>-----</p>
<p>33.3 During most of the year, approximately how much time (in minutes) does it take your household to collect enough water for your household's drinking and cooking needs for a normal (average) day?</p> <p>I TOTAL TIME = THERE AND BACK FOR EACH PERSON AND TRIP COMBINED. IF WATER IS COLLECTED FROM INSIDE THE HOUSEHOLD OR IN THE HOUSEHOLD'S YARD/COMPOUND, WRITE '1' MINUTE IF RESPONDENT DOES NOT KNOW, PROBE And 29 other symbols [4]</p> <p>E Q33_11-Q33_2</p> <p>VI self=-99</p> <p>M1 99 entered, is this correct or should it be "don't know" -99</p>	<p>NUMERIC: INTEGER Q33_3</p> <p>-----</p>
<p>34. Does your household treat water before drinking it (any treatment method: boiling, allowing to settle, filter, chemical treatment, etc.)?</p>	<p>SINGLE-SELECT Q34</p> <p>01 <input type="radio"/> No, household does not believe treatment is necessary</p> <p>02 <input type="radio"/> Never</p> <p>03 <input type="radio"/> Rarely</p> <p>04 <input type="radio"/> Sometimes</p> <p>05 <input type="radio"/> Often</p> <p>06 <input type="radio"/> Always</p>
<p>35. During the last 12 months, for how many months was your household's main source of water sufficient to meet your household's drinking and cooking needs?</p> <p>I IF RESPONDENT DOES NOT KNOW OR REMEMBER, PROBE. IF REALLY UNSURE, WRITE -99</p> <p>VI self<=12 && self>=0 self=-99</p> <p>M1 Enter number between 0 and 12, or -99 for don't know</p>	<p>NUMERIC: INTEGER Q35</p> <p>-----</p>
<p>36. How often do you worry there will not be enough water from your household's main water source to satisfy your household's drinking and cooking needs?</p>	<p>SINGLE-SELECT Q36</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p>

<p>37. Can your household usually afford to pay the fees (direct payments only, not maintenance fees) for using water from your household's main water source?</p>	<p>SINGLE-SELECT Q37</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p> <p>06 <input type="radio"/> Household does not need to pay for water</p>
<p>38. Generally, what do you think the quality of your household's drinking water is (before any treatment)?</p>	<p>SINGLE-SELECT Q38</p> <p>02 <input type="radio"/> Very bad</p> <p>03 <input type="radio"/> Poor</p> <p>04 <input type="radio"/> Satisfactory</p> <p>05 <input type="radio"/> Good</p> <p>06 <input type="radio"/> Very good</p> <p>01 <input type="radio"/> Don't know</p>

INTERVIEW
FARMING/LIVESTOCK/AQUACULTURE

<p>39a. Does your household have access to land for agriculture, orchards, livestock or aquaculture (meaning fish-farming), including land that is owned, leased or otherwise available to the household?</p>	<p>SINGLE-SELECT Q39a</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes</p>
<p>39b. How much of this land is used by the household and how much is leased out to other households?</p> <p>E Q39a-2</p>	<p>SINGLE-SELECT Q39b</p> <p>01 <input type="radio"/> All of it is used by the household</p> <p>02 <input type="radio"/> Part of it is used and part is leased out to other households</p> <p>03 <input type="radio"/> All of it is leased out to other households</p>
<p>40. How much land in hectares does your household have for agriculture (for crops, grasses, trees, orchards, etc.)?</p> <p>I IF THE HOUSEHOLD ONLY HAS ACCESS FOR LIVESTOCK OR AQUACULTURE, WRITE "0"</p> <p>E Q39a-2 && Q39b-2</p> <p>V1 se1F<50</p> <p>M1 You entered more than 50 acres. Please check if correct.</p>	<p>NUMERIC: DECIMAL Q40</p> <p>-----></p>
<p>41a. Is the majority of your household's land flat, gently sloping or steep?</p> <p>E Q40-0</p>	<p>SINGLE-SELECT Q41a</p> <p>04 <input type="radio"/> Flat</p> <p>03 <input type="radio"/> Gently sloping</p> <p>02 <input type="radio"/> Steep</p> <p>99 <input type="radio"/> Mixed (specify)</p> <p>01 <input type="radio"/> Don't know</p>

<p>33.2 During the dry season, approximately how much time (in minutes) does it take your household to collect enough water for your household's drinking and cooking needs for a normal (average) day?</p> <p>I TOTAL TIME = THERE AND BACK FOR EACH PERSON AND TRIP COMBINED. IF WATER IS COLLECTED FROM INSIDE THE HOUSEHOLD OR IN THE HOUSEHOLD'S YARD/COMPOUND, WRITE '1' MINUTE IF RESPONDENT DOES NOT KNOW, PROBE And 29 other symbols (3)</p> <p>V1 self=-99</p> <p>M1 99 entered, is this correct or should it be "don't know" -99</p>	<p>NUMERIC: INTEGER Q33_2</p> <p>-----</p>
<p>33.3 During most of the year, approximately how much time (in minutes) does it take your household to collect enough water for your household's drinking and cooking needs for a normal (average) day?</p> <p>I TOTAL TIME = THERE AND BACK FOR EACH PERSON AND TRIP COMBINED. IF WATER IS COLLECTED FROM INSIDE THE HOUSEHOLD OR IN THE HOUSEHOLD'S YARD/COMPOUND, WRITE '1' MINUTE IF RESPONDENT DOES NOT KNOW, PROBE And 29 other symbols (4)</p> <p>E Q33_11-Q33_2</p> <p>V1 self=-99</p> <p>M1 99 entered, is this correct or should it be "don't know" -99</p>	<p>NUMERIC: INTEGER Q33_3</p> <p>-----</p>
<p>34. Does your household treat water before drinking it (any treatment method: boiling, allowing to settle, filter, chemical treatment, etc.)?</p>	<p>SINGLE-SELECT Q34</p> <p>01 <input type="radio"/> No, household does not believe treatment is necessary</p> <p>02 <input type="radio"/> Never</p> <p>03 <input type="radio"/> Rarely</p> <p>04 <input type="radio"/> Sometimes</p> <p>05 <input type="radio"/> Often</p> <p>06 <input type="radio"/> Always</p>
<p>35. During the last 12 months, for how many months was your household's main source of water sufficient to meet your household's drinking and cooking needs?</p> <p>I IF RESPONDENT DOES NOT KNOW OR REMEMBER, PROBE. IF REALLY UNSURE, WRITE -99</p> <p>V1 self<=12 && self>=0 self=-99</p> <p>M1 Enter number between 0 and 12, or -99 for don't know</p>	<p>NUMERIC: INTEGER Q35</p> <p>-----</p>
<p>36. How often do you worry there will not be enough water from your household's main water source to satisfy your household's drinking and cooking needs?</p>	<p>SINGLE-SELECT Q36</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p>

<p>37. Can your household usually afford to pay the fees (direct payments only, not maintenance fees) for using water from your household's main water source?</p>	<p>SINGLE-SELECT Q37</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p> <p>06 <input type="radio"/> Household does not need to pay for water</p>
<p>38. Generally, what do you think the quality of your household's drinking water is (before any treatment)?</p>	<p>SINGLE-SELECT Q38</p> <p>02 <input type="radio"/> Very bad</p> <p>03 <input type="radio"/> Poor</p> <p>04 <input type="radio"/> Satisfactory</p> <p>05 <input type="radio"/> Good</p> <p>06 <input type="radio"/> Very good</p> <p>01 <input type="radio"/> Don't know</p>

INTERVIEW
FARMING/LIVESTOCK/AQUACULTURE

<p>39a. Does your household have access to land for agriculture, orchards, livestock or aquaculture (meaning fish-farming), including land that is owned, leased or otherwise available to the household?</p>	<p>SINGLE-SELECT Q39a</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes</p>
<p>39b. How much of this land is used by the household and how much is leased out to other households?</p> <p>E Q39a-2</p>	<p>SINGLE-SELECT Q39b</p> <p>01 <input type="radio"/> All of it is used by the household</p> <p>02 <input type="radio"/> Part of it is used and part is leased out to other households</p> <p>03 <input type="radio"/> All of it is leased out to other households</p>
<p>40. How much land in hectares does your household have for agriculture (for crops, grasses, trees, orchards, etc.)?</p> <p>I IF THE HOUSEHOLD ONLY HAS ACCESS FOR LIVESTOCK OR AQUACULTURE, WRITE "0"</p> <p>E Q39a-2 && Q39b-2</p> <p>V1 se1F<50</p> <p>M1 You entered more than 50 acres. Please check if correct.</p>	<p>NUMERIC: DECIMAL Q40</p> <p>-----</p>
<p>41a. Is the majority of your household's land flat, gently sloping or steep?</p> <p>E Q40-0</p>	<p>SINGLE-SELECT Q41a</p> <p>04 <input type="radio"/> Flat</p> <p>03 <input type="radio"/> Gently sloping</p> <p>02 <input type="radio"/> Steep</p> <p>99 <input type="radio"/> Mixed (specify)</p> <p>01 <input type="radio"/> Don't know</p>

<p>SPECIFY MIXED STEEPNESS</p> <p>E Q41a--99</p>	<p>TEXT</p> <p>Q41_s</p> <hr/>
<p>41b. Is any part of your land terraced? IF YES ASK "How much of it is terraced?"</p> <p>E Q41a>=2 && Q41a!=4</p>	<p>SINGLE-SELECT</p> <p>Q41b</p> <p>01 <input type="radio"/> Not terraced</p> <p>02 <input type="radio"/> Less than half terraced</p> <p>03 <input type="radio"/> More than half terraced</p> <p>04 <input type="radio"/> Fully terraced</p>
<p>42. What kind of soil covers the majority of your household's land?</p> <p>E Q40>0</p>	<p>SINGLE-SELECT</p> <p>Q42</p> <p>02 <input type="radio"/> Stony-gravelly</p> <p>03 <input type="radio"/> Clay</p> <p>04 <input type="radio"/> Loamy [mixed clay, sand &/or silt]</p> <p>05 <input type="radio"/> Sandy-droughty</p> <p>06 <input type="radio"/> Wet [wetland/marsh]</p> <p>07 <input type="radio"/> Mixed (specify)</p> <p>99 <input type="radio"/> Other (specify)</p> <p>01 <input type="radio"/> Don't know</p>
<p>SPECIFY</p> <p>E Q42--7 Q42--99</p>	<p>TEXT</p> <p>Q42_s</p> <hr/>
<p>43. During the last 2 years, was your household able to make, or buy, enough compost/manure or artificial fertilizer for each growing season?</p> <p>E Q40>0</p>	<p>SINGLE-SELECT</p> <p>Q43</p> <p>01 <input type="radio"/> Household does not think they need to use compost/manure or fertilizer</p> <p>02 <input type="radio"/> No</p> <p>03 <input type="radio"/> Rarely</p> <p>04 <input type="radio"/> Sometimes</p> <p>05 <input type="radio"/> Often</p> <p>06 <input type="radio"/> Always</p>
<p>44. During the last 2 years, was your household able to afford enough seed for each growing season?</p> <p>E Q40>0</p>	<p>SINGLE-SELECT</p> <p>Q44</p> <p>01 <input type="radio"/> Not necessary because household saved seed</p> <p>02 <input type="radio"/> No</p> <p>03 <input type="radio"/> Rarely</p> <p>04 <input type="radio"/> Sometimes</p> <p>05 <input type="radio"/> Often</p> <p>06 <input type="radio"/> Always</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q44--99</p>	<p>TEXT</p> <p>Q44_s</p> <hr/>

<p>45.1 Is there generally enough water for your household's crops during the dry season?</p> <p>E Q4b-0</p>	<p>SINGLE-SELECT Q45_1</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p> <p>07 <input type="radio"/> Few or no crops grown</p>
<p>45.2 Is there generally enough water for your household's crops during the rest of the year?</p> <p>E Q4b-0</p>	<p>SINGLE-SELECT Q45_2</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p> <p>07 <input type="radio"/> Few or no crops grown</p>
<p>46a. Does the household have livestock ?</p>	<p>SINGLE-SELECT Q46a</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes</p>
<p>46.1 Is there generally enough water for your household's livestock during the dry season?</p> <p>E Q46a-2</p>	<p>SINGLE-SELECT Q46_1</p> <p>02 <input type="radio"/> Never</p> <p>03 <input type="radio"/> Rarely</p> <p>04 <input type="radio"/> Sometimes</p> <p>05 <input type="radio"/> Often</p> <p>06 <input type="radio"/> Always</p>
<p>46.2 Is there generally enough water for your household's livestock during the rest of the year ?</p> <p>E Q46a-2</p>	<p>SINGLE-SELECT Q46_2</p> <p>02 <input type="radio"/> Never</p> <p>03 <input type="radio"/> Rarely</p> <p>04 <input type="radio"/> Sometimes</p> <p>05 <input type="radio"/> Often</p> <p>06 <input type="radio"/> Always</p>
<p>47. During the last 2 years, how often was your household able to grow, collect or buy enough fodder?</p> <p>E Q46a-2</p>	<p>SINGLE-SELECT Q47</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p>
<p>48a. Does the household engage in fish farming (aquaculture)?</p>	<p>SINGLE-SELECT Q48a</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes</p>

<p>48.1 Is there generally enough water for your household's aquaculture during the dry season?</p> <p>E Q48a--2</p>	<p>SINGLE-SELECT Q48_1</p> <p>02 <input type="radio"/> Never</p> <p>03 <input type="radio"/> Rarely</p> <p>04 <input type="radio"/> Sometimes</p> <p>05 <input type="radio"/> Often</p> <p>06 <input type="radio"/> Always</p>
<p>48.2 Is there generally enough water for your household's aquaculture during the rest of the year?</p> <p>E Q48a--2</p>	<p>SINGLE-SELECT Q48_2</p> <p>02 <input type="radio"/> Never</p> <p>03 <input type="radio"/> Rarely</p> <p>04 <input type="radio"/> Sometimes</p> <p>05 <input type="radio"/> Often</p> <p>06 <input type="radio"/> Always</p>
<p>49. During the last 2 years, how often was your household able to make or buy enough fish feed?</p> <p>E Q48a--2</p>	<p>SINGLE-SELECT Q49</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p>
<p>50. Does your household usually have enough people to work/manage your farm? (crops, orchards, forestry, livestock and/or aquaculture)</p> <p>E (Q39a--2 && Q39b-c--2) Q46a--2 Q48a--2</p>	<p>SINGLE-SELECT Q50</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p>
<p>51. What kind of ownership of your land does your household have?</p> <p>E Q39a--2</p>	<p>SINGLE-SELECT Q51</p> <p>01 <input type="radio"/> Illegal access, squatting</p> <p>02 <input type="radio"/> Share-cropping arrangement</p> <p>03 <input type="radio"/> Rented for less than 12 months</p> <p>04 <input type="radio"/> Common-law ownership</p> <p>05 <input type="radio"/> Leasehold less than 5 years</p> <p>06 <input type="radio"/> Leasehold 5-10 years</p> <p>07 <input type="radio"/> Leasehold 11-20 years</p> <p>08 <input type="radio"/> Leasehold 21-30 years</p> <p>09 <input type="radio"/> Leasehold 31-40 years</p> <p>10 <input type="radio"/> Leasehold for >40 years</p> <p>11 <input type="radio"/> Freehold (legally owned)</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q51--99</p>	<p>TEXT Q51_5</p> <p>_____</p>

INTERVIEW
NEGATIVE EVENTS

STATIC TEXT

Of all the possible negative events (natural or socio-economic) that could occur in the next 12 months, and that would have a bad or damaging impact on your household, which 3 are you most worried about? (as far as negative impacts on household members, livelihoods, agriculture, livestock, aquaculture ...)

<p>52.1 WRITE FIRST NEGATIVE EVENT (MOST WORRIED)</p> <p>I IF THE RESPONDENT DOES NOT KNOW, WRITE -99 IF THE RESPONDENT IS NOT VERY WORRIED ABOUT ANY NEGATIVE EVENT, WRITE -88 VI selfi="99" && selfi="88"</p> <p>M1 Don't forget minus sign before 99 or 88</p>	<p>TEXT Q52_1</p> <p>_____</p>
<p>52.2 WRITE SECOND NEGATIVE EVENT (SECOND MOST WORRIED)</p> <p>I IF THE RESPONDENT CANNOT MENTION A SECOND EVENT, WRITE -99 E Q52_11="-99" && Q52_11="-88"</p> <p>VI selfi="99"</p> <p>M1 Don't forget minus sign before 99</p>	<p>TEXT Q52_2</p> <p>_____</p>
<p>52.3 WRITE THIRD NEGATIVE EVENT (THIRD MOST WORRIED)</p> <p>I IF THE RESPONDENT CANNOT MENTION A THIRD EVENT, WRITE -99 E Q52_11="-99" && Q52_11="-88" && Q52_21="-99"</p> <p>VI selfi="99"</p> <p>M1 Don't forget minus sign before 99</p>	<p>TEXT Q52_3</p> <p>_____</p>
<p>53.1 How damaging would a %Q52_1% be for your household?</p> <p>E Q52_11="-99" && Q52_11="-88"</p>	<p>SINGLE-SELECT Q53_1</p> <p>01 <input type="radio"/> Low-minor severity</p> <p>02 <input type="radio"/> Medium-moderate severity</p> <p>03 <input type="radio"/> High-major severity</p> <p>-01 <input type="radio"/> Don't know</p>
<p>54.1 How likely is it that a %Q52_1% will occur in the next 12 months?</p> <p>E Q52_11="-99" && Q52_11="-88"</p>	<p>SINGLE-SELECT Q54_1</p> <p>01 <input type="radio"/> Unlikely</p> <p>02 <input type="radio"/> Likely</p> <p>03 <input type="radio"/> Very likely</p> <p>-01 <input type="radio"/> Don't know</p>
<p>53.2 How damaging would a %Q52_2% be for your household?</p> <p>E Q52_11="-99" && Q52_11="-88" && Q52_21="-99"</p>	<p>SINGLE-SELECT Q53_2</p> <p>01 <input type="radio"/> Low-minor severity</p> <p>02 <input type="radio"/> Medium-moderate severity</p> <p>03 <input type="radio"/> High-major severity</p> <p>-01 <input type="radio"/> Don't know</p>
<p>54.2 How likely is it that a %Q52_2% will occur in the next 12 months?</p> <p>E Q52_11="-99" && Q52_11="-88" && Q52_21="-99"</p>	<p>SINGLE-SELECT Q54_2</p> <p>01 <input type="radio"/> Unlikely</p> <p>02 <input type="radio"/> Likely</p> <p>03 <input type="radio"/> Very likely</p> <p>-01 <input type="radio"/> Don't know</p>

<p>53.3 How damaging would a %Q52_3% be for your household?</p> <p>E Q52_11="-99" && Q52_11="-88" && Q52_21="-99" && Q52_31="-99"</p>	<p>SINGLE-SELECT Q53_3</p> <p>01 <input type="radio"/> Low-minor severity</p> <p>02 <input type="radio"/> Medium-moderate severity</p> <p>03 <input type="radio"/> High-major severity</p> <p>-01 <input type="radio"/> Don't know</p>
<p>54.3 How likely is it that a %Q52_3% will occur in the next 12 months?</p> <p>E Q52_11="-99" && Q52_11="-88" && Q52_21="-99" && Q52_31="-99"</p>	<p>SINGLE-SELECT Q54_3</p> <p>01 <input type="radio"/> Unlikely</p> <p>02 <input type="radio"/> Likely</p> <p>03 <input type="radio"/> Very likely</p> <p>-01 <input type="radio"/> Don't know</p>
<p>55. If a %Q52_1% were to occur in the next 12 months, what are the 3 main ways your household would likely react (cope)?</p> <p>I THE ORDER IN WHICH YOU ENTER THE ANSWERS IS IMPORTANT: START WITH THE PRIMARY STRATEGY!</p> <p>E Q52_11="-99" && Q52_11="-88"</p>	<p>MULTI-SELECT: ORDERED Q55</p> <p>001 <input type="checkbox"/> Seek off-farm work</p> <p>002 <input type="checkbox"/> Work more hours or take on other jobs</p> <p>003 <input type="checkbox"/> Start a business</p> <p>004 <input type="checkbox"/> Reduce health-care spending</p> <p>005 <input type="checkbox"/> Reduce alcohol consumption</p> <p>006 <input type="checkbox"/> Reduce meat consumption</p> <p>007 <input type="checkbox"/> Reduce fuel consumption</p> <p>008 <input type="checkbox"/> Plant fewer crops next growing season</p> <p>009 <input type="checkbox"/> Lease out farmland</p> <p>010 <input type="checkbox"/> Children help more than usual with household work</p> <p>011 <input type="checkbox"/> Ask friends to help with farm labour or business</p> <p>012 <input type="checkbox"/> Ask family to help with farm labour or business</p> <p>013 <input type="checkbox"/> Rely on local government</p> <p>014 <input type="checkbox"/> Rely on national government</p> <p>015 <input type="checkbox"/> Rely on aid organizations</p> <p>016 <input type="checkbox"/> Rely on group insurance</p> <p>And 23 other symbols [6]</p>
<p>SPECIFY</p> <p>E Q55.Contains(99)</p>	<p>TEXT Q55_1_s</p> <p>_____</p>
<p>SPECIFY</p> <p>E Q55.Contains(999)</p>	<p>TEXT Q55_2_s</p> <p>_____</p>

<p>56. If a %Q52_1% were to occur in the next 12 months, how long do you think it would take for your household to return to at least the situation before it happened?</p> <p>I ANSWER IN MONTHS IF NOT POSSIBLE TO ANSWER IN MONTHS, USE CODES: DON'T KNOW.....99 LESS THAN 1 MONTH..... And 47 other symbols (5)</p> <p>E Q52_11="-99" && Q52_11="-88"</p> <p>V1 self1=99 && self1=88 && self1=77</p> <p>M1 You entered 77, 88 or 99 without minus sign. Is this correct?</p>	<p>NUMERIC: INTEGER Q56</p> <p>-----</p>
<p>57. If in an extreme disaster (of any sort) your household's home was completely destroyed, but your family members were not injured, how long would it take for your household to rebuild your home?</p> <p>I ANSWER IN MONTHS IF NOT POSSIBLE TO ANSWER IN MONTHS, USE CODES: DON'T KNOW.....99 LESS THAN ONE MONTH..... 88 And 113 other symbols (6)</p> <p>E Q52_11="-99" && Q52_11="-88"</p> <p>V1 self1=99 && self1=88 && self1=77 && self1=66</p> <p>M1 You entered 66, 77, 88 or 99 without minus sign. Is this correct?</p>	<p>NUMERIC: INTEGER Q57</p> <p>-----</p>
<p>58. If a %Q52_1% were to occur in the next 12 months, who do you think would be most likely to assist your household?</p> <p>E Q52_11="-99" && Q52_11="-88"</p>	<p>SINGLE-SELECT Q58</p> <p>01 <input type="radio"/> No one</p> <p>02 <input type="radio"/> Family/relatives</p> <p>03 <input type="radio"/> Friends</p> <p>04 <input type="radio"/> Insurance company</p> <p>05 <input type="radio"/> Financial institution</p> <p>06 <input type="radio"/> Local government</p> <p>07 <input type="radio"/> National government</p> <p>08 <input type="radio"/> Government (general)</p> <p>09 <input type="radio"/> Aid organizations</p> <p>11 <input type="radio"/> Church/mosque/other religious group</p> <p>10 <input type="radio"/> Don't know</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q58=99</p>	<p>TEXT Q58_s</p> <p>-----</p>

INTERVIEW
FOOD AND NUTRITION SECURITY

<p>59. During the last 12 months, did any member of your household eat less than three meals, or smaller portions, than usual because there was not enough food?</p> <p>I IF YES, ASK "For approximately how long/how often did this happen?"</p>	<p>SINGLE-SELECT Q59</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Yes, once or twice</p> <p>03 <input type="radio"/> Yes, for about 1 week</p> <p>04 <input type="radio"/> Yes, for a few weeks</p> <p>05 <input type="radio"/> Yes, for about 1 month</p> <p>06 <input type="radio"/> Yes, for more than 1 month</p> <p>07 <input type="radio"/> Yes, most days</p> <p>08 <input type="radio"/> Don't know</p>
<p>60. During the last 12 months, did any member of your household go to sleep at night hungry?</p> <p>I IF YES, ASK "For approximately how long/how often did this happen?"</p>	<p>SINGLE-SELECT Q60</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Yes, once or twice</p> <p>03 <input type="radio"/> Yes, for about 1 week</p> <p>04 <input type="radio"/> Yes, for a few weeks</p> <p>05 <input type="radio"/> Yes, for about 1 month</p> <p>06 <input type="radio"/> Yes, for more than 1 month</p> <p>07 <input type="radio"/> Yes, most days</p> <p>08 <input type="radio"/> Don't know</p>
<p>61. During the past 12 months, did your household experience a period of time longer than 2 weeks when there was not enough food?</p> <p>I IF YES, ASK "How many periods like this were there in the last 12 months?"</p>	<p>SINGLE-SELECT Q61</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes, 1 period of time</p> <p>03 <input type="radio"/> Yes, 2 periods of time</p> <p>04 <input type="radio"/> Yes, 3 periods of time</p> <p>05 <input type="radio"/> Yes, 4 periods of time</p> <p>06 <input type="radio"/> Yes, more than 4 periods of time</p> <p>07 <input type="radio"/> Don't remember</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q61--99</p>	<p>TEXT Q61_s</p> <p>_____</p>
<p>62. During the past 12 months, did your household ever experience 1 full day with no food to eat?</p> <p>I IF YES, ASK: "How often did this occur?"</p>	<p>SINGLE-SELECT Q62</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Once or twice</p> <p>03 <input type="radio"/> Approximately once a month</p> <p>04 <input type="radio"/> Approximately every 2 weeks</p> <p>05 <input type="radio"/> Approximately every week</p> <p>06 <input type="radio"/> Don't know</p>

63.1 During the last 12 months, how often did the majority of your household eat grains (cereals, bread, rice, pasta)?

SINGLE-SELECT Q63_1

- 01 Never
- 02 Almost never
- 03 Approximately once a month
- 04 A few times a month
- 05 About once a week
- 06 A few times a week
- 07 Every day
- 08 Not eaten for religious or cultural reasons

63.2 During the last 12 months, how often did the majority of your household eat roots &/or tubers (potatoes, cassava, etc.)?

SINGLE-SELECT Q63_2

- 01 Never
- 02 Almost never
- 03 Approximately once a month
- 04 A few times a month
- 05 About once a week
- 06 A few times a week
- 07 Every day
- 08 Not eaten for religious or cultural reasons

63.3 During the last 12 months, how often did the majority of your household eat vegetables or greens?

SINGLE-SELECT Q63_3

- 01 Never
- 02 Almost never
- 03 Approximately once a month
- 04 A few times a month
- 05 About once a week
- 06 A few times a week
- 07 Every day
- 08 Not eaten for religious or cultural reasons

63.4 During the last 12 months, how often did the majority of your household eat fruits?

SINGLE-SELECT

Q63_4

- 01 Never
- 02 Almost never
- 03 Approximately once a month
- 04 A few times a month
- 05 About once a week
- 06 A few times a week
- 07 Every day
- 08 Not eaten for religious or cultural reasons

63.5 During the last 12 months, how often did the majority of your household eat dairy products and/or eggs?

SINGLE-SELECT

Q63_5

- 01 Never
- 02 Almost never
- 03 Approximately once a month
- 04 A few times a month
- 05 About once a week
- 06 A few times a week
- 07 Every day
- 08 Not eaten for religious or cultural reasons

63.6 During the last 12 months, how often did the majority of your household eat meat and/or fish/seafood?

SINGLE-SELECT

Q63_6

- 01 Never
- 02 Almost never
- 03 Approximately once a month
- 04 A few times a month
- 05 About once a week
- 06 A few times a week
- 07 Every day
- 08 Not eaten for religious or cultural reasons

<p>63.7 During the last 12 months, how often did the majority of your household eat nuts and/or legumes (including derivatives, tofu, etc.)?</p>	<p>SINGLE-SELECT Q63_7</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Almost never</p> <p>03 <input type="radio"/> Approximately once a month</p> <p>04 <input type="radio"/> A few times a month</p> <p>05 <input type="radio"/> About once a week</p> <p>06 <input type="radio"/> A few times a week</p> <p>07 <input type="radio"/> Every day</p> <p>08 <input type="radio"/> Not eaten for religious or cultural reasons</p>
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INTERVIEW
EMPLOYMENT, CREDIT, ASSETS AND EQUALITY

<p>64. During the last 12 months, has anyone in your household managed/run their own business (other than selling agricultural products)?</p> <p>i IF YES, ASK: "for how many months out of the last 12 months?"</p>	<p>SINGLE-SELECT Q64</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes, 1-2 months</p> <p>03 <input type="radio"/> Yes, 3-4 months</p> <p>04 <input type="radio"/> Yes, 5-6 months</p> <p>05 <input type="radio"/> Yes, 7+ months</p>
<p>65. During the last 12 months, has anyone in your household provided others a skilled service (for example, equipment repair, tailoring, construction work) for money or barter?</p> <p>i IF YES, ASK: "How often?"</p>	<p>SINGLE-SELECT Q65</p> <p>01 <input type="radio"/> Never</p> <p>02 <input type="radio"/> Rarely</p> <p>03 <input type="radio"/> Sometimes</p> <p>04 <input type="radio"/> Often</p> <p>05 <input type="radio"/> Always</p>
<p>66. If your household wanted to borrow money from a bank or other financial service provider (not including friends or relatives), would your household be able to borrow money?</p>	<p>SINGLE-SELECT Q66</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Probably not</p> <p>03 <input type="radio"/> Probably yes</p> <p>04 <input type="radio"/> Definitely yes</p> <p>05 <input type="radio"/> Don't know</p>
<p>67. Is your household currently in debt from any lender including family and friends?</p> <p>i REMIND RESPONDENT THAT ALL INFORMATION WILL BE TREATED CONFIDENTIALLY</p>	<p>SINGLE-SELECT Q67</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes, a little</p> <p>03 <input type="radio"/> Yes, a moderate amount</p> <p>04 <input type="radio"/> Yes, a lot</p> <p>05 <input type="radio"/> Don't know, or don't want to discuss</p>

<p>68. To whom is the majority of this debt owed?</p> <p>E Q67>1 && Q67<5</p>	<p>SINGLE-SELECT Q68</p> <p>01 <input type="radio"/> Relatives</p> <p>02 <input type="radio"/> Friends</p> <p>03 <input type="radio"/> Village fund</p> <p>04 <input type="radio"/> Village government</p> <p>05 <input type="radio"/> Rural credit cooperative</p> <p>06 <input type="radio"/> Private money lender</p> <p>07 <input type="radio"/> Microfinance institution</p> <p>08 <input type="radio"/> Government bank</p> <p>09 <input type="radio"/> Private bank</p> <p>10 <input type="radio"/> Joint village & bank fund</p> <p>11 <input type="radio"/> Joint development project & bank fund</p> <p>99 <input type="radio"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q68=99</p>	<p>TEXT Q68_s</p> <p>-----</p>
<p>69. How many of the people (adults and children) in your household usually have adequate footwear?</p>	<p>SINGLE-SELECT Q69</p> <p>01 <input type="radio"/> None</p> <p>02 <input type="radio"/> Less than half the household</p> <p>03 <input type="radio"/> About half the household</p> <p>04 <input type="radio"/> Most of the household</p> <p>05 <input type="radio"/> All household members do</p> <p>06 <input type="radio"/> Don't know</p>
<p>70. How many of the people (adults and children) in your household have sufficient clothing for severe weather (for example, very hot and sunny, very cold or very wet weather, depending on the area)?</p>	<p>SINGLE-SELECT Q70</p> <p>01 <input type="radio"/> None</p> <p>02 <input type="radio"/> Less than half the household</p> <p>03 <input type="radio"/> About half the household</p> <p>04 <input type="radio"/> Most of the household</p> <p>05 <input type="radio"/> All household members do</p> <p>06 <input type="radio"/> Don't know</p>
<p>71. Does your household have a television?</p> <p>I REMIND RESPONDENT THAT YOU HAVING NOTHING TO DO WITH THE TV LICENCE AUTHORITIES AND NO INFORMATION WILL BE SHARED. IF YES, ASK "How many?" IF NO, WRITE 0.</p> <p>V1 self<3</p> <p>M1 Does the household really have this many televisions?</p>	<p>NUMERIC: INTEGER Q71</p> <p>-----</p>

<p>72. Do some households in your village/area have fewer economic or political opportunities than others because of their religion or ethnic/minority group?</p>	<p>SINGLE-SELECT Q72</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes, a few households</p> <p>03 <input type="radio"/> Yes, less than half of the households</p> <p>04 <input type="radio"/> Yes, about half the households</p> <p>05 <input type="radio"/> Yes, more than half the households</p> <p>06 <input type="radio"/> Don't know</p>
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<p>73. In the last 2 years, how has this situation of inequality changed?</p> <p>E Q72>1</p>	<p>SINGLE-SELECT Q73</p> <p>01 <input type="radio"/> Improved slightly</p> <p>02 <input type="radio"/> Improved moderately</p> <p>03 <input type="radio"/> Improved a lot</p> <p>04 <input type="radio"/> Worsened slightly</p> <p>05 <input type="radio"/> Worsened moderately</p> <p>06 <input type="radio"/> Worsened a lot</p> <p>07 <input type="radio"/> No significant change</p> <p>08 <input type="radio"/> Don't know</p> <p>99 <input type="radio"/> Other (specify)</p>
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<p>SPECIFY</p> <p>E Q73=99</p>	<p>TEXT Q73_s</p> <p>_____</p>
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INTERVIEW
FARMING CONTINUED

74. We already asked you some questions about your land, but would like to ask a few more. Among the following agricultural practices, which are those that your household is doing?

- I READ OUT ALL OPTIONS TO THE RESPONDENT AND TICK ALL THAT APPLY
- E Q40-0
- V1 ! (Q74.Contains(-1) && Q74.ContainsAny(1,2,3,4,5,6,7,8,9,10,11,12,99))
- M1 You cannot select "Don't know" together with one of the other options
- V2 ! (Q74.Contains(12) && Q74.ContainsAny(1,2,3,4,5,6,7,8,9,10,11,-1,99))
- M2 You cannot select "None" together with one of the other options

MULTI-SELECT

Q74

- 01 Not ploughing (zero tillage)
- 02 Reduced ploughing (low tillage)
- 03 Rotating crops between seasons (e.g. alternating cereals and legumes)
- 04 Mulching to retain soil moisture and regulate soil temperature
- 05 Reducing erosion by wind and water (i.e. hedging, ditching, stone lines..)
- 06 Dosing fertilizer
- 07 Terracing and/or land reclamation
- 08 Manure application (to restore soil organic content)
- 09 Agroforestry/planting trees in fields
- 10 Intercropping with nitrogen fixing legumes (like cowpeas, beans or pigeon peas)
- 11 Fertilizing practices leaving crop residues in the field
- 99 Other (specify)
- 01 Don't know
- 12 None

SPECIFY

TEXT

Q74_s

E Q74.Contains(99)

75. Among the following problems, which are those that your household is facing with its land?

- I READ OUT ALL OPTIONS TO THE RESPONDENT AND TICK ALL THAT APPLY
- E Q40>0
- V1 ! (Q75.Contains(-1) && Q75.ContainsAny(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,99))
- M1 You cannot select "Don't know" together with one of the other options
- V2 ! (Q75.Contains(15) && Q75.ContainsAny(1,2,3,4,5,6,7,8,9,10,11,12,13,14,-1,99))
- M2 You cannot select "None" together with one of the other options

MULTI-SELECT

Q75

- 01 Drought
- 02 Soil erosion
- 03 Floods (from river/sea)
- 04 Landslides
- 05 Wild fires
- 06 Pest infestations
- 07 Frost
- 08 Hail
- 09 Heavy rains
- 10 Heat waves (temperature extremes)
- 11 Soil salinity
- 12 Loss of soil fertility
- 13 Storms/strong winds
- 14 Plant diseases
- 99 Other (specify)
- 01 Don't know

[And 1 other symbols \[7\]](#)

SPECIFY

TEXT

Q75_s

- E Q75.Contains(99)

76. What are the 3 main sources of freshwater for crops and livestock for most of the year? CAN BE LESS THAN 3

- I THE ORDER IN WHICH YOU ENTER THE ANSWERS IS IMPORTANT: START WITH PRIMARY SOURCE! A PRIVATE WELL IS USED PRIMARILY BY THE HOUSEHOLD, BUT MAY ALSO BE SHARED WITH 2-4 OTHER HOUSEHOLDS, AND IS LOCATED WITHIN 500 METERS OF THE HOUSEHOLD
- E Q40>0 || Q46a==2
- V1 ! (Q76.Contains(-1) && Q76.ContainsAny(1,2,3,4,5,6,7,8,9,10,11,12,13,14))
- M1 You cannot select "don't know" or "None" together with one of the other options

MULTI-SELECT: ORDERED

Q76

- 01 Piped water from treatment plant
- 02 Borehole
- 03 Private well
- 04 Communal well
- 05 Spring
- 06 Rainwater harvesting container
- 07 Water vender
- 08 Stream
- 09 Lake
- 10 Pond, lake (or other still water body)
- 11 River
- 12 Household wastewater
- 13 Dam
- 14 Rainfall
- 01 Don't Know

INTERVIEW

INTERVIEW

37 / 49

CLIMATE

77. Among the following types of weather information, which are those that your household receives?

- I READ OUT ALL OPTIONS TO THE RESPONDENT AND TICK ALL THAT APPLY. DAILY AND WEEKLY RAINFALL AND TEMPERATURE SHOULD ONLY BE TICKED IF THE HOUSEHOLDS RECEIVES THESE REGULARLY.
- V1 ! (Q77.Contains(-1) && Q77.ContainsAny(1,2,3,4,5,6,7))
- M1 You cannot select "Don't know" or together with one of the other options
- V2 ! (Q77.Contains(7) && Q77.ContainsAny(1,2,3,4,5,6,-1))
- M2 You cannot select "None" or together with one of the other options

MULTI-SELECT

Q77

- 01 Forecast of daily and weekly rainfall
- 02 Forecast of daily and weekly temperatures
- 03 Hydrology advisory (rise and fall of water level)
- 04 Extreme event advisories (drought, floods, etc.)
- 05 Climate change projections
- 06 Advice on crop calendar
- 01 Don't know
- 07 None

77a. Which of the types of weather information you said your household receives have you used in the past to help you make agricultural decisions?

- I READ OUT ALL OPTIONS TO THE RESPONDENT AND TICK ALL THAT APPLY.
- F Q77.Contains(@optioncode) || (@optioncode==7) || (@optioncode=-1)
- E !Q77.ContainsAny(-1,7)
- V1 ! (Q77use.Contains(-1) && Q77use.ContainsAny(1,2,3,4,5,6,7))
- M1 You cannot select "Don't know" or together with one of the other options
- V2 ! (Q77use.Contains(7) && Q77use.ContainsAny(1,2,3,4,5,6,-1))
- M2 You cannot select "None" or together with one of the other options

MULTI-SELECT

Q77use

- 01 Forecast of daily and weekly rainfall
- 02 Forecast of daily and weekly temperatures
- 03 Hydrology advisory (rise and fall of water level)
- 04 Extreme event advisories (drought, floods, etc.)
- 05 Climate change projections
- 06 Advice on crop calendar
- 01 Don't know
- 07 None

<p>78. Among the following information sources about weather issues, which are those that your household has access to?</p> <p>I READ OUT ALL OPTIONS TO THE RESPONDENT AND TICK ALL THAT APPLY</p> <p>V1 ! (Q78.Contains(-1) && Q78.ContainsAny(1,2,3,4,5,6,7,8,9,10,11,12))</p> <p>M1 You cannot select "Don't know" together with one of the other options</p> <p>V2 ! (Q78.Contains(12) && Q78.ContainsAny(1,2,3,4,5,6,7,8,9,10,11,-1))</p> <p>M2 You cannot select "None" together with one of the other options</p>	<p>MULTI-SELECT Q78</p> <p>01 <input type="checkbox"/> Private extension providers</p> <p>02 <input type="checkbox"/> Cell phone SMS</p> <p>03 <input type="checkbox"/> Community groups (women, religious, youth..) or farmer associations</p> <p>04 <input type="checkbox"/> Development NGOs</p> <p>05 <input type="checkbox"/> Government extension services</p> <p>06 <input type="checkbox"/> Information exchange with fellow farmers</p> <p>07 <input type="checkbox"/> Village information centres</p> <p>08 <input type="checkbox"/> Internet</p> <p>09 <input type="checkbox"/> Newspaper/Press</p> <p>10 <input type="checkbox"/> Television</p> <p>11 <input type="checkbox"/> Radio</p> <p>-01 <input type="checkbox"/> Don't know</p> <p>12 <input type="checkbox"/> None</p>
<p>79. Have you heard of the term "climate change"?</p>	<p>SINGLE-SELECT Q79</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes</p>
<p>80. How or where did you hear about climate change?</p> <p>I MORE THAN ONE ANSWER POSSIBLE PROBE: "Did you hear in any other way?"</p> <p>E Q79=2</p>	<p>MULTI-SELECT Q80</p> <p>01 <input type="checkbox"/> Community groups (women, religious, youth..) or farmer associations</p> <p>02 <input type="checkbox"/> Development NGOs</p> <p>03 <input type="checkbox"/> Government extension services</p> <p>04 <input type="checkbox"/> Information exchange with fellow farmers</p> <p>05 <input type="checkbox"/> Village information centres</p> <p>06 <input type="checkbox"/> Internet</p> <p>07 <input type="checkbox"/> Newspaper/Press</p> <p>08 <input type="checkbox"/> Television</p> <p>09 <input type="checkbox"/> Radio</p> <p>99 <input type="checkbox"/> Other (specify)</p>
<p>SPECIFY</p> <p>E Q80.Contains(99)</p>	<p>TEXT Q80s</p> <hr/>
<p>81. Have you observed changes in weather patterns since you were young?</p>	<p>SINGLE-SELECT Q81</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes</p> <p>03 <input type="radio"/> Don't know</p>

<p>82. Did these changes in weather patterns make you change any agricultural practices?</p> <p>E Q81→2</p>	<p>SINGLE-SELECT Q82</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> Yes</p> <p>03 <input type="radio"/> Don't know</p>
<p>83. What have you changed?</p> <p>E Q82→2</p>	<p>TEXT Q82s</p> <p>_____</p>

INTERVIEW / CLIMATE
TZ ADDITIONAL QUESTIONS

<p>84. Does your household usually cultivate any of the following crops?</p> <p>I READ OUT THE OPTIONS AND TICK ALL THAT APPLY. THE ORDER DOES NOT MATTER</p> <p>E Q39a→2</p> <p>V1 !(Q84.Contains(88) && Q84.ContainsAny(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,99,77))</p> <p>M1 You cannot select 'none' together with one of the other options</p> <p>V2 !(Q84.Contains(77) && Q84.ContainsAny(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,88,99))</p> <p>M2 You cannot select 'dont know' together with one of the other options</p>	<p>MULTI-SELECT Q84</p> <p>01 <input type="checkbox"/> Maize</p> <p>02 <input type="checkbox"/> Beans</p> <p>03 <input type="checkbox"/> Sorghum</p> <p>04 <input type="checkbox"/> Groundnuts</p> <p>05 <input type="checkbox"/> Millet</p> <p>06 <input type="checkbox"/> Sunflower</p> <p>07 <input type="checkbox"/> Cassava</p> <p>08 <input type="checkbox"/> Cotton</p> <p>09 <input type="checkbox"/> Sweet potatoes</p> <p>10 <input type="checkbox"/> Sesame</p> <p>11 <input type="checkbox"/> Cowpeas</p> <p>12 <input type="checkbox"/> Cabbage</p> <p>13 <input type="checkbox"/> Carrots</p> <p>14 <input type="checkbox"/> Green pepper</p> <p>15 <input type="checkbox"/> Cloves</p> <p>16 <input type="checkbox"/> Onions</p> <p>And 13 other symbols (8)</p>
<p>SPECIFY</p> <p>E Q84.Contains(99)</p>	<p>TEXT Q84s</p> <p>_____</p>

INTERVIEW / CLIMATE
Roster: CULTIVATION ROSTER - %ROSTERTITLE%

<p>generated by multi-select question Q84</p> <p>E Q84.Contains(1) Q84.Contains(2) Q84.Contains(3) Q84.Contains(4) Q84.Contains(5) Q84.Contains(6) Q84.Contains(7) Q84.Contains(8) Q84.Contains(9) Q84.Contains(10)</p>		cultivation
<p>84.1a How much land did you cultivate for %rosteritle% in the last season? (in hectares)</p>	<p>NUMERIC: DECIMAL</p> <p>cultivate84_1a</p> <p>_____</p>	
<p>84.1b How much Kilograms of %rosteritle% do you harvest per hectare?</p> <p>I IF RESPONDENT DOES NOT KNOW HARVEST IN KILOGRAM ASK HOW MANY BAGS, THEN ASK HOW MANY 'DEBE' CAPACITY OF EACH BAG " 100 KILOGRAM BAG = 6 STANDARD 20LT DEBES", THEN CONVERT NUMBER OF BAGS TO KILOGRAMS B And 35 other symbols (8)</p>	<p>NUMERIC: INTEGER</p> <p>cultivate84_1b</p> <p>_____</p>	

<p>84.2 How much is your annual income from %rostertitle%?</p>	<p>SINGLE-SELECT cultivate84_2</p> <p>01 <input type="radio"/> Less than Tshs100,000</p> <p>02 <input type="radio"/> Tshs100,000 - Tshs500,000</p> <p>03 <input type="radio"/> Tshs500,000 - Tshs1,000,000</p> <p>04 <input type="radio"/> Tshs1,000,000 - Tshs2,000,000</p> <p>0 <input type="radio"/></p> <p>05 <input type="radio"/> Tshs2,000,000 +</p> <p>06 <input type="radio"/> Does not sell</p>
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<p>84.3 How many production cycles do you usually do in a year for %rostertitle%?</p>	<p>NUMERIC: INTEGER cultivate84_3</p> <p>-----</p>
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<p>84.4 To whom do you usually sell most of %rostertitle%?</p> <p>E cultivate84_21-6</p>	<p>MULTI-SELECT cultivate84_4</p> <p>01 <input type="checkbox"/> Trader</p> <p>02 <input type="checkbox"/> Local market</p> <p>03 <input type="checkbox"/> Relatives</p> <p>04 <input type="checkbox"/> National Marketing Board</p> <p>05 <input type="checkbox"/> Other</p> <p>06 <input type="checkbox"/> Does not sell</p>
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<p>84.5 Do you have a supplier contract with your market for %rostertitle%?</p> <p>E cultivate84_21-6</p>	<p>SINGLE-SELECT cultivate84_5</p> <p>01 <input type="radio"/> Yes</p> <p>02 <input type="radio"/> No</p>
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<p>85. Does your household usually keep any of the following livestock?</p> <p>V1 ! (Q85.Contains(99) && Q84.ContainsAny(1,2,3,4,5,6,7,88))</p> <p>M1 You cannot select "None" together with one of the other options</p> <p>V2 ! (Q85.Contains(88) && Q84.ContainsAny(1,2,3,4,5,6,7,99))</p> <p>M2 You cannot select 'dont know' together with one of the other options</p>	<p>MULTI-SELECT Q85</p> <p>01 <input type="checkbox"/> Goats</p> <p>02 <input type="checkbox"/> Cattle for beef</p> <p>03 <input type="checkbox"/> Cattle for dairy</p> <p>04 <input type="checkbox"/> Indigenous chicken</p> <p>05 <input type="checkbox"/> Chicken broilers</p> <p>06 <input type="checkbox"/> Pigs</p> <p>07 <input type="checkbox"/> Sheep</p> <p>08 <input type="checkbox"/> Bees</p> <p>99 <input type="checkbox"/> None</p> <p>88 <input type="checkbox"/> Dont know</p> <p>09 <input type="checkbox"/> Camel</p> <p>10 <input type="checkbox"/> Donkey</p>
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INTERVIEW / CLIMATE
Roster: LIVESTOCK ROSTER - %ROSTERTITLE%
generated by multi-select question Q85 livestock

E Q85.Contains(1)|| Q85.Contains(2) || Q85.Contains(3)|| Q85.Contains(4)|| Q85.Contains(5)|| Q85.Contains(6)|| Q85.Contains(7)|| Q85.Contains(8)|| Q85.Contains(9)|| Q85.Contains(10)

<p>85.1 How many %rostertitle% do you have?</p>	<p>NUMERIC: INTEGER livestock85_1</p> <p>-----</p>
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85.2 How much is your annual income from %rostertitle%?	<p>SINGLE-SELECT Tivestock85_2</p> <p>01 <input type="radio"/> Less than Tshs100,000</p> <p>02 <input type="radio"/> Tshs100,000 - Tshs500,000</p> <p>03 <input type="radio"/> Tshs500,000 - Tshs1,000,000</p> <p>04 <input type="radio"/> Tshs1,000,000 - Tshs2,000,000</p> <p>05 <input type="radio"/> Tshs2,000,000 +</p> <p>06 <input type="radio"/> Does not sell</p>
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85.3 How many production cycles do you usually do in a year for %rostertitle%?	<p>NUMERIC: INTEGER Tivestock85_3</p> <p>-----</p>
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85.4 To whom do you usually sell most of %rostertitle%?	<p>MULTI-SELECT Tivestock85_4</p> <p>01 <input type="checkbox"/> Trader</p> <p>02 <input type="checkbox"/> Local market</p> <p>03 <input type="checkbox"/> Relatives</p> <p>04 <input type="checkbox"/> National Marketing Board</p> <p>05 <input type="checkbox"/> Other</p> <p>06 <input type="checkbox"/> Does not sell</p>
---	---

85.5 Do you have a supplier contract with your market for %rostertitle%?	<p>SINGLE-SELECT Tivestock85_5</p> <p>01 <input type="radio"/> Yes</p> <p>02 <input type="radio"/> No</p>
--	--

<p>86. Do you have any of the following trees on your household land?</p> <p>E Q39a-2</p> <p>V1 !(Q86.Contains(99) && Q86.ContainsAny(1,2,3,4,5,6,7,8,9,88))</p> <p>M1 You cannot select "None" together with one of the other options</p> <p>V2 !(Q86.Contains(88) && Q86.ContainsAny(1,2,3,4,5,6,7,8,9,99))</p> <p>M2 You cannot select 'dont know' together with one of the other options</p>	<p>MULTI-SELECT Q86</p> <p>01 <input type="checkbox"/> Avocado</p> <p>02 <input type="checkbox"/> Mango</p> <p>03 <input type="checkbox"/> Pawpaw</p> <p>04 <input type="checkbox"/> Orange</p> <p>05 <input type="checkbox"/> Lemon</p> <p>06 <input type="checkbox"/> Banana</p> <p>07 <input type="checkbox"/> Grapes</p> <p>08 <input type="checkbox"/> Water melon</p> <p>09 <input type="checkbox"/> Guava</p> <p>99 <input type="checkbox"/> None</p> <p>88 <input type="checkbox"/> Don't know</p> <p>10 <input type="checkbox"/> Dates</p>
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INTERVIEW / CLIMATE
Roster: FRUIT TREE ROSTER - %ROSTERTITLE%
generated by multi-select question Q86 fruittree

E Q86.Contains(1) || Q86.Contains(2) || Q86.Contains(3) || Q86.Contains(4) || Q86.Contains(5) || Q86.Contains(6) || Q86.Contains(7) || Q86.Contains(8) || Q86.Contains(9) || Q86.Contains(10)

86.1 How many kg of %rostertitle% did you harvest in the last season?	<p>NUMERIC: INTEGER fruittree86_1</p> <p>-----</p>
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<p>86.2 How much is your annual income from the sale of %rosteritle%?</p>	<p>SINGLE-SELECT fruittree86_2</p> <p>01 <input type="radio"/> Less than Tshs100,000</p> <p>02 <input type="radio"/> Tshs100,000 - Tshs500,000</p> <p>03 <input type="radio"/> Tshs500,000 - Tshs1,000,000</p> <p>04 <input type="radio"/> Tshs1,000,000 - Tshs2,000,00</p> <p>0 <input type="radio"/></p> <p>05 <input type="radio"/> Tshs2,000,000 +</p> <p>06 <input type="radio"/> Does not sell</p>
<p>86.3 To whom do you usually sell most of %rosteritle%?</p>	<p>MULTI-SELECT fruittree86_3</p> <p>01 <input type="checkbox"/> Trader</p> <p>02 <input type="checkbox"/> Local market</p> <p>03 <input type="checkbox"/> Relatives</p> <p>04 <input type="checkbox"/> National Marketing Board</p> <p>05 <input type="checkbox"/> Other</p>
<p>86.4 Do you have a supplier contract with your market for %rosteritle%?</p>	<p>SINGLE-SELECT fruittree86_4</p> <p>01 <input type="radio"/> Yes</p> <p>02 <input type="radio"/> No</p>
<p>88. What food storage facilities do you have in your household which enables you to store food for more than six months?</p>	<p>MULTI-SELECT Q88</p> <p>01 <input type="checkbox"/> Sisal Bags</p> <p>02 <input type="checkbox"/> Metallic drums</p> <p>03 <input type="checkbox"/> Plastic drums</p> <p>04 <input type="checkbox"/> Kihenge</p> <p>99 <input type="checkbox"/> Other (specify)</p> <p>05 <input type="checkbox"/> Brick silo</p>
<p>SPECIFY</p> <p>Q88. Contains(99)</p>	<p>TEXT Q88_s</p> <hr/>
<p>89. In the past 12 months have you experienced the following natural resources use conflicts?</p>	<p>MULTI-SELECT Q89</p> <p>01 <input type="checkbox"/> Access and use of land</p> <p>02 <input type="checkbox"/> Farmers-pastoralist</p> <p>03 <input type="checkbox"/> Access and use of Pasture</p> <p>04 <input type="checkbox"/> Access and use of Forest</p> <p>05 <input type="checkbox"/> Access and use of Water</p>

90. Out of the total land owned by the household, how many hectares are under the following (Climate smart agriculture)?

MULTI-SELECT Q90

- 01 Not ploughing (zero tillage)
- 02 Reduced ploughing (low tillage)
- 03 Rotating crops between seasons (e.g. alternating cereals and legumes)
- 04 Mulching to retain soil moisture and regulate soil temperature
- 05 Reducing erosion by wind and water (i.e. hedging, ditching, stone lines..)
- 06 Dosing fertilizer
- 07 Terracing and/or land reclamation
- 08 Manure application (to restore soil organic content)
- 09 Agroforestry/planting trees in fields
- 10 Intercropping with nitrogen fixing legumes (like cowpeas, beans or pigeon peas)
- 11 Fertilizing practices leaving crop residues in the field
- 12 Drought resistance crop cultivar
- 13 Deep tillage
- 99 Other (specify)
- 01 Don't know
- 14 None

SPECIFY

TEXT Q90_s

E Q90. Contains (99)

INTERVIEW / CLIMATE

Roster: HECTARES - %ROSTERTITLE%
generated by multi-select question Q90

Q90a

Q90a How many hectares of your total land is under %rostertitle% ?

NUMERIC: DECIMAL

Q90_a

INTERVIEW / CLIMATE

HOUSEHOLD RESILIENCE SCORE CARD QUESTIONS

115. Have one or more household members participated in the formulation of joint village land-use plan?	SINGLE-SELECT 01 <input type="radio"/> Yes 02 <input type="radio"/> No	participate_LUP
116. Is at least one family member participating in a FFS or a producer group, that has increased household production and/or incomes?	SINGLE-SELECT 01 <input type="radio"/> Yes 02 <input type="radio"/> No	participate_FFS
117. Has the household adopted a climate-smart production system including measures for the sustainable management of soils and water in at least 1/4 of its cultivated land?	SINGLE-SELECT 01 <input type="radio"/> Yes 02 <input type="radio"/> No	climate_smart_agric
118. Has the household access to a secure water source (rainwater harvesting and micro supplementary irrigation) for at least 1/5 of its cultivated land?	SINGLE-SELECT 01 <input type="radio"/> Yes 02 <input type="radio"/> No	access_water_source
119. In the last years has the family used weather forecast information to take decision on crops and varieties to cultivate and time of planting?	SINGLE-SELECT 01 <input type="radio"/> Yes 02 <input type="radio"/> No	weather_forecast_info
120. Does the family have access to a renewable energy source for household and production needs?	SINGLE-SELECT 01 <input type="radio"/> Yes 02 <input type="radio"/> No	access_renewable_energy

INTERVIEW FOLLOW UP

121. Are you willing to participate in a follow-up survey similar to this one in a few years?	SINGLE-SELECT 01 <input type="radio"/> No 02 <input type="radio"/> Yes	followup
122. Can we reach you by mobile phone? E followup==2	SINGLE-SELECT 01 <input type="radio"/> No 02 <input type="radio"/> Yes	phone
123. If you don't mind, could we take down your mobile phone number? E phone==2	NUMERIC: INTEGER -----	phone_nu

STATIC TEXT

THANK RESPONDENT FOR HIS COOPERATION AND COMPLETE AND CHECK INTERVIEW

RECORD END TIME OF THE INTERVIEW	DATE: CURRENT TIME -----	time_end
----------------------------------	-----------------------------	----------

Please reenter the GPS

GPS

GPS_2

N

W

A

VILLAGE SURVEY

SUPERVISOR	SINGLE-SELECT supervisor 01 <input type="radio"/> Innocent Zilihona 02 <input type="radio"/> Omari Mzirai 03 <input type="radio"/> Jane Mbilinyi 04 <input type="radio"/> Canute Hyandye 05 <input type="radio"/> Zacharia Masanyiwa 06 <input type="radio"/> Stephen Lugaimukamu
Please enter the date	DATE: CURRENT TIME date _____
DISTRICT	SINGLE-SELECT district 01 <input type="radio"/> Kondoa Haubi 02 <input type="radio"/> Mkalama 03 <input type="radio"/> Nzega Sigili 04 <input type="radio"/> Magu Sukuma 05 <input type="radio"/> Micheweni
Kondoa Villages E district=1	SINGLE-SELECT kondoa 01 <input type="radio"/> Haubi 02 <input type="radio"/> Mafai 03 <input type="radio"/> Mwisanga 04 <input type="radio"/> Ntomoko
Sigili Villages E district=3	SINGLE-SELECT nzega 01 <input type="radio"/> Bulambuka 02 <input type="radio"/> Bulende 03 <input type="radio"/> Iboja 04 <input type="radio"/> Lyamalagwa 05 <input type="radio"/> Sigili
Sukuma Villages E district=4	SINGLE-SELECT magu 01 <input type="radio"/> Iseni 02 <input type="radio"/> Lumeji 03 <input type="radio"/> Nyang'hanga
Mkalama Wards E district=2	SINGLE-SELECT mkalama 01 <input type="radio"/> Maombala 02 <input type="radio"/> Mwangeza

<p>Maombala Villages</p> <p>E aka1ana=1</p>	<p>SINGLE-SELECT maombala</p> <p>01 <input type="radio"/> Lugongo</p> <p>02 <input type="radio"/> Mkiko</p> <p>03 <input type="radio"/> Mpambala</p> <p>04 <input type="radio"/> Nyahaa</p>
<p>Mwangeza Village</p> <p>I Put the village name as "Munguli"</p> <p>E aka1ana=2</p>	<p>TEXT mwangeza</p> <p>_____</p>
<p>Micheweni Pemba Wards</p> <p>E district=5</p>	<p>SINGLE-SELECT micheweni_P</p> <p>01 <input type="radio"/> Micheweni</p> <p>02 <input type="radio"/> Maziwa Ng'ombe</p>
<p>Micheweni Villages</p> <p>E micheweni_P=1</p>	<p>SINGLE-SELECT micheweni</p> <p>01 <input type="radio"/> Kwale/Majenzi</p> <p>02 <input type="radio"/> Micheweni Chamboni</p> <p>03 <input type="radio"/> Micheweni Mjini</p> <p>04 <input type="radio"/> Mjini Wingwi</p> <p>05 <input type="radio"/> Shumbamjini</p>
<p>Maziwa Ng'ombe Villages</p> <p>E micheweni_P=2</p>	<p>SINGLE-SELECT maziwa</p> <p>01 <input type="radio"/> Kiuyu Mbuyuni</p> <p>02 <input type="radio"/> Maziwa Ng'ombe</p> <p>03 <input type="radio"/> Shanake</p>
<p>What kind of agro-ecological zone is this village in?</p>	<p>SINGLE-SELECT agrozone</p> <p>01 <input type="radio"/> semi arid</p> <p>02 <input type="radio"/> coastal</p>
<p>Please enter the GPS location</p>	<p>GPS gps</p> <p>N _____</p> <p>W _____</p> <p>A _____</p>
<p>1a. What is the approximate population in your village?</p> <p>I Information to be collected from interview with village leader (elder, chlef, official, etc)</p>	<p>NUMERIC: DECIMAL v1</p> <p>SCOPE: SUPERVISOR</p> <p>_____</p>
<p>1b. What is the approximate number of household olds in your village?</p>	<p>NUMERIC: DECIMAL v1b</p> <p>SCOPE: SUPERVISOR</p> <p>_____</p>

VILLAGE INFORMATION

STATIC TEXT

Of all the negative events, natural or socio-economic, that occurred in the region over the last 5 years, which were the most damaging to people in your village (as far as negative impacts on their households, livelihoods, and/or agriculture/livestock)? IF DON'T KNOW: Type -99 IF NOT VERY WORRIED ABOUT ANY EVENT: Type -88

<p>WRITE FIRST NEGATIVE EVENT (MOST DAMAGING)</p> <p>I IF DON'T KNOW: Type -99 IF NOT VERY WORRIED ABOUT ANY EVENT: Type -88</p>	<p>TEXT</p> <p>v2_1</p> <p>-----</p>
<p>WRITE SECOND NEGATIVE EVENT</p> <p>I IF DON'T KNOW or NO MORE NEGATIVE EVENTS: Type -99 E v2_1= "-99" && v2_1= "-88"</p>	<p>TEXT</p> <p>v2_2</p> <p>-----</p>
<p>WRITE THIRD NEGATIVE EVENT</p> <p>I IF DON'T KNOW or NO MORE NEGATIVE EVENTS: Type -99 E v2_1= "-99" && v2_1= "-88" && v2_2= "-99"</p>	<p>TEXT</p> <p>v2_3</p> <p>-----</p>
<p>WRITE FOURTH NEGATIVE EVENT</p> <p>I IF DON'T KNOW or NO MORE NEGATIVE EVENTS: Type -99 E v2_1= "-99" && v2_1= "-88" && v2_2= "-99" && v2_3= "-99"</p>	<p>TEXT</p> <p>v2_4</p> <p>-----</p>
<p>WRITE FIFTH NEGATIVE EVENT</p> <p>I IF DON'T KNOW or NO MORE NEGATIVE EVENTS: Type -99 E v2_1= "-99" && v2_1= "-88" && v2_2= "-99" && v2_3= "-99" && v2_4= "-99"</p>	<p>TEXT</p> <p>v2_5</p> <p>-----</p>
<p>When did the %v2_1% occur? IF DON'T KNOW: Type -99</p> <p>E v2_1= "-99" && v2_1= "-88"</p>	<p>TEXT</p> <p>v2_1detail1s</p> <p>-----</p>
<p>What was the duration of %v2_1% ?</p> <p>E v2_1= "-99" && v2_1= "-88"</p>	<p>TEXT</p> <p>v2_1detail1s2</p> <p>-----</p>
<p>What was the impact of %v2_1% on households?</p> <p>E v2_1= "-99" && v2_1= "-88"</p>	<p>TEXT</p> <p>v2_1detail1s3</p> <p>-----</p>
<p>What were the recovery efforts made after %v2_1%?</p> <p>E v2_1= "-99" && v2_1= "-88"</p>	<p>TEXT</p> <p>v2_1detail1s4</p> <p>-----</p>
<p>When did the %v2_2% occur? IF DON'T KNOW: Type -99</p> <p>E v2_1= "-99" && v2_1= "-88" && v2_2= "-99"</p>	<p>TEXT</p> <p>v2_2detail1s</p> <p>-----</p>
<p>What was the duration of %v2_2% ?</p> <p>E v2_1= "-99" && v2_1= "-88" && v2_2= "-99"</p>	<p>TEXT</p> <p>v2_2detail1s2</p> <p>-----</p>

<p>What was the impact of %v2_2% on households ?</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99"</p>	<p>TEXT</p> <p>v2_2details3</p> <p>-----</p>
<p>What were the recovery efforts made after %v2_2%?</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99"</p>	<p>TEXT</p> <p>v2_2details4</p> <p>-----</p>
<p>When did the %v2_3% occur? IF DON'T KNOW: Type -99</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99" && v2_31= "-99"</p>	<p>TEXT</p> <p>v2_3details1s</p> <p>-----</p>
<p>What was the duration of %v2_3% ?</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99" && v2_31= "-99"</p>	<p>TEXT</p> <p>v2_3details2</p> <p>-----</p>
<p>What was the impact of %v2_3% on households ?</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99" && v2_31= "-99"</p>	<p>TEXT</p> <p>v2_3details3</p> <p>-----</p>
<p>What were the recovery efforts made after %v2_3%?</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99" && v2_31= "-99"</p>	<p>TEXT</p> <p>v2_3details4</p> <p>-----</p>
<p>When did the %v2_4% occur? IF DON'T KNOW: Type -99</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99" && v2_31= "-99" && v2_41= "-99"</p>	<p>TEXT</p> <p>v2_4details1s</p> <p>-----</p>
<p>What was the duration of %v2_4% ?</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99" && v2_31= "-99" && v2_41= "-99"</p>	<p>TEXT</p> <p>v2_4details2</p> <p>-----</p>
<p>What was the impact of %v2_4% on households ?</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99" && v2_31= "-99" && v2_41= "-99"</p>	<p>TEXT</p> <p>v2_4details3</p> <p>-----</p>
<p>What were the recovery efforts made after %v2_4%?</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99" && v2_31= "-99" && v2_41= "-99"</p>	<p>TEXT</p> <p>v2_4details4</p> <p>-----</p>
<p>When did the %v2_5% occur? IF DON'T KNOW: Type -99</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99" && v2_31= "-99" && v2_41= "-99" && v2_51= "-99"</p>	<p>TEXT</p> <p>v2_5details1s</p> <p>-----</p>
<p>What was the duration of %v2_5% ?</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99" && v2_31= "-99" && v2_41= "-99" && v2_51= "-99"</p>	<p>TEXT</p> <p>v2_5details2</p> <p>-----</p>

<p>What was the impact of %v2_5% on households ?</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99" && v2_31= "-99" && v2_41= "-99" && v2_51= "-99"</p>	<p>TEXT v2_5details3</p> <hr/>
<p>What were the recovery efforts made after %v2_5%?</p> <p>E v2_11= "-99" && v2_11= "-88" && v2_21= "-99" && v2_31= "-99" && v2_41= "-99" && v2_51= "-99"</p>	<p>TEXT v2_5details4</p> <hr/>

11TH COMPONENT

<p>Has your village been engaged in a natural resources management plan?</p>	<p>SINGLE-SELECT v24</p> <p>02 <input type="radio"/> Yes</p> <p>01 <input type="radio"/> No</p> <p>-01 <input type="radio"/> Don't know</p>
<p>Please describe this natural resources management plan</p> <p>E v24→2</p>	<p>TEXT v245</p> <p>_____</p>
<p>Is this natural resource management plan related to LDFS?</p> <p>E v24→2</p>	<p>SINGLE-SELECT projectimplementation</p> <p>01 <input type="radio"/> Yes</p> <p>02 <input type="radio"/> No</p> <p>03 <input type="radio"/> Don't Know</p>
<p>Among the following weather related events, which are those that may affect your village infrastructure?</p> <p>I Read out options, and select no more than 3</p>	<p>MULTI-SELECT v25</p> <p>01 <input type="checkbox"/> Flood</p> <p>02 <input type="checkbox"/> Wild fires</p> <p>03 <input type="checkbox"/> Storm</p> <p>04 <input type="checkbox"/> Hail</p> <p>05 <input type="checkbox"/> Drought</p> <p>06 <input type="checkbox"/> Landslides</p> <p>07 <input type="checkbox"/> Frost</p> <p>08 <input type="checkbox"/> Erosion</p>

11TH COMPONENT

Roster: WEATHER RELATED EVENTS

generated by multi-select question v25

weatherevent

<p>How damaging would a %rostartitle% be?</p>	<p>SINGLE-SELECT damage</p> <p>01 <input type="radio"/> Low-minor severity</p> <p>02 <input type="radio"/> Medium-moderate severity</p> <p>03 <input type="radio"/> High-major severity</p> <p>-01 <input type="radio"/> Don't know</p>
<p>How likely is it that a %rostartitle% will occur in the next 12 months?</p>	<p>SINGLE-SELECT v27</p> <p>01 <input type="radio"/> Unlikely</p> <p>02 <input type="radio"/> Likely</p> <p>03 <input type="radio"/> Very likely</p> <p>-01 <input type="radio"/> Don't know</p>
<p>Does your village adopt measures to protect in frastructure from climate-related events?</p>	<p>SINGLE-SELECT v28</p> <p>02 <input type="radio"/> Yes</p> <p>01 <input type="radio"/> None</p> <p>-01 <input type="radio"/> Don't know</p>

What kind of measures?

E v28→2

TEXT

v28s

VILLAGE EDUCATION

STATIC TEXT

Information to be collected from interview with village head teacher (or the most senior teacher available)

3. How many schools (for students age 5 to 14, public and private) are there in your village?	NUMERIC: INTEGER v3 -----
4. Can you please list the names of the schools in your village? E v31=0	LIST v4 -----

VILLAGE EDUCATION

Roster: SCHOOL ROSTER
generated by list question v4

schroster

5.1 What is the total number of female students in %rostertitle% (age 5 to 14)?	NUMERIC: INTEGER v5_1 -----
5.2 What is the total number of male students in %rostertitle% (age 5 to 14)?	NUMERIC: INTEGER v5_2 -----
6.1 How many full-time teachers are there at %rostertitle%?	NUMERIC: INTEGER v6_1 -----
6.2 How many part-time teachers are there at %rostertitle%?	NUMERIC: INTEGER v6_2 -----

STATIC TEXT

FOR ALL THE SCHOOLS COMBINED

7. Are full-time teachers provided with subsidized, or free housing? If so, what is the quality of the housing? E v31=0	SINGLE-SELECT v7 01 <input type="radio"/> No 02 <input type="radio"/> Yes, provided poor-quality housing 03 <input type="radio"/> Yes, provided adequate-quality housing 04 <input type="radio"/> Yes, provided high-quality housing 05 <input type="radio"/> Don't know
--	---

<p>8. Do the teachers have adequate teaching supplies to teach effectively? (for example: chalk, teacher's books, maps, posters)?</p> <p>E v31=0</p>	<p>SINGLE-SELECT v8</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> A few teachers do</p> <p>03 <input type="radio"/> About half the teachers do</p> <p>04 <input type="radio"/> Most teachers do</p> <p>05 <input type="radio"/> Yes, all teachers do</p> <p>06 <input type="radio"/> Don't know</p>
<p>9. Do the students have adequate school supplies to learn/study effectively? (for example: note books, pencils, textbooks, chairs, uniforms (if required), desk)</p> <p>E v31=0</p>	<p>SINGLE-SELECT v9</p> <p>01 <input type="radio"/> No</p> <p>02 <input type="radio"/> A few students do</p> <p>03 <input type="radio"/> About half the students do</p> <p>04 <input type="radio"/> Most students do</p> <p>05 <input type="radio"/> Yes, all students do</p> <p>06 <input type="radio"/> Don't know</p>
<p>10. In the last 2 school years, how has the overall performance of the majority of the students changed?</p> <p>! Please clarify that this is not an evaluation of the teacher or the school, but rather a more general evaluation of the learning environment</p> <p>E v31=0</p>	<p>SINGLE-SELECT v10</p> <p>01 <input type="radio"/> Improved slightly</p> <p>02 <input type="radio"/> Improved moderately</p> <p>03 <input type="radio"/> Improved a lot</p> <p>04 <input type="radio"/> Worsened slightly</p> <p>05 <input type="radio"/> Worsened moderately</p> <p>06 <input type="radio"/> Worsened a lot</p> <p>07 <input type="radio"/> No significant change</p> <p>08 <input type="radio"/> Don't know</p> <p>09 <input type="radio"/> Other</p>
<p>SPECIFY</p> <p>E v10=9</p>	<p>TEXT v10s</p> <p>-----</p>
<p>11. Were some of the schools unable to accept students due to limited places (or sleeping space in the school dorms) and/or limited school supplies?</p>	<p>SINGLE-SELECT v11</p> <p>-01 <input type="radio"/> None, able to accommodate all students</p> <p>-02 <input type="radio"/> None, accepted all students regardless of crowding</p> <p>-03 <input type="radio"/> Don't know</p> <p>01 <input type="radio"/> Yes, some</p>
<p>11s. How many students could not be accepted?</p> <p>E v11=1</p>	<p>NUMERIC: INTEGER v11s</p> <p>-----</p>

VILLAGE HEALTH

STATIC TEXT	
<i>Information to be collected from village senior health-care staff (or most senior available)</i>	
14. How many health-care centres (public & private) are there within approximately 5km of your village centre?	NUMERIC: INTEGER v14 -----
15. Please could you list the names of these health-care centres E v141=0	LIST v15 -----

VILLAGE HEALTH	
Roster: HEALTH-CARE CENTRES	
generated by list question v15	
hicarecentre	
16. How many patients can be treated/attended to in 1 day when %rosteritle% is at maximum capacity?	NUMERIC: INTEGER v16 -----
17. How often does %rosteritle% usually have enough medical supplies to provide adequate health care?	SINGLE-SELECT v17 01 <input type="radio"/> Never 02 <input type="radio"/> Rarely 03 <input type="radio"/> Sometimes 04 <input type="radio"/> Often 05 <input type="radio"/> Always
18.1 How many full-time health-care staff work in %rosteritle%?	NUMERIC: INTEGER v18_1 -----
19.1 On AVERAGE, how many years have the full time staff in %rosteritle% been working as a health-care professional?	NUMERIC: INTEGER v19_1 -----
20.1 On AVERAGE, how many years of formal medical training has each full-time staff in %rosteritle% completed?	NUMERIC: INTEGER v20_1 -----
18.2 How many part-time health-care staff work in %rosteritle%?	NUMERIC: INTEGER v18_2 -----
19.2 On AVERAGE, how many years have the part-time staff in %rosteritle% been working as a health-care professional?	NUMERIC: INTEGER v19_2 -----
20.2 On AVERAGE, how many years of formal medical training has each part-time staff in %rosteritle% completed?	NUMERIC: INTEGER v20_2 -----

STATIC TEXT

FOR ALL HEALTH CENTRES COMBINED

21. In the last 2 years, how has the overall health of the majority of the people in your village changed?

SINGLE-SELECT

v21

- 01 Improved slightly
- 02 Improved moderately
- 03 Improved a lot
- 04 Worsened slightly
- 05 Worsened moderately
- 06 Worsened a lot
- 07 No significant change
- 08 Don't know
- 09 Other

SPECIFY

TEXT

v21s

E v21--9

Appendix 3 Names of the Head of HH involved in the Endline Survey

District	Ward Name	Village Name	Village ID	HH ID	Name Of Household Head		
Kondoa DC	Haubi	Haubi	1	493	Furkana Juma Shana		
				495	Ramia Hassan Ramadhani		
				492	Hawa Omari Mlantya		
				859	Francisca Mbuva		
				855	Simon Msafiri John		
				862	Seraphin Maingu		
				455	Gabriel Thomas Lukumo		
				863	Veronica John		
				439	Mdhamiru Hamisi Iyuru		
				852	Ismail Issa		
				457	Didas John		
				854	Gabriel Tatizo Kombe		
				434	Bakari Benta Omari		
				442	Tedory Mourice		
				851	Leo Mpore Herman		
				465	Abdi Said Iyulu		
				464	Mustafa Hamiss Shaibu		
				428	Filotea Kamili Johani		
				449	Honest Leonard		
				441	Patrice Mrimi		
				458	John Mruke		
				853	Pascal Luvuva Antony		
				466	Regina Evaris Maingu		
				451	Said Ndorobo		
		860	Misanya Venance Duma				
		857	Monica Antonin				
		463	Bashiru Said Iyulu				
		861	Maria Dominiki				
		440	Ayubu Ramadhan				
		858	Zither Mbuva Mark				
		856	Engelisti Msami				
				Mafai	2	474	Juma Rajab Ng'ungu
						429	Abdilahi Mohamed Bakari
						923	Msende Mzamilo Abdallah
						476	Hamid Mavere
						489	Ramadhan Ally Tutika
		471	Hamis Rajab Nyundo				
		919	Hamis Ramadhani				
		918	Amina Hamisi Mikina				
		479	Abdilah Hussein				
		473	Shafii Husein Muhamed				
		483	Omari Abdallah Saidi				
		916	Siraji Mohamed Bakari				
		482	Hamisi Ramadhan Imondi				

				917	Bakari Mohamed Salimu
				920	Swalehe Juma Ramadhani
				475	Hawa Said
				481	Abuukhanifa Juma Mjili
				922	Issa Kadiri Athumani
				472	Halifa Shaban Mavunta
				921	Mohamed Hamisi
				468	Mwanaamina Hassan Lutu
				467	Fadhili Selemani Chira
				470	Rehema Selemani Chira
				477	Zainab Nkamia
	Kalamba	Loo	3	803	Juma Waziri Damas
				912	Zaituni Issa
				802	Abdi Said Damas
				804	Idd Ramadhan Gharimu
				805	Paschal Thomas Jacha
				915	Shakidu Abdalah Nkunya
				865	Iddi Ismaili Luvambo
				864	Athumani Mohamed Bakari
				914	Mwanjaa Ally
				913	Idd Goronya Mwenda
				809	Abdulhaman Idd
				810	Saidi Juma Suba
				796	Osama Maulidi Madege
				819	Ramadhan Mohamed Kimolo
				792	Juma Omari Hoti
				811	Iddi Boi
				820	Harubu Ramadhan Salimu
				790	Mwanaidi Said Kafwira
				817	Ramadhan Issa Athumani
				812	Hassan Kaluta
				801	Ramadhani Iddi Changa
				818	Ramadhan Abdala Kimolo
				813	Rashid Hussen Sauko
				800	Ambrose Makar
				925	Asha Idd Masha
				806	Bashiru Ramadhan Kijaji
				808	Molisadi Abdallah Mulido
				807	Rukia Juma Ikoki
				924	Majid Shaban Said
				926	Said Hassan Ally
Mkalama DC	Mpambala	Mpambala	4	868	Juma Mwagala Mnkumbu
				501	Elias Daudi Kilango
				867	Magdalena Salimu Mpanda
				1035	Shimbi Shima Gashi
				505	Maita Baniga Songelaeli

				873	Philipo Abel Philipo
				506	Jared Daudi Kileme
				514	Haji Said
				875	Emiliana Madulu
				931	Petro Matson Enock
				934	Brayson Musa
				936	Yohana Kitundu Msengi
				935	Elisante Anthony Kali
				938	Ruben Mandi
				941	Joseph Martin Mgilya
				509	Kamata Fungo John
				499	Michael Kessy
				944	Samson Kingwene Msengi
				946	Issa Mpanda Madimida
		Mkiko	5	945	Melsonby Charles
				947	Halima Mgelwa Yindi
				606	Rashid Msagaha
				597	William Shukia
				953	Jerry Rashid
				604	Solo Kindagilo Luhende
				586	Hamisi Selemani Magandi
				605	Holo Bundara Tewe
				970	Masalu Lutema Masesa
				600	Daudi Saidi Nzugika
				962	Janson Hamisi Seleman
				961	Jackson Kazi
				615	Mohamed Athumani
				965	Milembe Masele Malale
				612	Selemani Mbuga
				603	Petrol Charles Makala
				613	Daudi Emmanuel
				607	Doncaster Mbogo Katalama
				974	Silvester Stephano Kisepe
				981	Kitundu Godson Mapengo
				985	Petro Seleman Shukia
				602	Bryton Nazael Benjamin
				987	Halma Athmani Kitundu
				988	Yohana Micodemo Kisimbo
				986	Medson Nitwa Sati
				983	Wilson Makala Macheмба Juma
				616	Elinest Emmanuel
				614	Mariam Athuman
		Nyahaa	23	530	Jimisha Midaya Nyige
				529	Sen Shimbi Nzila
				537	Nkinda Mkumbo

				552	Judaism Moja Ntakunde
				971	Jilatu Kombe
				976	Zengo Luhende Mahona
				969	Holo Salumu Munyandishi
				979	Gigwa Mwigulu
				973	Haruna John Loth
				972	Mogi Gunda
				977	Christina Dionis
				996	Wilson Anthony
				532	Mbigili Malegi Mpanji
				993	Mhindi Kashinje Jinula
				539	Doto Nasoni
				554	Samweli Mpanda
				551	Shumbi Simbila
				992	Doto Darushi Ndembi
				991	Said Ally Mutiko
				549	Modulu Mtingo Ndakama
				1000	Ngusa Masawi
				544	Tunguska Mahoiga Shingu
				1033	Kasana Maloda
		Lugongo	24	564	Ngusa Sobola Bundala
				569	Fainess Kitundu
				967	Magina Masunga Jilunguyi
				572	Lameck Msengi
				571	Ndoweke Kisanduu
				578	Mbalu Nzile
				576	Sai Dulenganija
				964	Robert Issa
				960	Amri Shukia Seleman
				968	Ng'walu Nkalango
				963	Emanuel Stephano Pyuza
				577	Njile Njemu
				966	Peter Mganga
				984	Chiku Isaya
				980	Aman Masalu Yereimia
				975	Christina Juma
				982	Emanuel Muli
				978	Mhela Zengo Magida
				990	Nkangala Nzoya
				567	Pawa Dotto
				995	Mandago Mpanda
				565	Kubeja Kamoga
				994	Kando Mpanda Mkilanya
				568	Talas Mpanda Msisi
				563	Ngasa Matungo
				575	Luli Madaha

				561	Mahidi Jidino Mihulu
				997	Ngusa Mahoiga
				998	Mpogomi Darushi Ndembi
				1001	Shiwa Ngwika
	Mwangeza	Munguli	6	942	Omari Ramadhan Gimbi
				949	Emanuel Jeremia Said
				948	Baraka Makula Mange
				620	Grace John
				646	Around Musa Undala
				642	Jilala Mahona
				629	Ezekiel Pesambili
				952	Mathayo Wilson Mawishi
				950	Kalimanzila Yumbu
				621	Sanghudi Jitinya Nyadu
				622	Mahuu Muraha
				630	Kefasi Denny
				955	Masasi Ndamo
				954	Njoka Gweku
				957	Emanuel Lutonja
				956	Gidamnati Ngobo
				617	Nicolasjackson Gibuo
				951	Kizali Abel Mawishi
				959	Gemu Maige
				958	Edward Mashimba Mkumbo
				633	Juke Nyorobi
				628	Ester Awadhi
				636	Daudi Yohana
				644	Simon Zakaria Mrangi
				989	Jorum Charles
				619	Juma Abdala Maganga
	Ibaga	Igonia	7	927	Hamisi Shukia
				866	Omary Magwana
				869	Juma Isaack
				871	Shukia Makala
				872	Juma Said Shukia
				874	Pili Said
				764	Charles Mpanda
				781	Salim Ally Fimbo
				762	Iddi Ramadhan
				765	Suleman Wilson
				928	Kefas Mkilanya
				876	Pyuza Mwendu
				930	Frank Jumanne
				929	Emmanuel Yindi
				932	Ibrahim Gabriel
				940	Asha Gyole

				933	Jumanne Yindi Kivelenge		
				939	Wazaeli Isaack		
				768	Musa Kingu		
				937	Juma Mwendo		
				763	Joseph Cleopa		
				761	Jackson Mwendo		
				766	Elias Ezekiel Mtipa		
				767	Abdallah Amri		
				943	Hamis Ally		
				999	Issa Gunda		
Nzega DC	Sigili	Lyamalangwa	8	1029	Sementi Busingu		
				883	Regina Machibula		
				879	Mwashi Maige		
				300	Eliza Machimula		
				290	Wilbroad Ntale		
				870	Mondesta Zenze		
				305	Ngasa Majebele		
				293	Jumanne Bundala		
				304	Hamis Seni		
				739	Busungu Kulwa Tanganyika		
				284	Sement Busungu		
				302	Saida Kashinje		
				307	Makenzi Ruchagula		
				306	Shija Rusasu		
				298	Laurent Magaka		
				286	Nkuba Salula		
				287	Ngalambi Kamwenda		
				296	Mwajuma Zenze		
				295	Masesa Seni		
				288	Mariam Seni		
				291	Shimba Puli Nsoga		
				294	Shija Maganga		
				882	Doi Shita		
				279	Msalasini Nghinda		
				276	Kasokola Mashine		
				280	Paulina Malale		
				297	Melesiana Sitta		
				877	Nghonge Nyemha		
		303	Said Kasema Ally				
		881	Agnes Charles Mabula				
				Bulambuka	9	347	Shokela Mabula
						352	Rose Charles
				363	Melesiana Luhende		
				884	Juma Sheka		
				355	Ramadhan Abdallah		
				366	Emmanuel Luhende		

				887	Manundo Solea
				351	Annastazia Richard
				357	Yohana Augustino
				365	Fabian Luhende
				1016	Esther Charles
				367	Nyanjige Shimbi
				346	Mhamila Kagito
				359	Dotto Malehiwa
				1017	Jackson Yusuph Shaban
				348	Christopher Nkindwa
				344	Zakayo Maziku
				886	Juke Dotto
				1021	Joseph John
				342	Moshi Makonda
				885	Paskali Dotto
				1022	Mwaje Maziku
				361	Mandaru Mashine
				343	Erick Deus
				360	Lucia Mazunya
				341	Kuya Shilu
				1018	Ngasa Mayunga
				350	Nkindwa Dighai Sunu
				1039	Mugashi Tomas Kwangu
				1015	Ndelenhale Nhagi
		Sigili	10	333	Ndutu Muhoja
				329	John Shija
				327	Hamis Lupia
				312	Masingija Lubasha
				328	John Kasanzu Nkinga
				1030	Mwandu Mpanduzi
				336	Posiano Lupia Mafundo
				334	Juma Omari
				337	Rehema Nzela
				326	Captain Mbwana
				330	Raphael Dotto Geremakuzwa
				313	Ngusho Kiyenze
				411	John Nsonsoma
				335	Paulo Maduka
				323	Martha Sengo
				325	Emanuel Mwika
				331	Paschal Zabron
				314	Paschal Robert
				320	Nyanzobe Maganga
				332	Rashid Njile
				319	John Ngula
				315	Kubilu Sululu

				321	Elizabeth Shija
				308	Juma Mahimbo
				317	Subi Maganga
				1020	Jumanne Mabula
				324	Juma Bundala
				318	Said Martini
				422	Lucas Nkwabi
				310	Mabula Mayunga
				309	Juma Mabula
				311	Deus Ngasa
		Ilalo	11	1002	Masisa Masele Magu DCta
				1003	Mazigwa Kilupa
				755	Kashindye Nyanda
				751	Juma Makole
				750	Mazigwa Machibya
				756	Jackson Joshua
				749	Mchane Maganga
				746	Julias Likalilo
				758	Mabula Tungu
				745	Zakaria John
				747	Jeremia Masisa
				743	Juma Masanja
				757	Hamis Misokia
				742	Mabruk Nkwabi
				759	Pili Ngasa
				878	Dickson Mihayo
				754	Maganga John
				741	Amina Maganga
				740	Basu Manyekenda
				753	Hanga Matongo
		Iboja	21	1006	Onesmo Mahona
				379	Mwinamila Maige
				391	Bugali Gerema
				378	Neema Daudi
				394	Hamis Pascal
				1005	Christina Nestoty
				387	Mhoja Hasani
				1004	Wilson Masanja
				395	Ali Athuman
				1019	Michael Rashid
				388	Sebastiano Malim
				396	William Masatya
				375	Sanga Mpemba
				374	Kasubi Nkomya
				397	Mahela Chama
				392	Amina Thomas

				381	Samson Ntengwa
				389	Lucia Lilya
				393	Mohamed Said Nyoma
				380	Ntegwa Mahona
				373	Tungu Mayanzani
				368	Amos Makoye
				382	Ntaki Manyanda
				385	Moshi Kisabo
				383	Manyanda Saida
				372	Peresi Maganga
				370	Shija Shigera
				1007	Tumbo Jumanne Kulwa
				369	Mayanzani Tungu
		Bulende	22	405	Paskali John
				1024	Daudi Malale
				401	James Malale
				418	Mboje Malale
				1031	Manyanda John
				417	Mtalimbo Inanda
				404	Regina Subuya
				1023	Seleman Amos
				403	John Maheta
				1008	Chambi Kashinje
				427	Masaka Kahuya
				419	Nsangikwa Hassan
				1032	Lucia Kashinje
				409	Hassan Ngasikwa
				412	Nkumbi Mahona
				416	Joseph Ngoma
				1026	Cheyo Kusundwa
				1025	Nice William
				1009	Kulwa Samwel
				424	Kawawa Salimba
				415	Mungo Umoja
				423	Masanja Vunjabei
				421	Luani Ndura
				410	Lusoka Chalya
				408	Lolela Mboje
				402	Simoni Salimba
				384	Frank Manyanda
				406	Salimba Jinai
				414	Lukas Roketi Lufunga
Magu DC	Sukuma	Nyang'hanga	12	893	Bahati Mchuma
				712	Mashimba Ernest
				708	Mayala Kamata
				731	Gerevas Galashi

				723	Magdalena Lukanu
				733	Mathias Musa Kinasa
				1038	Madoshi John
				717	Nzila Nnoni
				722	Daniel Bahati
				716	Musa Samson
				1037	Lemmy Willy
				718	Mashauri Lusanika
				720	Sundi Yahona
				727	Ezron Zakaria
				725	Sophia Bahati
				724	Marko Lung'wecha
				719	Joseph Mayala
				726	Charles Beatus
				710	Manoni Bashinganye
				736	Lulengo Shinge
				730	Robert Bulabo
				734	Maritha Magashi
				735	Masota Stephano
				715	Mathayo Makungu
				707	Ernest Ngolyo
				728	Komanya Msalaba
				711	Mageni Mshigwa
				709	Ndaki Kana Marko
				894	Charles Marko
		Iseni	13	891	Emmanuel Lucas
				889	Samweli Bupilipili
				892	Masalu Lubeja
				684	Veronica Buchenja
				682	Paskali Chenya
				701	Masubi Paulo
				705	Tabu Mwanzalima
				687	Mashaka Samson
				699	Emanuel Thomas
				729	Robert Charles
				703	Angelina Misalaba
				706	Ndabacha Wiponya
				679	Juma Kakome
				694	Paulo Joseph
				677	Anthony Masele
				702	Elias Kaswahili
				696	Matthias Komanya
				678	Masalu Daudi
				686	Anna Joshua
				680	Huba Bilia
				683	Chenya Mlelema

				704	Laurencia Lugiko
				693	Musa Adam
				692	Ezekiel Yunga
				688	Felix Julias
				681	Rachel Jemus
				695	Joseph Gervas
				890	Jackson Paulo
				1036	Faustine Edward
				685	Abel Sastanese
				888	Mathias Kusekwa
		Lumeji	14	671	Enock Mabilika
				667	Helena Enock
				669	Elikana Shilangila
				665	Juma Jackson
				651	Samweli Seko
				675	Daniel Petro
				652	John Shitabojiwa
				663	Salu Mabilika
				654	Mashauri Robert
				660	Shinje Bunela
				662	Ester Batule
				656	Kulwa Doto
				647	Daniel Silvesta
				643	Kashinje Mshina
				648	Shija Lunyembeleka
				676	Koretha Luhaula
				668	Luhoyo Mhoja
				664	Hoja Ndimuke
				666	Theleza Maduka
				653	Mashauri Robert
				658	Makubi Malimi
				672	Bernadeta Barnaba
				657	Mlima John
				670	Masumbuko Kasubi
				1034	Evarist Pamba
				655	Martha Lugembe Masanja
				659	Juma Kishamawe
				649	Ester Mhoja
				661	Christina Yegela
	Buhumbi	Kitongo	20	821	Paulo Maduka
				836	Alidi Juma
				839	Makoye Sahani
				840	Rashid Said
				838	Unice Mibirika Bangili
				895	Malongo Msalaba Malando
				832	Lucas Mathias

				844	Perpetua Manyama
				1011	Malimi Mussa
				842	Rahel Bangili
				837	Mwaru Yohana
				827	Daudi Luvagula
				822	Faustine Buhurula
				896	Kiswaga John
				1013	Bahati Edward
				848	Susana Nyanda
				828	Simon Andrew
				1012	Mashiku Mazuri
				834	Silvester Mkaga
				824	Emmanuel Sahani
				833	Jefta Kubona
				897	Juma Sahani
				826	Meresiana Ngwanza
				830	Ndalahwa Mashauri
				898	Mpina Martine
				850	Doyai Andrea
				1010	Mathayo Mussa
				846	Juma Manyasima
				1014	Robert Budaga
				829	Wilbert Msalaba
				847	Paulo Gervas
Micheweni DC	Micheweni DC	Chamboni	15	88	Shame Mbwana Shame
				73	Time Kombe Faki
				63	Issa Kombo Ally
				66	Ali Massoud Mwinyi
				81	Hamad Fundi Kombo
				86	Faki Hamad Haji
				217	Jabu Hamad Kombo
				79	Ali Kombo Ali
				71	Zuberi Juma Hamisi
				82	Faki Hamad Fundi
				69	Hamis Omary Haji
				62	Viwe Khatibu Hamad
				78	Hamad Juma Salim
				89	Siti Kombo Said
				68	Mohamed Kombo
				77	Khamis Shoka Hassan
				65	Khatib Mbwara Mbwana
				90	Omary Hamad Haji
				172	Viwe Maruhun Khatibu
				83	Haji Hassan Sharifu
				87	Mbarouk Mbwana
				80	Sanani Seif Juma

				70	Bakar Said Makame
				75	Ali Faki Kombo
				61	Salim Hamis Ali
				219	Bivite Khamis Mwinyi
				72	Rashid Omari Hamadi
				74	Bizume Abdalaha Mshindo
				76	Ujudi Mpenda Haji
				64	Mussa Omar Yussuf
				67	Ali Faki Hamad
				85	Biddi Mbware Haji
		Mjiniwingwi	16	181	Shame Juma Omari Mata
				907	Masudi Ally Mbwana
				170	Maulid Isa Chande
				164	Hamadi Mwinyi Shoka
				167	Mkasi Juma Ibrahimu
				175	Ali Yusuph Faki
				171	Rashid Athman Tumu
				187	Ismail Shaame Hamad
				163	Kombo Mjaja
				173	Time Issa Hamad
				165	Hassan Salum Simba
				169	Makame Juma Makame
				188	Shaame Hamad Khamis
				166	Hamadi Ali Hamadi
				186	Hamisi Tani Kombo
				177	Adia Sheckhe Nassoro
				191	Hassan Ali Khatibu
				190	Khatibu Ali Makame
				179	Kombo Faki Bakari
				178	Abdalaha Khatib Omar
				910	Bikuu Juma Khatib
				909	Rehema Mwinyi Hamad
				183	Omar Haji Omar
				911	Ismail Bakar Haji
				184	Mohamed Kombo Makame
				185	Shoka Juma Makame
		Majenzi	25	49	Salum Omari Kombo
				41	Bakari Hamad Kombo
				46	Khatibu Kombo Faki
				37	Njiwa Simba Salehe
				45	Halima Juma Omari
				42	Mfaki Hassan Shaame
				39	Said Shame Said
				50	Ali Haji Omar
				58	Ali Hamad Masoud
				44	Pandu Khatib Juma

				36	Rashid Bakari Kombo
				32	Kombo Mbwana Haji
				52	Hamad Mbwana Shaame
				906	Rashid Juma Hamad
				56	Omar Juma Pandu
				35	Ali Hamad Kombo
				38	Bijuma Shani Said
				54	Juma Faki Juma
				34	Khatibu Salim Omar
				40	Halibut Hassan
				43	Khatibu Faki Shehe
				60	Shaame Kai Omar
				51	Mose Juma Faki
				33	Shame Masoud Said
				53	Hamad Said Mbwana
				31	Ali Swadi Hamad
				47	Mbarouk Hassan Hamad
		Micheweni DC Mjini	26	200	Saidi Hamisi Haji
				120	Umoja Faki Masoud
				197	Hadia Mwinyi Suwed
				196	Ali Marick Mbwala
				214	Bjiine Kombo Kwale
				128	Time Hamad Makame
				221	Haji Abrahaman Ali
				212	Shehe Juma
				209	Khabibu Hamza Shoka
				204	Rabia Khamis Rashidi
				103	Mpaji Mansour Marzukul
				215	Simba Mjaka Hassan
				203	Mboje Khamis Shaame
				202	Faki Khatibu Simba
				904	Said Juma Hamad
				210	Ali Hamadi Mjaja
				198	Halima Nassoro Chumu
				211	Ali Hamadi Kai
				208	Haji Rashidi Faki
				201	Mjaka Amani Mjaka
				205	Ali Kombo Shineni
				199	Ayubu Khatibu Ayubu
				220	Hamad Ali Mkadani
				118	Haji Juma Khamis
				207	Simba Kombo Khatib
				117	Bikombo Shungi Bakari
				94	Hamad Yahaya
				189	Khatibu Shehe Yusufu
				216	Khamis Kombo Hassan

				213	Omar Ali Hamad
				218	Ali Hamad Makame
				102	Mbwara Seif Ismail
		Shumbamjini	27	14	Ramadhan Bakar Shaame
				11	Omari Abdallah Juma
				16	Bakari Ali Hassan
				4	Khatibu Khalfan Issa
				27	Salama Jabu Shaame
				2	Juma Hamad Ally
				29	Makame Ibrahimu Alfani
				905	Khatibu Kombo Mbwana
				25	Asa Ali Hamad
				30	Omar Salim Mselem
				28	Bikame Bakari
				12	Ibrahim Mwinyi Makame
				23	Siti Khatibu Bakari
				21	Bakari Faki Mnubi
				10	Subira Hanad Al
				3	Hadaa Kombo Hamad
				17	Bakar Ali Bakar
				9	Kombo Ali Mbwana
				18	Nassoro Shaame Jaaa
				20	Zaituni Omar Hamad
				24	Mjaja Khamis Mwinyi
				1	Ally Omar Hassan
				19	Nasuha Ismail I'shaka
				26	Khatibu Kombo Bakari
				15	Mbwana Sharifu Kai
				7	Omar Ruhusa Makame
	MaziwaNg'ombe	MaziwaNg'ombe	17	262	Salume Ali Khamis
				242	Juma Khatibu Juma
				238	Rashid Mbarouk Faki
				239	Kombo Khatibu Kombo
				250	Kombo Juma Ali
				251	Kombo Ali Ismsil
				240	Simba Hanad Yussuf
				241	Khamis Said Khamis
				247	Mussa Ali Said
				245	Rashid Khamis Rashid
				248	Mwihaji Sharifu Kombo
				249	Shezume Juma Sharifu
				224	Shabani Hamad Juma
				229	Makeufi Haji
				244	Hamad Juma Bakar
				253	Kombo Rashid Bro
				252	Rashid Kombo Zume

				243	Juma Omary Shaame
				902	Kombo Hamisi Juma
				237	Hamad Kombo Hatibu
				234	Khatibu Hamad Ali
				233	Time Salim Faki
				225	Khatibu Omar Khatibu
				222	Bakari Ali Hamad
				227	Hamad Ali Faki
				235	Mwanahamisi Haji Hassan
				230	Ali Mbwana Simba
				226	Kombo Said Shineni
				246	Juma Hamad Khatibu
				232	Juma Salim Faki
				231	Juma Sheha Ismail
				228	Time Shoka Ismail
		Kiuyu	18	116	Bikuu Hija Dawa
				96	Mboga Hija Dawa
				99	Mwavite Shoka Faki
				121	Simba Ismail Khatibu
				93	Mbwara Shaame Kombo
				123	Sharifu Juma
				101	Mshindo Faki Shoka
				95	Hamad Faki Kombo
				111	Khamis Abdalla Khamis
				92	Faki Rashid Juma
				91	Jabu Ali Rajabu
				108	Bikame Juma Mjaka
				113	Ali Kombo Kombo
				98	Bakari Omari Hamis
				899	Kombo Ali Bakari
				1027	Sharifu Juma
				109	Bipombe Bakar Juma
				112	Muhudhar Kombo Shaame
				105	Kombo Hamisi Kombo
				106	Sharifu Hamad Faki
				110	Khamis Zume Juma
				107	Kombo Haji Mbwana
		Wingwi mapofu	19	269	Fatma Rashid Nassoro
				259	Ally Rajabu Kombo
				255	Mohamed Ali Mohamed
				270	Omari Nassor Rashid
				258	Sizani Fadhiliun Khamisi
				275	Said Ali Aid
				271	Athuman Ali Khamis
				261	Mchanga Juma Haji
				281	Hamad Abdalla Bakar

				272	Rashid Suleiman Juma
				266	Ali Bakar Ali
				264	Abdalla Said Omar
				265	Ali Hamad Ali
				267	Ali Juma Omar
				260	Ali Juma Hamad
				263	Bikame Suleiman Khamis
				908	Juma Salim Juma
				278	Hadia Hassan Nassoro
				254	Mohamed Hamad Hassan
				268	Abdi Othman Khamis
				274	Omari Faki Omari
				273	Hadia Ismail
				256	Hamad Ally Mbarouk
		Shanake	28	144	Ally Mkasha Mpemba
				157	Nshamba Hatibu Kaye
				162	Hija Mbwana Makame
				155	Shiba Faki Shiba
				900	Viwe Shame Hamisi
				901	Said Hatibu Ally
				149	Sharifu Juma Khatibu
				57	Juma Hamad Abeid
				6	Hamad Juma Hamad
				137	Hamadi Ali Bakari
				139	Mbikao Hamad Salehe
				150	Sharifu Haji Faki
				160	Kombo Hija Kombo
				158	Khatibu Shaame Hamis
				143	Hamad Hassan Juma
				133	Hamad Sharifu Hamad
				159	Hatibu Ally Hatibu
				145	Abdalla Hassan Ali
				903	Abdallah Ally Simba
				153	Kai Mbwana Kai
				146	Mboje Kombo Dawa
				142	Mboje Dawa Suawi
				135	Iddi Ali Khatibu
				140	Juma Seif Juma
				138	Abdalla Hassan Ali
				141	Mikioni Juma Simba
				156	Mwinchande Othman Hassan
				1028	Khatibu Said Khatib
				134	Hatibu Sharif Faki
				148	Said Hassan Juma
				152	Hamis Hamad Kombo

Appendix 4

Guiding questions for FGD and SSC

1. Main Interventions Identification
 - What were the main interventions of the GEF/LDFS project in your area? (Ensure several interventions are mentioned for comprehensive understanding.)
2. Participation in Interventions
 - How did you participate in these project interventions? (Probe for details on participation for each intervention mentioned in question 1.)
3. Evaluation of Interventions
 - What aspects of the project interventions have been successful, and which have not?
 - What are the possible reasons for the successes and challenges encountered? (Discuss for each intervention mentioned in question 2)
4. Resource Use Conflicts
 - What disagreements or conflicts have occurred over using shared resources (rangeland, forestland, water) within the Village or with neighbouring Villages?
5. Conflict Resolution
 - How were these conflicts or disagreements resolved?
6. Learning and Adoption of Practices
 - How have you participated in learning about and using conservation and climate-smart farming practices? (Probe for details on various practices and technologies adopted.)
7. Realized Benefits
 - What benefits have you realised from using conservation and climate-smart farming practices so far?
8. Producer Groups
 - Are there any producer groups that process and sell products jointly to improve market access and income from their production? (be for names of groups, types of products, and market access details.)
9. Support to Producer Groups
 - What support have producer groups received from the GEF/LDFS project to improve processing and market access?
10. Suggestions for Improvement
 - What changes or improvements would you suggest to realise more benefits from the GEF/LDFS project interventions? (Probe for suggestions for each intervention discussed.)
11. Sustainability Plans
 - How do you plan to sustain the achievements made through the project beyond its lifetime?

Appendix 5

Guiding questions for key informant interviews.

1. Main Interventions Identification
 - What were the main interventions of the GEF/LDFS project in your area?
2. ii. Evaluation of Interventions
 - What aspects of the project interventions have been successful, and which have not?
 - What are the possible reasons for these outcomes?
3. Natural Resource Committee Functionality
 - What is the functionality and composition of the inter-Village Natural Resource Committee?
4. Achievements of the Committees
 - What achievements have the Committees realized so far in their area of jurisdiction?
5. Adoption of Conservation Practices
 - How has the adoption and use of GEF/LDFS conservation and climate-smart crop production practices been in your area?
6. Status of Crop Production
 - What was the status of crop production before and after the project intervention?
7. Realized Benefits
 - What benefits of conservation and climate-smart farming practices have been realized so far in your area?
8. Water Availability
 - What is the current availability of water for agriculture and livestock use?
9. Producer Groups
 - Are there any producer groups that process and/or sell products jointly to improve market access and income from their production? (Probe for group names, member composition, leadership, types of products, and market access.)
10. Group Achievements and Challenges
 - What are the achievements and challenges faced by these income-generating groups in your area?
 - How can the operations of these groups be improved?
11. Support to Producer Groups
 - What support have producer groups received from the GEF/LDFS project to improve processing and market access?
12. Sustainability Plans
 - What measures are in place to ensure that the achievements attained through the project are sustained beyond its lifetime?