



**AMDT**  
AGRICULTURAL MARKETS DEVELOPMENT TRUST



# SUNFLOWER

## VALUE CHAIN ENDLINE EVALUATION REPORT

Submitted by:



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## LIST OF ABBREVIATIONS

|          |                                                                 |
|----------|-----------------------------------------------------------------|
| AKF      | Aga Khan Foundation AKF                                         |
| AMDT     | Agricultural Markets Development Trust                          |
| ANSAF    | Agriculture Non-State Actors Forum                              |
| ASDP     | Agricultural Sector Development Program                         |
| BDS      | Business Development Service                                    |
| CAMARTEC | Centre for Agriculture Mechanization and Rural Technology       |
| CAPI     | Computer-Assisted Personal Interview                            |
| CBO      | Community-Based Organization                                    |
| CC       | Council Chairperson                                             |
| CSA      | Climate Smart Agricultural                                      |
| CSAPs    | Climate Smart Agricultural Practices                            |
| CEZOSOPA | Central Zone Sunflower Oil Processors                           |
| DAP      | District Agricultural Plans                                     |
| DC       | District Council                                                |
| DC       | District Commissioner                                           |
| DED      | District Executive Director                                     |
| DTO      | District Trade Officers                                         |
| ESRF     | Economic and Social Research Foundation                         |
| FGD      | Focus Group Discussion                                          |
| GAFCo    | Great African Food Company                                      |
| KIIs     | Key Informant Interviews                                        |
| MSMEs    | Micro-Small and Medium-Scale Enterprises                        |
| M4P      | Making Markets Work for the Poor                                |
| M&E      | Monitoring and Evaluation                                       |
| NBS      | National Bureau of Standards                                    |
| NGOs     | Non-Governmental Organizations                                  |
| ODK      | Open Data Kit                                                   |
| OPV      | Open Pollinated Variety                                         |
| PPD      | Purified Protein Derivative                                     |
| QFP      | Quality Food Products                                           |
| RRN      | Relative Record Number                                          |
| SAGCOT   | Southern Agricultural Growth Corridor of Tanzania               |
| SDM      | Service Delivery Model                                          |
| SHF      | Small Holder Farmer                                             |
| SIDO     | Small Industries Development Organization                       |
| SME      | Small and Medium Enterprise                                     |
| STATA    | Software for Statistics and Data Science                        |
| TADB     | Tanzania Agricultural Development Bank                          |
| TNBC     | Tanzania National Business Council                              |
| TOSCA    | Topology and Orchestration Specification for Cloud Applications |
| URT      | United Republic of Tanzania                                     |
| VAT      | Value Added Tax                                                 |



## EXECUTIVE SUMMARY

This report presents the findings of an end-line assessment of the sunflower value chain, following a three-year intervention targeting at least 150,000 smallholder farmers in the regions of Singida, Dodoma, Manyara, Iringa, Songwe, Rukwa, Njombe, Lindi, and Mtwara. The aim was to increase their incomes through self and wage employment by 50 percent by 2020; support the creation of an organized and sustainable sunflower subsector which enhances increased production and productivity and income opportunities for smallholder men, women and youth farmers, and small and medium processors, as well as link farmers, processors, and rural inputs supply chain to improved seed supply. Further, the Agricultural Markets Development Trust (AMDT) aimed at providing targeted support to processors and farmer organizations to enter pro-poor contractual arrangements. Other interventions included facilitating the generation of evidence to support advocacy efforts aimed at improving functionality, efficiency, and productivity of the entire sunflower value chain.

The assessment covered 887 farming households involving a sample of 682 males (76.89%) and 205 females (23.11%). Among the specific objectives, the survey aimed at assessing the situation of the sunflower value chain, traction in the various parameters as well as qualitative and behavioral changes amongst the actors and stakeholders along the chain. Additionally, business models, the number of impacted smallholder farmers, and emerging business reforms.

Overall, the findings show that the AMDT together with the ecosystem of other actors has been successful in bringing about notable transformation to strengthen a sector that can improve the livelihoods of millions of families, paving the way for future industrialization and sustainable growth. These transformations in policy, trade, and business services demonstrate a high potential for long-term large-scale job creation and the opportunity for competitive advantage. As evidenced by various parameters, the employment opportunities for poor women, men, and young people and their incomes have increased exponentially along the value chains and through support and adoption of high-yielding disease and drought-resistant sunflower seeds, farmers have been able to increase productivity. Additionally, some smallholder farmers have been linked to market outlets and contract farming arrangements that have resulted in secured and predictable markets, opening the potential for further improved incomes and deepening poverty reduction in the supported programme areas.

In total, the AMDT succeeded in impacting 190,000 smallholder sunflower farmers, surpassing the target of 150,000 farmers by 27 percent during the three years.

In Tanzania, the sunflower value chain is dominated by smallholder farmers and about 150 large-scale farms with a production per acreage of 12,507 tons. However, since the inception of the AMDT intervention in 2017, there has been an observed increase in the yield per acreage which may be a sign that the sunflower value chain is becoming competitive and levitating towards a change in the lives of poor farmers and an opportunity to substitute the import of edible oil in the country. Overall, smallholder farmers seem to have benefited substantially. Through the adoption of better cultivation practices and the planting of high yield seeds, farmers have been able to improve their yields per acre by up to three times. Most smallholder farmers have more than doubled their incomes and they are increasingly moving out of poverty. Through linkages with large processors, the farmers have also secured stable markets for their products, some having secured contract farming arrangements AMDT's service delivery model.

**Access to productive assets and services:** The study has shown that access to markets and extension services and improved farm practices have played an integral role in promoting productive asset accumulation as well as services. Smallholder farmer's access to credit, market, and extension messaging allows them to utilize the available market opportunities to purchase livestock such as oxen and engage in mechanized farming and irrigation that are vital for poverty reduction. AMDT has also facilitated linkages between smallholder farmers and crop collecting centres and aggregators that relay purchased sunflower seeds to sell to oil processing mills. These arrangements have improved production and productivity and increased incomes among farmers. The use of contract farming between processors and some smallholder farmers, where the latter supplies sunflower seeds in exchange for improved seed varieties, fertilizer, and

extension services has catalyzed the introduction of a new market system and arrangement that did not exist before and proving to be a change agent.

Due to the AMDT intervention, a lot of farmers have been motivated to sell their produce. This is revealed by the increased number of farmers' households reported selling their produce from 65.5 percent during the baseline (2018) to 74.47 percent in the endline (2020).

**Finance accessibility:** The percentage of smallholders with access to finance from several diverse financial institutions, a key plank in facilitating improved technologies and increased productivity, shows an upward trend from 4.3 percent to 10.48 percent. However, while the access to such finances for males increased from 55.3 percent to 77.8 percent, access to their female counterparts appeared to have decreased. The decline in the number of women accessing credit from financial institutions can be attributed to collateral requirements. Women are particularly disadvantaged since they own less fixed assets such as land or houses than men.

**House ownership, conditions, and toilet types:** About 852 or 96.05 percent of the households own their houses against 94.6% during the baseline survey. At the same time, about 833 households (93.91%) had standard iron sheets as roofing materials compared to 54 households or 9.09% that had grass-thatched houses. During the baseline, only 89 percent of the households were found to have iron sheet roofing, pointing to a four percent increase following the AMDT sunflower intervention. While this positive correlation may not equal causation in the absence of a control group, the perception is that an increasing rate of off-farm activities indicates that the farmers' sources of income had been diversified and increased, leading to an increasing purchasing power of such items as high-quality roofing materials and that might be attributed to the AMDT interventions along the sunflower value chain in the respective regions. The households whose houses have earthen floors also decreased from 49% to 40% in 2021. On the other hand, 84 percent of the households had pit latrines against 97 percent in 2018 with 142 (16%) households having flush toilets, against 52 households or 6 percent during the baseline survey.

**Asset endowment:** House ownership was followed by cell phone possession by 786 or 89% of the respondents and radio ownership by 786 households (60%). Other assets owned by the farming households include bicycles, motorcycles, carts, cars, and tractors, which are also used for income generation. Comparatively, there seems to be some improvement in the possession of some assets such as housing and TV sets from 137 to 209. However, the ownership of some other assets appears to have subsided.

**Household off-farm sources of income:** About 50 percent of the total households (444 people) were also engaged in some form of off-farm activities. This is an improvement from the 40 percent during the baseline survey. The off-farm sources of income included casual or farm labour, formal employment, kiosk trading on, brewing, livestock and fishing, tailoring, milling, carpentry, butchery, and construction; to mention a few.

**Vulnerability to food insecurity and coping mechanisms:** Data showed that on average, households had adequate food over 11 months, of course variedly across regions. However, the Lindi region recorded only nine months of adequate food while Singida, Songwe, and Manyara indicated adequate food all year round. To cope up with food deficits in the months that shortages occurred, 93% of the total households of 175 purchased food while others had to rely on food relief and donations.

**Access to amenities:** There was a slight increase in the number of households (91.2 percent compared against 90.4 percent in 2018) who use firewood as cooking. On the contrary, the use of charcoal as cooking fuel recorded a decrease of six percent against eight percent while the use of gas increased from 0.9 percent to 2.37 percent during the period. Other cooking fuels were electricity and solar power which had an insignificant number of users. Increasing use of modern sources of energy including electricity and gas is an indication of improving incomes among smallholder farmers who have been beneficiaries of AMDT interventions. Additionally, there is an increasing number of households averaging about 44.76 percent that are using solar power as a source of lighting against 39.1 percent reported in 2018. Likewise, there is a significant increase in the use of electricity from 21.3 percent to 31.79 percent. These results indicate an improved economic condition for the households meaning that there is a positive correlation between the AMDT interventions and the seeming economic empowerment, with obvious trade-offs facilitating other value chain activities such as processing and packaging.



**Adoption of new practices and behaviour:** Among the mitigation measures against climate variability and the risks of rain-fed agricultural systems, farmers have been encouraged to adopt Climate-Smart Agricultural (CSA) practices to increase their resilience. The most common CSA practices during the endline were windbreaks (99.7%), grass strips (99.4%), use of crop residual (99%), post-harvest handling (98.6%), and contour farming (97.4%). Grass strips (99.4%), post-harvest handling (98.6%), and contour farming (97.4%) are the new practices and business behaviour that the sunflower farming population has adopted following the sunflower AMDT intervention. This implies that indeed there have been businesses in the project regions adopting new practices and behaviour.

**Business models:** There have been several improvements and the emergence of new business models along the sunflower value chain in the catchment regions. This development has benefited the productive poor. For example, the payment system has changed in favour of the farmers. Unlike in 2018, 98% of the farmers are now paid in cash. Very few are paid through promissory notes (0.2%), warehouse receipts (1.1%), and barter system (0.1%). A bigger proportion of the farming households sold or marketed their produce (75%) compared to 67% households in 2018. This implies that more farmers have access to markets today than during the baseline. Likewise, the state of roads is far much better today as 20.3% and 61.5% of the total roads are respectively tarmacked or are all-weather. Only 18.3% are seasonal roads. This makes the proportion of passable roads to be 81.8 percent of the total road network.

Besides access to the models adopted by the AMDT, and other project actors have indeed facilitated farmers' access to other products and services including inputs and output markets, insurance, technologies, and machinery. For example, regarding CSA 99.7% of the households adopted windbreaks, 99.4% adopted grass strips, while 99% resorted to the use of crop residue and 98.6% chose post-harvest handling, and 97.4% went for contour farming. These are higher percentages compared to the baseline. Fertilizer use also pointed to an upward trend with 41.4 percent of the farmers interviewed using manure, 22.8% using Diammonium Phosphate (DAP), 7.9% using Mavuno phosphorus-based fertilizer, and 4.6 percent using Urea. Another noteworthy issue that emerged from the analysis is that extension services are readily available and accessible to a significant number of farmers. The findings show that a total of 739 out of 887 farmers, equivalent to 83.3% of the respondents, access extension services within a radius of 3.5 km.

Most Micro, Small, and Medium Enterprises (MSMEs) had also reported improved competitiveness and productivity along the value chain. They include millers, processors, tractor owners, oxen plough owners; to mention a few. For instance, processors in Dodoma reported being highly satisfied with the availability of markets for their processed sunflower cooking oil.

The scaling up of Climate-Smart Agriculture (CSA) practices culminated in the adoption of new habits with 77% of the male and 23% of the female respondents citing these actions as beneficial and 31% of the respondents overall having been motivated into action through awareness creation by the AMDT and therefore beneficial. These practices include water pans and planting basins, gabion and storm bands, post-harvest handling, and bounding surface soil. Other technologies that have come onstream are credit and crop insurance to help farmers access capital and manage risk.

The AMDT and its partners tended to rely more on a wide range of media strategies to communicate key messages to sunflower value chain actors. The media sources included print and electronic media. Other information and communication approaches included direct contacts, extension workers, community meetings, agro-dealers, farmers' groups, and community-based organizations (CBOs). There was also the use of brochures, pamphlets, producer associations, and university and research institutions.

Despite the initial successes and great potential, the sunflower seeds oil sector in Tanzania still faces many challenges and hurdles for scaling up. These include inputs quality and standards including for fertilizer, poor infrastructure (roads, railway, and air) and marketing infrastructure specifically storage facilities; lack of agricultural credit that could enable small scale producers and processors to use high-quality technologies required to increase production, productivity, and improve sunflower oil quality and a weak policy environment. Additionally, lack of awareness of standards and procedures in the whole value chain (supplier of quality seeds, farmers, processors, and traders) would enable them to overcome challenges in oil refining, packaging, and hence meeting market demand and the necessary quality standards. These challenges call for collaborative measures to build confidence among the sector's different actors by encouraging partnerships and commitment in formulating and implementing long-term and short-term



policies to sustain the sector. For instance, the development and multiplication of improved sunflower seeds with high oil extraction content, disease, and drought resistance could be scaled up.

The government, Non-Governmental Organisations (NGOs), and actors in the value chain should continue to promote the use of improved seeds and good agronomic practices to increase production and productivity as well as improving the efficiency in sunflower processing to avoid losses.

The government is urged to increase import duty on crude and refined edible oils to discourage the importation of cooking oil while fostering demand for domestic refined sunflower. In addition, greater surveillance is needed at border entries to deter illegal importation of edible oils which have the potential to create unfair competition within the domestic supply. A removal of Value Added Tax (VAT) on domestic crude and refined sunflower oil and an exemption of VAT on solvent extraction machinery would encourage the use of improved sunflower machinery technology by small-scale processors. Additionally, the development of a customized digital-based information and communication platform would enable stallholder sunflower farmers to access new crop husbandry practices using their mobile phones as small scale and medium size oil processors if facilitated could meet international quality standards and accreditation of their sunflower products.

## INTRODUCTION

### 1.1 Background and Rationale

The Agricultural Markets Development Trust (AMDT) is a long-term facility with the overarching objective of increasing incomes and employment opportunities for poor women, men, and young people in Tanzania. The trust works with the private sector, the Government of the United Republic of Tanzania, and Civil Society Organisations (CSOs) to promote the Making Markets Work for the Poor (M4P) approach that seeks to stimulate changes to market systems leading to a broad and sustained impact on the lives of smallholder farmers as well as the competitiveness of agricultural Micro, Small, and Medium Enterprises (MSMEs). The AMDT achieves this by investing, together with market actors, in interventions that are based on diagnosed constraints and pro-poor opportunities; are well coordinated to enhance the leveraging of investments and resources targeting similar outcomes and stimulate the development of inclusive, competitive, and resilient agricultural market systems, leading to sustained benefits and impacts for the productive poor.

Starting with a one-year inception phase in 2017 and a pilot from January 2018 to December 2020, the AMDT has been supporting the sunflower value chain in 11 regions of Dodoma, Mbeya, Rukwa, Katavi, Songwe, Singida Lindi, Mtwara, Manyara, Iringa, and Njombe. The overarching objective for the sunflower value chain was to increase the incomes of at least 150,000 smallholder farmers by 50% by the end of 2020. To achieve this, AMDT intended to facilitate pro-poor systemic changes in selected markets systems within the value chain, specifically the seed market, the core market where there is weak collaboration, and selected service markets especially for finance, agricultural advisory services, Business Development Services (BDS), and climate-smart technologies. The AMDT targeted women who are farming and in small-scale processing, as well as youth who are employed as wage laborers in farming, processing, and the retail and distribution channels of the value chain.

During the inception phase, nine projects were commissioned with the Agha Khan, SNV, Farm Africa, Faida Mali, Quality Food Products (QFP), Techno Serve, ADDA Tanzania, CARE International, and the Swiss Development Corporation (SDC) as market facilitators or implementing partners. During the implementation, the AMDT was able to mobilize 46,122 smallholder farmers (47% of whom are women) of the targeted 51,000 in the period. This represented a 90% outreach achievement. Of these, 19,468 were engaged in contracts with processors to supply grain for the 2017/18 farming season. As a result of the lessons learned from the performance of the inception phase, the program decided to drop Techno Serve and replaced the implementation in Dodoma with Faida Mali. Work with QFP was also scaled down and eventually closed thus leaving only six institutions and seven projects. By the end of fiscal 2019/2020, the overall outreach to smallholder farmers and MSMEs had reached over 120,000 out of which 87,000 have fully engaged in some form of relationships with the market actors thus providing an impression of sustainability.

A baseline study was carried out in 2018 to provide an information base against which to monitor and assess the sunflower value chain interventions. Overall, 960 farming households were sampled and selected for the survey, of which only 890 were reached during data collection yielding a household response rate of 92.7 percent. This end-line evaluation is intended to assess the progress made by the interventions to generate results; to evaluate the changes in various parameters and qualitative and behavioral changes amongst the actors and stakeholders along the sunflower value chain including concerning business models, the number of smallholder farmers, and business reforms.

### 1.2 Objectives

The overall objective for this end-line study was to undertake an assessment of the performance of the sunflower value chain and establish resultant changes after a three-year intervention.

Specifically, the inquiry sought to:

- Collect information that would be used to update and compare with baseline data collected before the intervention.
- Determine, quantitatively and qualitatively, the status of the indicators concerning the objective and expected results of the project in comparison to the baseline situation; and
- Collect information and learning which would support the AMDT in designing a subsequent phase of the intervention.

### 1.3 Scope of the Evaluation

The endline study covered nine regions of Singida, Dodoma, Manyara, Iringa, Songwe, Rukwa, Njombe, Lindi, and Mtwara, the same regions that were sampled during the baseline. Considering the implementation status of the programme, the evaluation sought to probe the following performance indicator:

#### Project Performance Indicators

| Business Models          |                                                                                                                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | Are there businesses adopting new practices and behavior?                                                                                                                                                                 |
|                          | The extent to which the models piloted by AMDT, and actors helped the productive poor smallholder farmers to access various products and services (seeds, inputs and output markets, insurance, technologies, machinery)? |
|                          | No of new or improved business models benefiting productive poor piloted as a result of AMDT intervention (segregated by type of model)                                                                                   |
|                          | Are there any MSMEs who are beneficiaries of AMDT reporting improved productivity or competitiveness in the market systems? Determine improvement in percentile                                                           |
|                          | What are the new technologies that have been made available as a result of AMDT interventions?                                                                                                                            |
|                          | The extent to which the piloted models are inclusive to women, young men, and women both as productive poor and as MSME's in their own right                                                                              |
|                          | Determine the number of knowledge products targeting productive poor, AMDT partners, and other agricultural stakeholders through- research papers; extension information papers, media progress, articles, etc            |
|                          | Number of networks established as a result of AMDT                                                                                                                                                                        |
| The Small Holder Farmers |                                                                                                                                                                                                                           |
|                          | Determine the number and location of SHF who have benefited from AMDT interventions and how? (disaggregate by sex and age)                                                                                                |
|                          | % of AMDT beneficiaries with access to productive assets and services critical for the performance of their enterprises (disaggregated by sex and age and type of productive assets)                                      |
|                          | % of productive poor linked with providers of key services and productive assets (disaggregated by sex and age)                                                                                                           |
|                          | Is there an increase in income among SHF and MSMEs? Determine the extent of increase or decrease                                                                                                                          |
|                          | The extent of income opportunities (from self or wage employment) that can be sustainably accessed by productive poor and can be attributed to the AMDT interventions                                                     |
|                          | # of new or improved services and productive assets available for productive poor (segregated by type of productive assets)                                                                                               |
|                          | % of productive poor linked with providers of key services and productive assets (disaggregated)                                                                                                                          |
| Market Opportunities     |                                                                                                                                                                                                                           |
|                          | Number and type of new markets (input and end-markets) opportunities that have been created as a result of AMDT interventions                                                                                             |
|                          | What new rules or functions have been introduced or adopted in the market systems as a result of AMDT interventions                                                                                                       |
|                          | How do farmers (women, men, young men, and women) access information on markets, extension services, and weather, etc?                                                                                                    |
|                          | What new services are now accessed by the productive poor                                                                                                                                                                 |
|                          | Are there new or improved services and productive assets available for the productive poor (segregated by type of productive assets)                                                                                      |
|                          | Are there new climate-smart practices and technologies made available to the productive poor (segregated by type of technology)                                                                                           |
|                          | The number of innovative business solutions targeting constraints specifically faced by women and/or youth.                                                                                                               |
|                          | Number of AMDT and partner staff trained on M4P- disaggregated by sex                                                                                                                                                     |
| Business Reforms         |                                                                                                                                                                                                                           |
|                          | Determine the number of key business impeding issues identified by the stakeholders                                                                                                                                       |
|                          | Are there pro-poor business reforms adopted and sustained by stakeholders (state and non-state actors) in the targeted market systems                                                                                     |
|                          | # of pre-identified critical regulatory issues adopted by advocacy organizations                                                                                                                                          |
|                          | # of critical issues impeding women and youth participation in select markets adopted by advocacy organizations                                                                                                           |



## STUDY METHODOLOGY

### 2.1 General Design

The endline study collected both quantitative as well as qualitative data. Primary data was captured from the panel survey of the respondents during the baseline while secondary data was obtained from the baseline data and report, project monitoring reports, as well as other key documents<sup>1</sup>.

### 2.2 Technical Approach

It was decided that this assessment only required an adequacy evaluation; to determine if the expected process and outcome indicators were met. Although limited in the information that may be inferred, adequacy assessments do show progress toward pre-determined targets, which may be sufficient to argue for increased or continued funding. Based on the panel survey design, a simple pre-post comparison of results was performed given that the same respondents who participated in the baseline were also recruited for the end-line evaluation.

This comparison was attained by comparing simple descriptive statistics of project indicators during the baseline and the status at the endline.

The conventional pre-post comparison model is specified as.

$$\Delta I_T^i = (E_{T=1}^i - B_{T=0}^i) / X_{iT}$$

Where;  $\Delta I_T^i$  is the change of project indicators due to the sunflower value chain project intervention.  $E_{T=1}^i$  is the value of the indicator(s) at the endline and  $B_{T=0}^i$  is the value of the indicator(s) at the baseline.  $X_{iT}$  are the covariates that were controlled during the analysis for some of the indicators of interest: such covariates included gender, youth, geographical location, to mention a few.

### 2.3 Sampling and Sample Size

Purposive sampling was used to home in on the required respondents. To these ends, 887 farming households were surveyed against the targeted 890 households, reaching a response rate of 99.6%. A total of 115 cases or 13% of the total households were replaced due to household unavailability, relocation, or death.

A total of 26 Focus Group Discussions (FGDs) were conducted, representing one FGD per district. The member selection considered gender balance and age, among others. Key Informant Interviews (KIIs) were also conducted targeting 30 respondents that included implementing partners, Ward Executive Officers, or village chairpersons, agro-processors as well as officials of some selected financial institutions in the targeted regions. Table 1 shows the number of respondents covered per district. Additional information regarding the respondents is provided in the appendices.

<sup>1</sup> *Sunflower Market System Analysis, Sunflower Intervention Strategy, Gender Integration and Youth Inclusion Strategy, and the BEE Strategy.*

**Table 1: Number of respondents per district**

| District     | Frequency  | Percent    | Cumulative frequency |
|--------------|------------|------------|----------------------|
| Mbozi        | 22         | 2.48       | 2.48                 |
| Ileje        | 21         | 2.37       | 4.85                 |
| Songwe DC    | 18         | 2.03       | 6.88                 |
| Nkasi        | 49         | 5.52       | 12.4                 |
| Kalambo      | 65         | 7.33       | 19.73                |
| Wangingombe  | 48         | 5.41       | 25.14                |
| Makambako TC | 49         | 5.52       | 30.67                |
| Kilolo       | 51         | 5.75       | 36.41                |
| Iringa DC    | 41         | 4.62       | 41.04                |
| Chamwino     | 35         | 3.95       | 44.98                |
| Kondoa       | 25         | 2.82       | 47.8                 |
| Chemba       | 25         | 2.82       | 50.62                |
| Kongwa       | 38         | 4.28       | 54.9                 |
| Mkalama      | 25         | 2.82       | 57.72                |
| Singida DC   | 25         | 2.82       | 60.54                |
| Ikungi       | 26         | 2.93       | 63.47                |
| Iramba       | 25         | 2.82       | 66.29                |
| Babati       | 36         | 4.06       | 70.35                |
| Kiteto       | 35         | 3.95       | 74.3                 |
| Lindi        | 36         | 4.06       | 78.35                |
| Ruangwa      | 33         | 3.72       | 82.07                |
| Nachingwea   | 34         | 3.83       | 85.91                |
| Masasi       | 28         | 3.16       | 89.06                |
| Newala       | 35         | 3.95       | 93.01                |
| Mtwara       | 43         | 4.85       | 97.86                |
| Momba        | 19         | 2.14       | 100                  |
| <b>Total</b> | <b>887</b> | <b>100</b> |                      |

## 2.4 Data Collection

Before the actual data collection, a three-day training was convened for survey supervisors and enumerators, focussing on general survey methodologies including sampling techniques, the objective of the survey, informed consent, and confidentiality, interviewing techniques, and quality control. Interview guides were also developed containing a list of questions to guide to be posed to the respondents. The length of the structured questionnaire was limited to a maximum of one hour.

## 2.5 Data Processing And Analysis

Quantitative data was collected by Computer-Assisted Personal Interviewing (CAPI) with questionnaires having been programmed in handheld tablets installed with ODK software. The collected data was then stored in a data server through synchronization and reviewed by a data manager for quality checks and submission daily. Qualitative data was captured through note-taking audio recorders to ensure accurate information capture. Information was then transcribed to facilitate easy and precise analysis of information. The data collected was then exported to STATA and Microsoft Office Excel. Data were cleaned and checked for quality. The general analysis involved a comparison of descriptive statistics of key project indicators and outcomes to contrast baseline and endline findings. Additionally, thematic analysis was used to identify and clarify patterns in the data allowing inferences to be drawn specifically for qualitative information and assessing their relative importance in answering the evaluation questions.

## STUDY FINDINGS AND ANALYSIS

This section provides the findings of the evaluation study. It has five subsections mirroring the thematic areas of assessment, specifically household characteristics, business model, smallholder farmers, market opportunities, and business reforms.

### 1.3 Household Level Information

#### Socio-demographic characteristics of the respondents

##### *Gender*

The sample involved 682 males (76.89%) and 205 females (23.11%). The baseline data in 2018 had 82.2% males against 17.8% females. This difference is mainly attributed to sampling replacements in some cases.

##### *Age distribution*

Most of the respondents covered in this study were aged 36 years and above with 85.91 percent of the total farming households falling within this age bracket and above. The remaining farming households (14.09%) were either under 18 or below 35 years. Dodoma had the largest number of farming households with 36 years or above while Singida took a leading position in the composition of farming households with 18 and 35 years of age (Table 5).

##### *Land size holdings*

The study captured information related to the size of cultivated landholdings. On average, each farming household had 2.2 acres of cultivated owned land, though the regional average differed. For instance, the highest recorded acres are 3.7 in the Manyara district while the lowest at 1.4 was in the Lindi region. Table 6 in the appendices provides detailed information related to cultivated landholdings in each region, which is used to grow largely cashew (average of 4.1 acres of land) followed by maize, sorghum, sunflower, millet, and rice.

##### *House ownership, conditions, and toilet types*

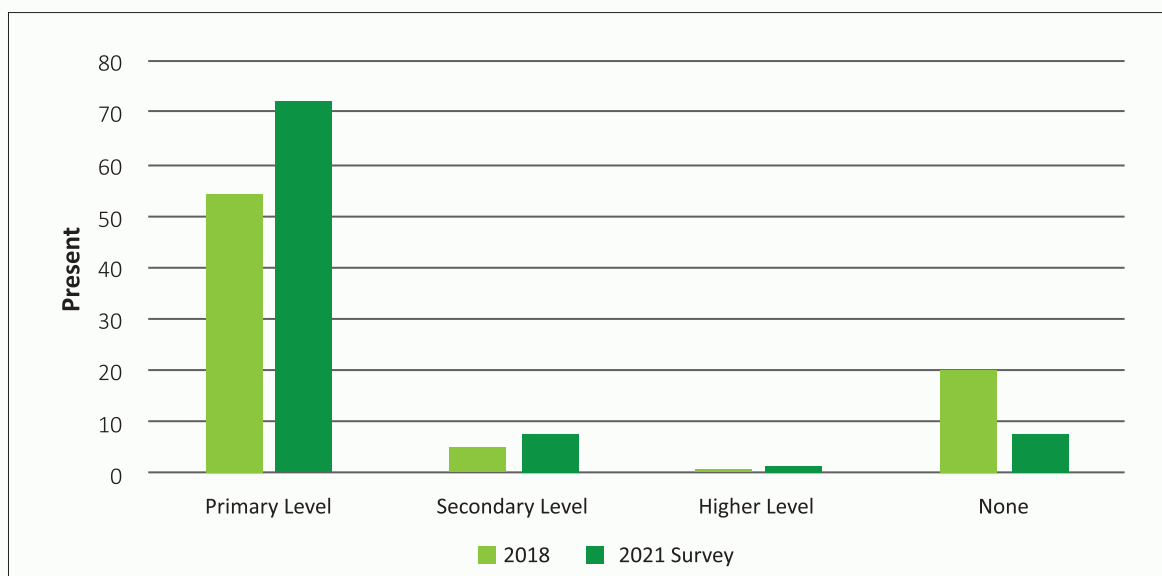
About 852 or 96.05 percent of the households own their houses against 94.6% during the baseline survey. At the same time, about 833 households (93.91%) had standard iron sheets as roofing materials compared to 54 households or 9.09% that had grass-thatched houses. During the baseline, only 89 percent of the households were found to have iron sheet roofing, pointing to a four percent increase following the AMDT sunflower intervention. While this positive correlation may not equal causation in the absence of a control group, the perception is that an increasing rate of off-farm activities indicates that the farmers' sources of income had been diversified and increased, leading to an increasing purchasing power of such items as high-quality roofing materials and that might be attributed to the AMDT interventions along the sunflower value chain in the respective regions.

Additionally, the walls of the main houses had slightly improved with only 167 households (or 18.83%) having mud wall materials against 19% during the baseline survey. Of the households, 152 (17.14%) had plaster wall finishes as the preferred choice for their houses and very few had used either wood or iron sheet material. There is an increasing number of households whose houses have cement floors, from 50 percent of the total population interviewed in 2018 to 58 percent or 519 households in 2021. The households whose houses have earthen floors also decreased from 49% to 40% in 2021. On the other hand, 84 percent of the households had pit latrines against 97 percent in 2018 with 142 (16%) households having flush toilets, against 52 households or 6 percent during the baseline survey.

##### *Education level*

More than 82% of the households were male-headed and between 59.5% of the household, heads had achieved a primary or secondary-level education. Specifically, about 54.4% of the household heads had attained and completed primary school while 4.9% had completed secondary or "O" level education. Only a paltry 1.2% of the household heads had completed a college education.

**Figure 1: Education level of farmers engaged in farming**



Comparatively, most of the farming households (642 or 72.38%) had completed primary- level of education as of 2021 which is an increase in the level of education compared with 59.5 percent in 2018. As of December 2020, about 80 (9%) farming household members in the sample had attended some classes in primary school but dropped out compared to 67 (7.55%) that had no formal-level education at all. Some 68 farming households (7.67%) had managed to complete ordinary secondary education while an insignificant number of farming households had attained a college-level education (Table 8).

### 3.1.1 Household off-farm sources of income

About 50 percent of the total households (444 people) were also engaged in some form of off-farm activities. This is an improvement from the 40 percent during the baseline survey. The off-farm sources of income included casual or farm labour, formal employment, kiosk trading on, brewing, livestock and fishing, tailoring, milling, carpentry, butchery, and construction; to mention a few. Remittances which are typically transfers from one person to another person or household was also a source of income for some. More than half of the respondents indicated to be earning some income from these off-farm activities. The minimum gross earning per month was estimated at TZS: 180,185 with a maximum of TZS: 265,831. Refer to Table 9 in the appendices for household off-farm sources of income.

### 3.1.2 Asset Endowment

Most farming households at 852 or 96 percent owned their houses. This was followed by cell phone possession by 786 or 89% of the respondents and radio ownership by 786 households (60%). Other assets owned by the farming households include bicycles, motorcycles, carts, cars, and tractors, which are also used for income generation. Comparatively, there seems to be some improvement in the possession of some assets such as housing and TV sets from 137 to 209. However, the ownership of some other assets appears to have subsided. This includes car ownership from 11 to seven, motorcycles from 140 to 100, bicycles from 528 to 385, and tractors from eight to two (Table 11). This difference can be attributed to a propensity by households to engage more in the construction of their own houses rather than investing in movable assets.

### 3.1.3 Vulnerability to Food Insecurity and Coping Mechanisms

Food security has three dimensions: availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports; access by households and individuals to adequate resources to acquire appropriate foods for a nutritious diet; and utilization of food through adequate diet, water, sanitation, and health care. (URT, 2014). In this regard, the evaluation examined the aspect of vulnerability to food insecurity and coping mechanisms during the last 12 months. Data showed that on average, households had adequate food over 11 months, of course variedly across regions. However, the



Lindi region recorded only nine months of adequate food while Singida, Songwe, and Manyara indicated adequate food all year round. Five regions had 11 months during the period. This is an improvement from 2018 which had indicated a long period of inadequate food among smallholder farmers (more than 10 months) within a year as most of the households (96.7%) had to purchase food to bridge the gap that had been occasioned by food deficits.

To cope up with food deficits in the months that shortages occurred, 93% of the total households of 175 purchased food while others had to rely on food relief and donations. Comparatively, 42.86 percent, against 49.3% of the households during the baseline survey spent more than TZS 100,000 in food purchases while 46.29 percent against 47.6% reported in 2018 spent less than TZS 100,000 doing so (Table 7.10).

### 3.1.4 Access to Amenities

#### *Water for domestic use and Irrigation*

The majority (44.7%) of the people interviewed use roof catchments for domestic use and irrigation. Others reported having used piped water (27%) and wells (12.85%). Other sources were streams or rivers, dams, protected or unprotected springs, ponds as well as boreholes (Table 15).

#### *Cooking fuel*

There was a slight increase in the number of households (91.2 percent compared against 90.4 percent in 2018) who use firewood as cooking. On the contrary, the use of charcoal as cooking fuel recorded a decrease of six percent against eight while the use of gas increased from 0.9 percent to 2.37 percent during the period. Other cooking fuels were electricity and solar power which had an insignificant number of users. Table 12 has more details. Increasing use of modern sources of energy including electricity and gas is an indication of improving incomes among smallholder farmers who have been beneficiaries of AMDT interventions. The other reason for the positive changes may be a government campaign regarding the use of alternative sources of energy as part of its concerted efforts against wanton deforestation in Tanzania.

#### *Sources of lighting*

There is an increasing number of households averaging about 44.76 percent that are using solar power as a source of lighting against 39.1 percent reported in 2018. Likewise, there is a significant increase in the use of electricity from 21.3 percent to 31.79 percent. Other sources of lighting include pressure lamps (6%), tin lamps (8.68%), and lanterns (7.33%). More details are contained in Table 10. These results indicate an improved economic condition for the households meaning that there is a positive correlation between the AMDT interventions and the seeming economic empowerment, with obvious trade-offs facilitating other value chain activities such as processing and packaging.

## 3.2 Business Models

### *Adoption of new practices and behaviour*

Among the mitigation measures against climate variability and the risks of rain-fed agricultural systems, farmers have been encouraged to adopt climate-smart agricultural practices to increase their resilience. The baseline cited crop rotation (82%), windbreaks (82%), terracing (73%), use of crop residuals (68%), and the use of cut-off drains (66%) as the most dominant CSA practices practiced by the farmers during the period. Comparatively, the most common CSA practices during the endline were windbreaks (99.7%), grass strips (99.4%), use of crop residual (99%), post-harvest handling (98.6%), and contour farming (97.4%). Grass strips (99.4%), post-harvest handling (98.6%), and contour farming (97.4%) are the new practices and business behaviour that the sunflower farming population has adopted following the sunflower AMDT intervention. This implies that indeed there have been businesses in the project regions adopting new practices and behaviour. On the contrary, the adoption of piped or gravity-fed irrigation during the dry season appeared to have dropped from 16 percent to 0.42 percent during the period. A probable cause for this decrease is that while irrigation helps to grow crops during periods of less than average rainfall, in most cases, however, the crop water need may be supplied fully by rainfall, thereby curtailing the demand for



irrigation. Additionally, irrigation requires infrastructure, which may have proven to be a stumbling block to many farmers.

**Table 2: Planted seed varieties**

| Sn | Seed Variety              | % of Farmers Planted |                |
|----|---------------------------|----------------------|----------------|
|    |                           | 2018 - Baseline      | 2021 – Endline |
| 1  | Local                     | 62.3                 | 4.62           |
| 2  | Record                    | 14.2                 | 0.21           |
| 3  | Hybrid local              | 8.8                  | 2.1            |
| 4  | Hysun                     | 6.8                  | 3.2            |
| 5  | Other varieties           | 8.0                  | 0              |
| 6  | New variety adoption rate | 37.8                 | 85.28          |

While the findings point to the use of diverse sunflower seed varieties, the use of the local variety has subsided by 4.62 percent, while the use of the Record variety has also declined in proportional terms to 0.21 percent. The use of unimproved varieties had also declined from 8.8 percent to 2.1 percent. The application of the Hysun 33 variety was also low at 3.2 percent compared to its use during the baseline period when 6.8% of the farmers planted the type. During the baseline, the use of local variety stood at 62.2%, Record was at 14.2, while hybrid local was 8.8%. These discrepancies point to a change in practices and business behaviour in terms of the adoption of improved seed varieties, which appears to have increased by 85.28 compared with the baseline data of 37.8 percent.

**Table 3: Source of information on seeds**

| Sn | Source                                | % of responses |
|----|---------------------------------------|----------------|
| 1  | Demonstration plot                    | 13.05          |
| 2  | Brochures/pamphlets                   | 11.53          |
| 3  | Training                              | 15.84          |
| 4  | Personal communication                | 40.31          |
| 5  | Telephone                             | 4.66           |
| 6  | SMS                                   | 0.44           |
| 7  | Field day                             | 5.69           |
| 8  | Local administration meeting (Baraza) | 0.1            |
| 9  | Promotional campaigns                 | 0.74           |
| 10 | Internet                              | 0              |
| 11 | Seminar/meetings                      | 6.42           |
| 12 | Radio Program                         | 1.23           |

The study also assessed the farmers' sources of information regarding seeds, establishing that high proportion access such information from AMDT-related communication interventions inter alia personal communication (40.3%), training (15%), demonstration farms (13.1%), and brochures. While this points to a deepening in the farmers' access to good-quality seed and knowledge of improved practices, it also shows an expanding seed market which is an important denominator in increasing smallholder productivity.

### Access to various products and services

Besides access to seeds, the survey showed that the models adopted by the AMDT, and other project actors have indeed facilitated farmers' access to other products and services including inputs and output markets, insurance, technologies, and machinery. For example, regarding CSA, 99.7% of the households adopted windbreaks, 99.4% adopted grass strips, while 99% resorted to the use of crop residue and 98.6% chose post-harvest handling, and 97.4% went for contour farming. These are higher percentages compared to the baseline. Fertilizer use also pointed to an upward trend with 41.4 percent of the farmers interviewed using manure, 22.8% using Diammonium Phosphate (DAP), 7.9% using Mavuno phosphorus-based fertilizer, and 4.6 percent using urea.



Another noteworthy issue that emerged from the analysis is that extension services are readily available and accessible to a significant number of farmers. The findings show that a total of 739 out of 887 farmers, equivalent to 83.3% of the respondents, access extension services within a radius of 3.5 km.

In addition, the sunflower intervention had also facilitated the creation of agricultural producer groups on crop and livestock production, value addition, and aquaculture through which various business development services including marketing, training, input acquisition, and financial services are offered. On average 85% of the services offered in the farmers' groups are related to training, 28% were financial services, 20% were input acquisition, and 9% were marketing services. These networks also serve sunflower producers in terms of soliciting for bank loans, negotiations, training, skills development, and enhancing farmer and group bargaining power with processors, including those related to contract farming.

There have been several improvements and the emergence of new business models along the sunflower value chain in the catchment regions. This development has benefited the productive poor. For example, the payment system has changed in favour of the farmers. Unlike in 2018, 98% of the farmers are now paid in cash. Very few are paid through promissory notes (0.2%), warehouse receipts (1.1%), and barter system (0.1%). A bigger proportion of the farming households sold or marketed their produce (75%) compared to 67% households in 2018. This implies that more farmers have access to markets today than during the baseline. Likewise, the state of roads is far much better today as 20.3% and 61.5% of the total roads are respectively tarmacked or are all-weather. Only 18.3% are seasonal roads. This makes the proportion of passable roads to be 81.8 percent of the total road network.

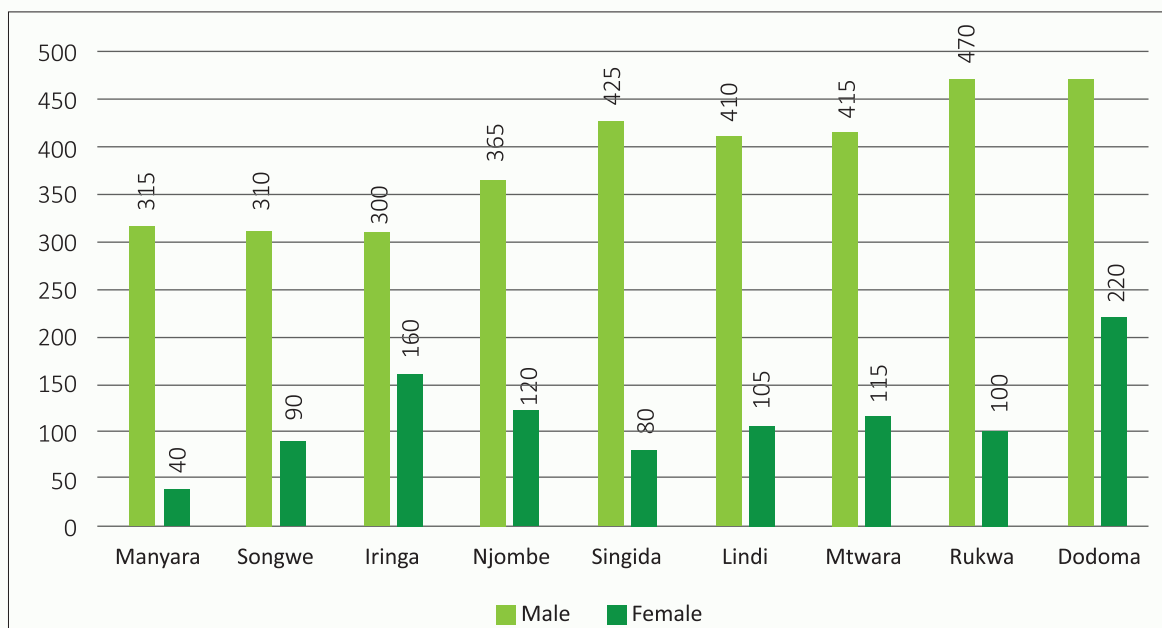
Over the past year, most Micro, Small, and Medium Enterprises (MSMEs) had also reported improved competitiveness and productivity along the value chain. They include millers, processors, tractors owners, oxen plough owners; to mention a few. For instance, processors in Dodoma reported being highly satisfied with the availability of markets for their processed sunflower cooking oil. In Nyanjali Ward, most processors took advantage of the local market selling to households, petty traders, and retailers. Oil extraction was also cited to be a profitable business partly because some farmers paid for this service with their sunflower cake, Tractor and oxen plough owners also earn considerable income from farmers for hiring the tractor and animal traction services.

The scaling up of CSA practices culminated into the adoption of new habits with 77% of the male and 23% of the female respondents citing these actions as having been beneficial and 31% of the respondents overall having been motivated into action through awareness creation by the AMDT. These practices include water pans and planting basins, gabion and storm bands, post-harvest handling, and bounding surface soil. Other technologies that have come onstream are credit and crop insurance to help farmers access capital and manage risk.

The AMDT and its partners tended to rely more on a wide range of media strategies to communicate key messages to sunflower value chain actors. The media sources included print and electronic media. Other information and communication approaches included direct contacts, extension workers, community meetings, agro-dealers, farmers' groups, and community-based organizations (CBOs). There was also the use of brochures, pamphlets, producer associations, and university and research institutions.

### 3.3 Small Holder Farmers

In Tanzania, the sunflower value chain is dominated by smallholder farmers and about 150 large-scale farms with a production per acreage of 12,507 tons. However, since the inception of the AMDT intervention in 2017, there has been an observed increase in the yield per acreage which may be a sign that the sunflower value chain is becoming competitive and levitating towards a change in the lives of poor farmers and an opportunity to substitute the import of edible oil in the country. Overall, smallholder farmers seem to have benefited substantially (Figure 2). Farmers have been able to improve their yields per acre by up to three times through the adoption of better cultivation practices and the planting of high yield seeds (Dalberg 2019). Most smallholder farmers have more than doubled their incomes and they are increasingly moving out of poverty. Through linkages with large processors, the farmers have also secured stable markets for their products, some having secured contract farming arrangements AMDT's service delivery model.

**Figure 2: Beneficiaries of AMDT interventions**


Since 2017, with funding from AMDT, Farm Africa has been providing technical assistance to actors working across the Tanzanian sunflower sector to meet the growing domestic demand for cooking oil.

AMDT's interventions in the sunflower value chain have therefore included a coterie of trade-offs including upskilling farmers to plant high yielding sunflower seeds such as Agro Meru, Agura 4, Amagro, Asan, Aysari, DK 8031, DK 831, DK 8990, DK628, DK853, High Sun, Hybrid 268 and Hybrid 621 to the delivery of training in good agricultural practice and climate-smart agriculture techniques facilitating relationships, credit information, contracts and trading arrangements between market actors, thereby promoting the business environment needed to unleash the sector's potential.

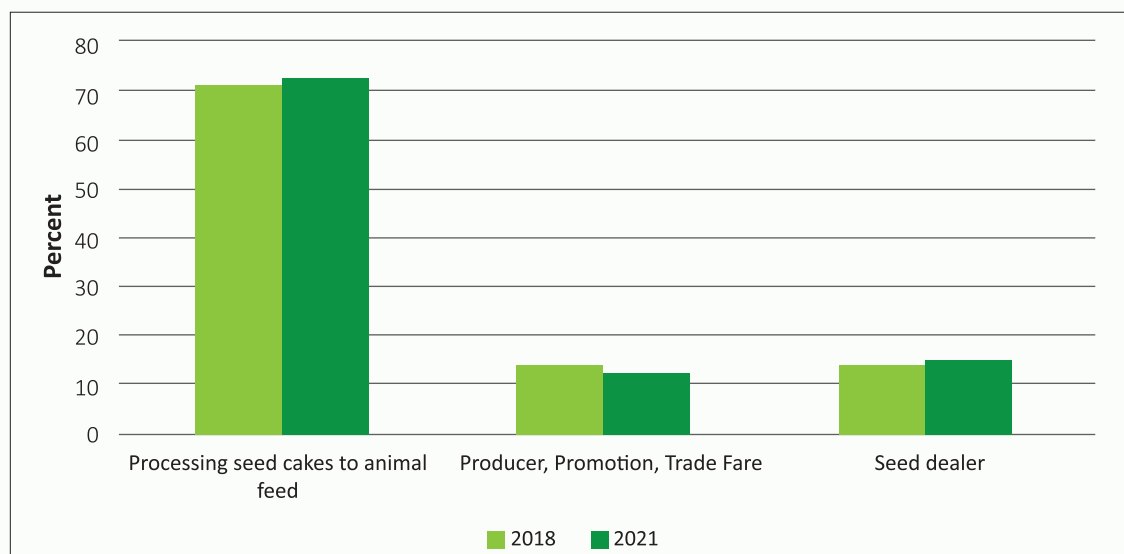
### 3.4 Access to Productive Assets and Services

The study has shown that access to markets and extension services and improved farm practices have played an integral role in promoting productive asset accumulation as well as services. Smallholder farmer's access to credit, market, and extension messaging allows them to utilize the available market opportunities to purchase livestock such as oxen and engage in mechanized farming and irrigation that are vital for poverty reduction. Table 14 shows access to productive assets and services among farming households. The main inputs have included improved and quality seed suppliers, machinery, pesticides, and herbicides control, and fertilizer suppliers. Indeed, the government through state research institutions supports AMDT's interventions aimed at assisting smallholder sunflower farmers to acquire yield-enhancing agricultural technologies such as improved crop varieties, which has been a challenge in meeting quantity demand.

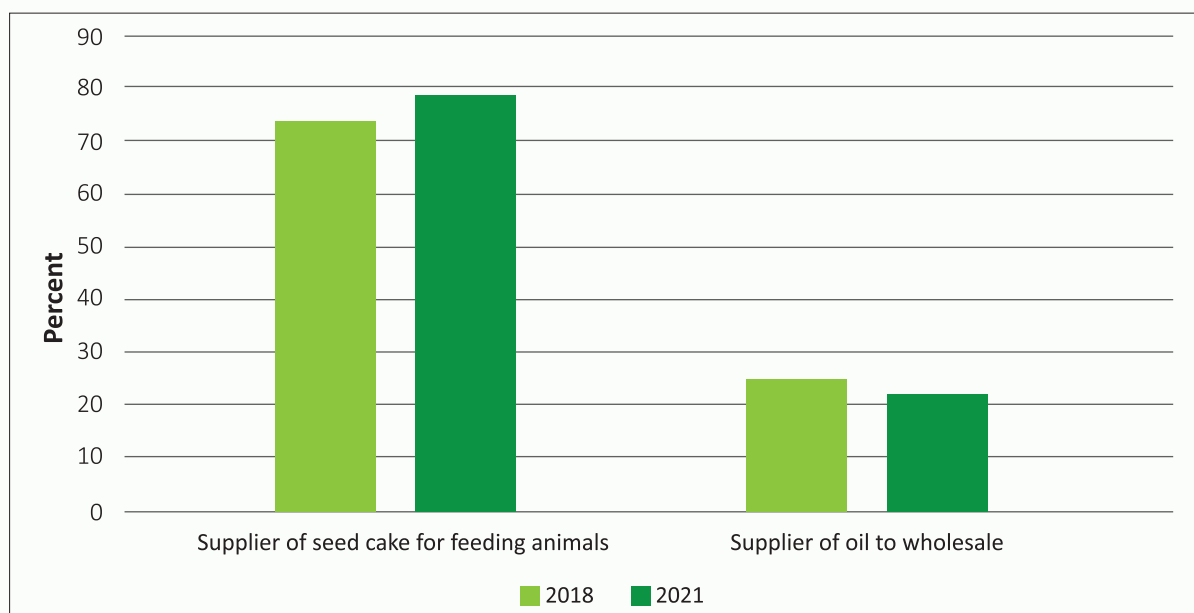
AMDT has also facilitated linkages between smallholder farmers and crop collecting centres and aggregators that relay purchased sunflower seeds to sell to oil processing mills. These arrangements have improved production and productivity and increased incomes among farmers. As in the 2018 baseline, most sunflower millers fall within the scale and medium scale enterprises category with the capacity of processing less than eight tonnes of oil per day. Figures 3 and 4 depict the sunflower millers' annual volumes.



**Figure 3: Sunflower millers' annual volumes**



**Figure 4: Sunflower millers' annual volumes**

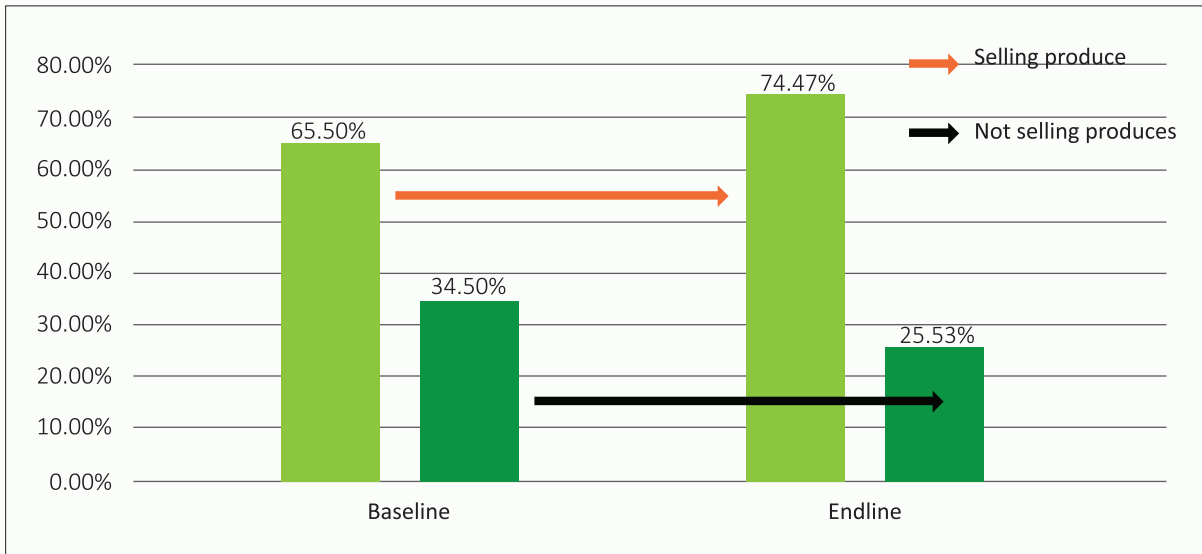


The use of contract farming between processors and some smallholder farmers, where the latter supplies sunflower seeds in exchange for improved seed varieties, fertilizer, and extension services has catalyzed the introduction of a new market system and arrangement that did not exist before and proving to be a change agent.

### 3.5 Market Opportunities

Due to AMDT intervention, a lot of farmers have been motivated to sell their produce. This is revealed by the increased number of farmers' households reported selling their produce from 65.5 percent during the baseline (2018) to 74.47 percent in the endline (Figure 5).

**Figure 5: Selling of produces**

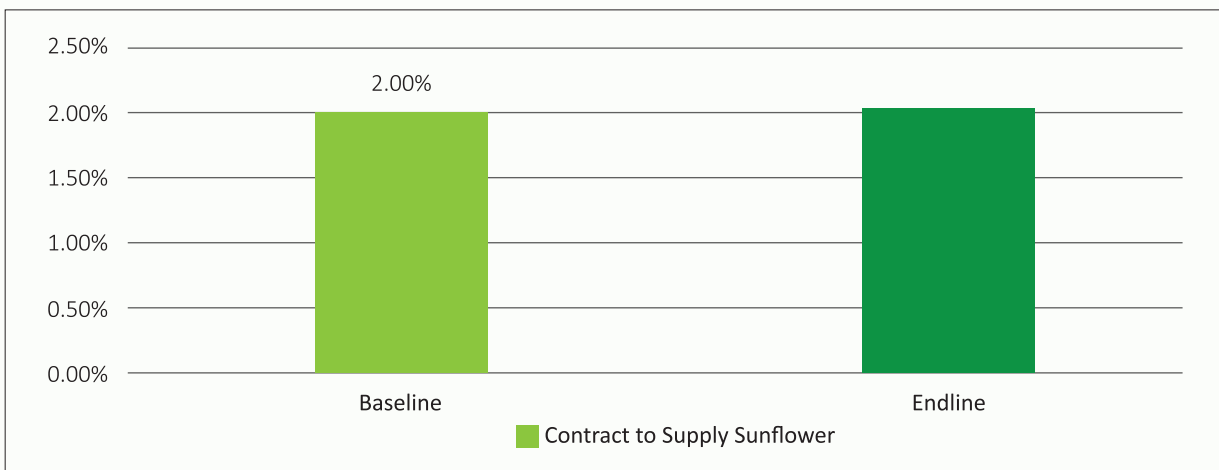


**3.5.1 Contract Farming Mechanism**

Contract farming can be defined as a system of cultivation and supply of agricultural goods based on an agreement between farmers and processing and or marketing firms, frequently at predetermined prices. In such an agreement, the purchaser, typically agribusinesses and large corporations, provides a supply of inputs – seeds, fertilizers, pesticides, etc. and technical know-how to the farmers. The farmer is required to provide the required commodity in the quantities and at the quality standards determined by the purchaser. Contract farming can give farmers the possibility of knowing in advance when to whom, and at what price they will sell their products. This helps to reduce the unpredictability of agriculture and allows them to better plan their production. It reduces the risks associated with fluctuating prices and can also help protect farmers against losses associated with natural disasters and climate change as these risks can be shared with the buyer under a contract. When buyers also provide access to inputs including finance and technical assistance, contract farming can lead to significantly increased yields and profits.

Despite the initial success and great potential of this type of arrangement within the sunflower industry, different farmers have given it a cold shoulder, with some even openly rejecting the model leading to a decline in the number of farmers with contracts from two percent during the baseline to 1.47 percent (Figure 4.6). Some of the concerns as cited by farmers include lack of awareness about the arrangement (45%), a low footprint within some of their localities (29%), and total rejection with some farmers abandoning such contracts citing opaque and skewed terms and provisions. To scale up, greater awareness of the benefits of contract farming, the principles of the model, including roles and responsibilities of each party to the contract, transparency in the contract process as well as techniques related to contract negotiations re vital in encouraging greater adoption and uptake of the contract farming model.

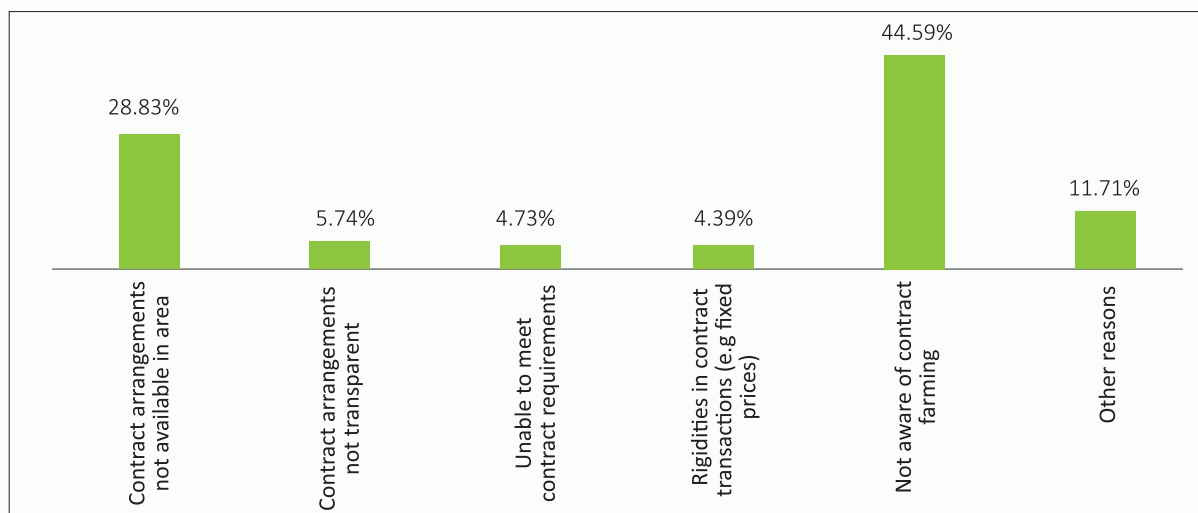
**Figure 6: Contract to supply sunflower**





About 50 percent of the contract farmers cited those agreements have been characterized by low prices compared to that offered in the open market as one of the main repugnancy reasons while 38 percent cited “unfulfilled” promises as a key concern. FGDs held with farmers across all districts revealed that promises to typically provide the grower with production inputs, credit, and extension services as well as a guaranteed sale price in return for the market have not been fulfilled and even when fulfilled there are delays in the inputs supply. Smallholder farmers' dissatisfaction with contract schemes was a recurring theme during the FGDs with issues of mistrust and lack of transparency as some of the main concerns. Thus, although contract farming is and can be an appropriate arrangement for supporting inclusive market development, a win-win contract negotiation couched with trust is key to this model’s effectiveness. Figure 7 points to the various reasons as to why farmers have been antagonistic to contract farming arrangements.

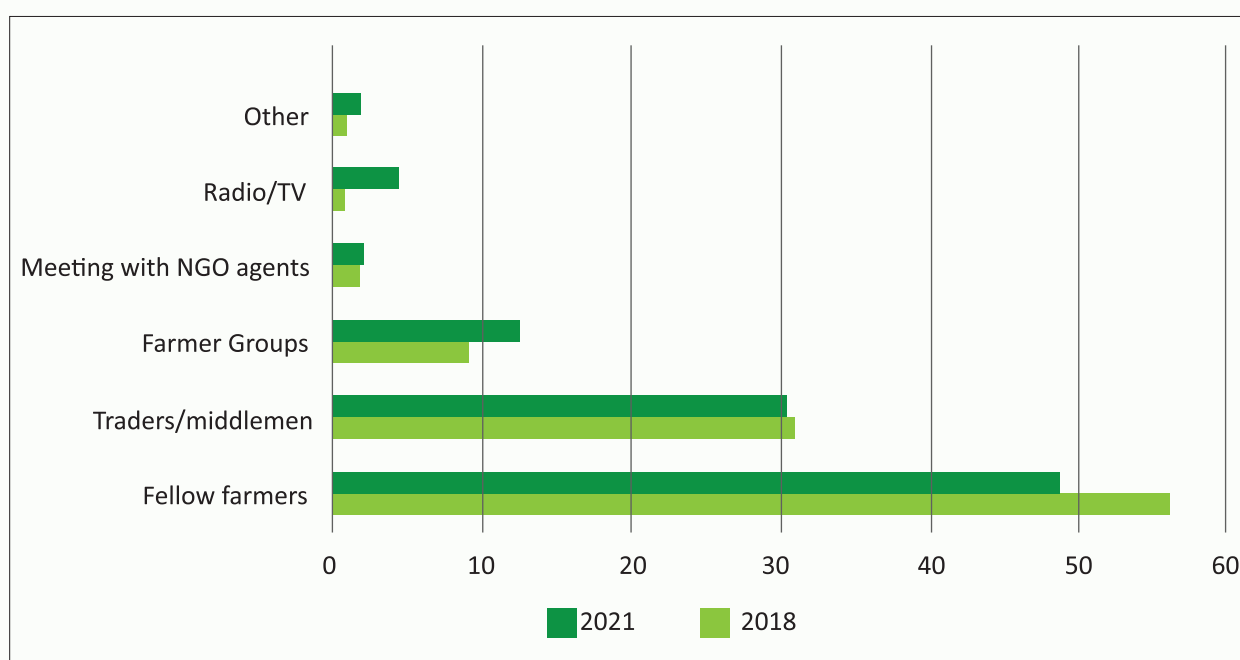
**Figure 7: Reasons as to antagonism to contract supply of sunflower**



### 3.5.2 Market Information

Availability and access to information have not changed significantly. Farmers continued to obtain necessary information from multiple sources with other farmers being the main source, followed by traders and farmer groups. Print, electronic, and other media outlets continued to be a low source of information (Figure 8).

**Figure 8: Sources of farmer information**



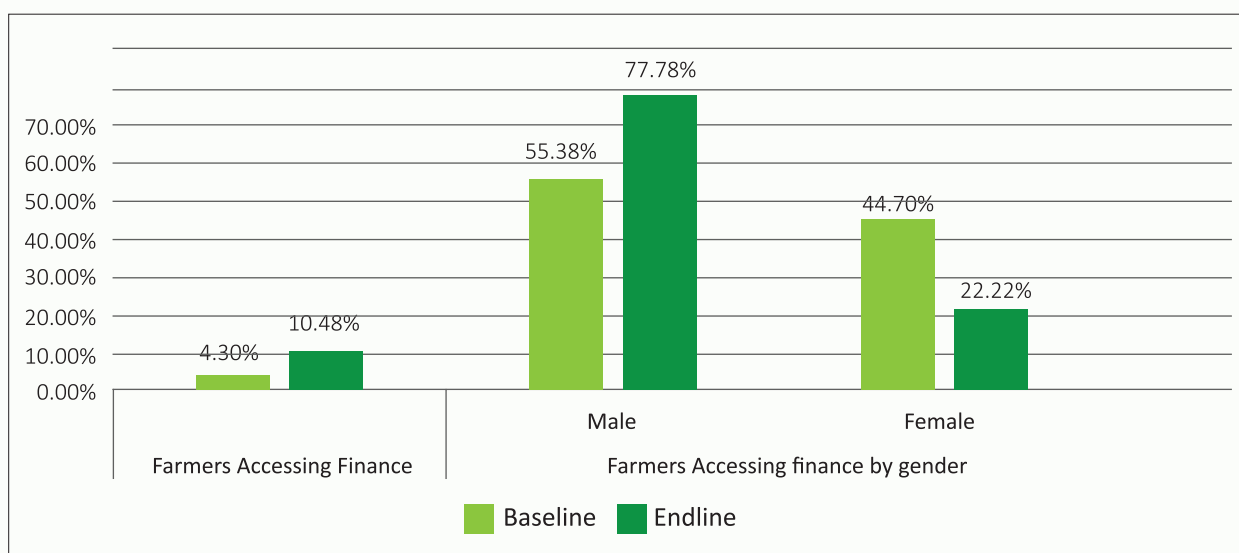
Likewise, there was a steady increase in the number of farmers relying on other farmers for market-specific information including extension services and the weather from 38.5% in 2018 to 68.5% while those relying on family and friends dropped from 56.1% to 26.8%. A similar decline is noted in the number of farmers relying on extension officers for such information (28.6% to 20.2% and radio programs (19.7% to 14.5%).

Comparatively, there was no significant difference between baseline and endline findings concerning access to commodity price information, because on average about 50 percent of the interviewed farmers said they obtained such data from agro-dealers. Similarly, over 80 percent of the farmers surveyed during baseline and endline reported having obtained extension services whereas more than 58 percent of those who keep livestock have access to veterinary service providers. Table 16 in the appendices shows a detailed analysis of such access to information among the sunflower farmers.

### 3.5.3 Finance Accessibility

The percentage of smallholders with access to finance from several diverse financial institutions, a key plank in facilitating improved technologies and increased productivity, shows an upward trend from 4.3 percent to 10.48 percent. However, while the access to such finances for males increased from 55.3 percent to 77.8 percent, access to their female counterparts appeared to have decreased (Figure 9).

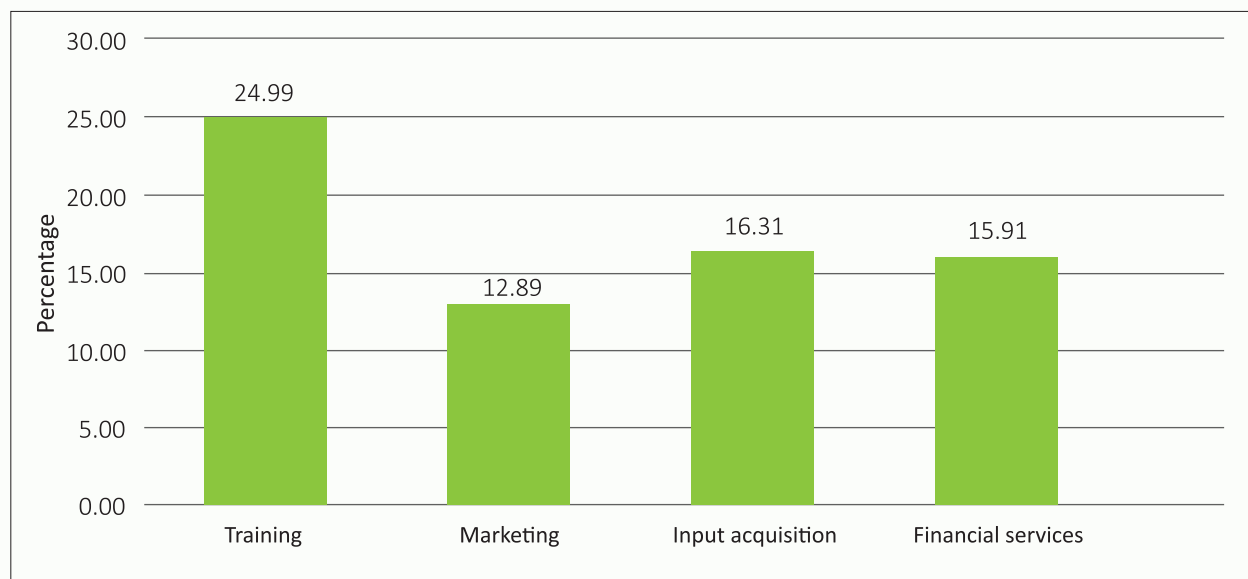
**Figure 9: Finance accessibility**



The decline in the number of women accessing credit from financial institutions can be attributed to collateral requirements. Women are particularly disadvantaged since they own less fixed assets such as land or houses than men. This has reduced their lending capacity as the most acceptable collateral for accessing credit in the village are fixed assets. In rare cases, the males have applied for loans on behalf of their spouses, which might also explain the spike in the number of males accessing such credit. Another reason would be the lending focus of the financial institutions, which have tended to favour traditional and strategic cash crops such as cashew nut, cotton, and tobacco, the value chains in which more men are actively engaged than women. To increase their chances of accessing financial loans, the AMDT facilitated farmers to organize into groups with trade-offs for training, marketing, and input acquisition. More than 16 percent of the respondents were members of such groups with most of those surveyed citing training (25%) to be the most important service provided by their groups followed by inputs acquisition and access to financial services (Figure 10).



**Figure 10: Services offered by farmers' groups**



### 3.6 Business Reforms

The study reveals that the AMDT together with the ecosystem of other actors has been successful in bringing about notable transformation to strengthen a sector that can improve the livelihoods of millions of families, paving the way for future industrialization and sustainable growth. These transformations in policy, trade, and business services demonstrate a high potential for long-term large-scale job creation and the opportunity for competitive advantage. Despite the initial successes and great potential of the sunflower seeds oil sector in Tanzania, it also faces many challenges for scaling up. These include inputs quality and standards including for fertilizer, poor infrastructure (roads, railway, and air) and marketing infrastructure specifically storage facilities; lack of agricultural credit that could enable small scale producers and processors to use high-quality technologies required to increase production, productivity, and improve sunflower oil quality and a weak policy environment. Additionally, lack of awareness of standards and procedures in the whole value chain (supplier of quality seeds, farmers, processors, and traders) would enable them to overcome challenges in oil refining, packaging, and hence meeting market demand and the necessary quality standards. These challenges call for collaborative measures to build confidence among the sector's different actors by encouraging partnerships and commitment in formulating and implementing long-term and short-term policies to sustain the sector.

For instance, the development and multiplication of improved sunflower seeds with high oil extraction content, disease, and drought resistance could be scaled up. The government is urged to increase import duty on crude and refined edible oils to discourage the importation of cooking oil while fostering demand for domestic refined sunflower. In addition, greater surveillance is needed at border entries to deter illegal importation of edible oils which have the potential to create unfair competition within the domestic supply. A removal of Value Added Tax (VAT) on domestic crude and refined sunflower oil and exemption of the same on solvent extraction machinery would encourage the use of improved sunflower machinery technology by small-scale processors. Additionally, the development of a customized digital-based information and communication platform would enable stallholder sunflower farmers to access new crop husbandry practices using their mobile phones as small scale and medium size oil processors if facilitated could meet international quality standards and accreditation of their sunflower products.



## CONCLUSION AND POLICY IMPLICATIONS

This chapter concludes the report with an overall summarized synopsis of the study findings. In addition, the chapter also provides some key recommendations based on the survey findings and suggests the way forward.

### 4.1 Conclusion

The AMDT aimed at exerting a high impact on poverty reduction by supporting at least 150,000 smallholder sunflower farmers to increase their incomes from self- and wage employment by 50 percent by 2020; support the creation of an organized and sustainable sunflower subsector which enhances increased production and productivity and income opportunities for smallholder men, women and youth farmers and SME processors, as well as link farmers, processors, and rural inputs supply chain to improved seed supply. Further, AMDT aimed at providing targeted support to processors and farmer organizations to enter pro-poor contractual arrangements. In addition, facilitating linkages between smallholder farmers and farmer organizations, processors, and financial service providers to enhance access to appropriate, women and youth-inclusive financial products as well as support a yield insurance product pilot to mitigate farmer financial risk in the use of improved seeds. Other interventions included facilitating the generation of evidence to support advocacy efforts aimed at improving functionality, efficiency, and productivity of the entire sunflower value chain.

Overall, by leveraging its support with the ecosystem of other sunflower actors and the government, the AMDT has performed exceptionally well in meeting most of the intended sunflower value chain performance targets. As evidenced by various parameters, the employment opportunities for poor women, men, and young people and their incomes have increased exponentially along the sunflower value chains and through support and adoption of high-yielding disease and drought-resistant sunflower seeds, farmers have been able to increase productivity. Additionally, some smallholder farmers have been linked to market outlets and contract farming arrangements that have resulted in secured and predictable markets, opening the potential for further improved incomes and deepening poverty reduction in the supported programme areas. In total, the AMDT succeeded in impacting 190,000 smallholder sunflower farmers, surpassing the target of 150,000 farmers by 27 percent during the three years.

**Stimulating the sunflower seed market:** Low yielding sunflower seeds that range between 0.4 to 0.6 tonnes per hectare in most smallholder farms in Tanzania compared with a potential yield of 2.0 to 3.0 tonnes per hectare; and very low oil content of about 15-20 percent compared with new seeds which have 35-42 percent oil content has been one of the most important drawbacks for low productivity in the country's sunflower value chain. By partnering with other sunflower supporters and sunflower seed research institutes, the AMDT has led the way in resolving this challenge by facilitating the private sector to invest in supplying improved seed varieties, while also encouraging the public sector to invest in developing the breeding capacity for new hybrid seed varieties in the longer term through responsible research. As a result of AMDT and partner's support, Tanzanian companies have invested over US\$200,000 (about TZS: 450 million) in growing hybrid seeds in Tanzania. In 2019 about 50 metric tonnes of hybrid seeds were produced locally. This is in addition to 243 metric tons of locally produced improved sunflower variety popularly known as 'Record.' By fostering widespread adoption of improved seeds, the AMDT has been one important driver of increased production of sunflower oil in the country making Tanzania one of the largest producers of the crop in Africa. It is estimated that private investment in seed multiplication has also cut the price of high-yielding hybrid sunflower seeds by 60 percent thus increasing productivity drastically (The Citizen, April 20, 2020).

**Facilitating contract arrangements for backward and forward linkages:** According to the review of the sunflower value chain, corporate investors have shown an interest in large-scale schemes involving over 10,000 smallholder sunflower farmers (Dalberg 2019). Due to enhanced contract farming arrangements, smallholder sunflower farmers have experienced improved access to finance and seeds from commercial and non-profit actors.



**Support to the harmonization of taxes, regulations, and laws:** One of the expected impact outcomes relates to improving the enabling environment in the sunflower agricultural value chains. According to Dalberg (2019), tax and tariff changes have transformed the entire sector by prompting investors to pursue hybrid seed, processing, and other investments in the sunflower sector. The seed sector has responded first by the importation of hybrid seeds and now local production of such seeds has started. The sunflower processors are investing in more than 50,000 metric tons of processing capacity and they are demanding more sunflower from farmers who continue to gain a steady income and improve their livelihoods – a key AMDT impact result for supporting the sunflower value chain.

**Enhance evidence generation of knowledge sharing and coordination:** One important intervention by AMDT is to facilitate enhanced capacity for advocacy and dialogue for the benefit of farmers as well as building stronger representative organizations and linkages. The AMDT has been successful on this front, supporting a wide range of stakeholders to see problems from each other's perspectives, improving understanding of the impact that policies and programs can have on various groups, encouraging participation in the policy process, and increased ownership and result in more responsive policies. For instance, a meeting convened in Mbeya on 23 May 2019, which brought together senior local government officials from 18 districts in the Southern Highlands of Tanzania reflected on the current PPD practices to align them with the Tanzania National Business Council (TNBC) guidelines additionally to increase understanding of incentives and capacities necessary for effective PPD that is also more inclusive of women, youth, and men. The event marked a key step towards AMDT's commitment to strengthen PPD networks in the targeted sunflower value chains.

## 4.2 Policy Recommendations

**Continue supporting multiplication of improved sunflower seeds with high oil extraction content that are disease and drought resistance.** This is an important intervention that could be achieved through increased government financing of research institutes researching sunflower seeds and provision of targeted incentives such as grants to sunflower seed multiplication companies with support from sunflower development partners and other non-state actors such as AMDT. Further, the government could support the establishment of a "Sunflower Stakeholder Group" composed of key representatives from the lead ministries, development partners supporting the industry, non-state actors, NGOs, and private sector organizations involved in supporting interventions in the sunflower value chain to periodically review progress towards achieving self-sufficiency in the domestic supply of this cholesterol-free cooking oil and substantially reduce oil imports and save foreign exchange for other development uses.

**Address the critical shortage of specialized sunflower extension staff.** Extension services are an important component in farm production and having a cadre of staff who can build the capacity of smallholder farmers to adopt good agricultural production practices, are well conversant with contract farming, and can help farmers garner win-win contractual arrangements with processors is key. Further, the extension staff could promote awareness around the Warehouse Receipt System (WRS), through which farmers can deposit sunflower seed and sell it later when the prices are better; at the same time, the stored seed serves as a guarantee for credits to farmers, which in some AMDT-supported areas has worked exceptionally well. The extension workers could additionally facilitate improvements to on-farm storage and support farmers in accessing digital information through their mobile phones on all issues related to their sales through the WRS. However, to be effective the extension service must be capacitated and empowered not only through skills training but also with working tools including transport, extension kits, and a matching remuneration.

**There is a need to scale up sunflower interventions to reach a greater number of beneficiaries to secure reliable and predictable market outlets for smallholder farmers' products.** Doing so would motivate farmers to cultivate more sunflowers and stimulate the adoption of appropriate farming technologies. This may entail continuing the excellent work already done by the AMDT and partners in linking smallholder farmers to secure markets through contract farming, service delivery models, and fast-tracking implementation of the country's second phase Agriculture Sector Development Programme (ASDP II), which aims at transforming the agricultural sector towards higher productivity, commercialization level and smallholder farmer income for improved livelihood, food and nutrition security and contribution to the Gross Domestic Product (GDP).

The program strategy is to transform gradually subsistence smallholders into sustainable commercial farmers by enhancing and activating sector drivers and supporting smallholder farmers to increase the productivity of target commodities within sustainable production systems and forge sustainable market linkages for competitive surplus commercialization and value chain development.

***Continue improving the sunflower value chain infrastructure as well as the policy, and legislative environment.*** Other hindering factors impinging negatively on the expanded trade along the sunflower value chain relate mostly to transport to the remote areas due to poor infrastructure, and a lack of logistics, such as cooperatives that could facilitate vertical and horizontal marketing integration. Interventions curbing these hindrances and ensuring an improved enabling policy environment would stimulate growth in the sunflower industry through the implementation of coherent and supportive policies in line with national development objectives and the reviewing of any policy constraints or issues that affect the industry, including assessing the impact of any tariffs and levies. The increase of import duty on crude and refined edible oils is creditable because it discourages the importation of cooking oil while fostering the demand for domestic refined sunflower oil. The current tariffs, however, have been too low to deter such importation. Tariffs in the range of 30 to 50 percent could be much of a deterrent. However, to work, greater surveillance around border entries including around the large porous coastal areas would be needed to deter illegal importation of edible oils which have the potential to create unfair competition within the domestic supply. The removal of VAT on domestic crude and refined sunflower oil as well the exemption of the same on solvent extraction machinery to encourage the use of improved sunflower machinery technology by small-scale processors should be continued. Further, the government and sunflower non-state actors could facilitate the development and adoption of small-scale environmentally friendly irrigation models, including drip irrigation and rain-harvesting which have been applied successfully in some areas in the country to increase farm productivity and reduce rainfall-dependent agriculture.

***Develop customized digital-based information and communication technologies for smallholder sunflower farmers.*** There is a growing recognition that Information and Communications Technologies (ICTs) comprising traditional media and newer tools, such as mobile phones and web-enabled services, can play an important role in enhancing the scaling-up process by facilitating interactions and linkages among relevant stakeholders and institutions while making information about agricultural innovations available, accessible, and affordable. As such, there is an opportunity to enable more farmers to take advantage of the mobile phone technology percolation to access a wide range of agricultural information using such gadgets.

***Enhance agricultural financing to enable small-scale producers and processors to access credit.*** Farmers and small entrepreneurs need finance to allow them to expand or invest in high-quality technologies required to increase production, productivity and improve sunflower oil quality. This would enable them to overcome challenges in oil refining and packaging to meet market demand and quality standards. However, financing is not a charitable activity; it is primarily profit-driven. This necessarily means that all possible regulations and programs to attract financing must be realistic with the characteristics of the sector and the viability and rate of return. Managing the risks and understanding the opportunities of the agriculture sector is key for any successful policy or law. This requires a coherent strategy with consistent regulation and policies that match the sectors' needs and are in line with the realistic capacities of all the actors.

***Investments in rural public goods, including roads and other infrastructures, can be a catalyst for improved edible oil subsector, particularly sunflower production.*** Poor rural roads, lack of marketing infrastructure specifically storage facilities and cluster aggregation facilities, and cold chains hamper the growth of the sunflower value chain. This is a common feature in rural areas where most farmers are located. Good infrastructure all of which are well documented in sectoral strategies and supported through respective ministerial budgetary allocations need to be addressed to help raise productivity and lowering the unit cost in the production activities.

***Small-scale sunflower processors should be encouraged to invest in improved processing mills that can extract high-quality sunflower oil and cake enough to meet both domestic and international market demands.*** Furthermore, easy access to sunflower seed throughout the year would increase the processors' capacity utilization thus widening their production and profits. As the supply of sunflower increases, millers



would no longer operate under capacity as is the case today. Therefore, given that government recognizes the importance of the sunflower sub-sector and has been making some efforts to improve productivity, the Ministry of Industries and Trade (MIT), Small Industries Development Organization (SIDO), and the Centre for Agriculture Mechanization and Rural Technology (CAMARTEC) could support smallholder sunflower processors acquire low-cost affordable processing mills that would add value to their products, improve quality as well as link the small processors to large firms capable of producing double-refined high quality “Made in Tanzania” sunflower cooking oil and other sunflower products. The national mandate of CAMARTEC is to undertake applied research and development, promotion, adaptation, and dissemination of appropriate technologies in the fields of agriculture mechanization and rural technology while SIDO a parastatal organization under the MIT responsible for planning, coordinating, promoting, and offering technical, economic and management services to small industries both existing and prospective.

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## ANNEX I: DATA COLLECTION TOOLS

### A. FOCUS GROUP DISCUSSION GUIDE

1. Which major crops are grown in this area?
2. What inputs do you use in sunflower production?
3. What type of seeds do most farmers use for sunflower production- improved or local?
4. Which sunflower varieties are available in this area?
5. Which are the preferred sunflower varieties (get all the names)? By a show of hands let the participants confirm their preferred variety of those named and find out the reasons for the preference.
6. Where do most farmers get their sunflower seed from? Please check for all varieties and elaborate on the distribution channel.
7. For those that recycle, how many times do they replant the sunflower seed?
8. For those that do not use improved sunflower seed varieties what is the reason?
9. What is the price of improved sunflower seed?
10. On average what is the size of sunflower farms in this area?
11. What are the costs of producing one acre of sunflower? Indicate stepwise from farm preparation up to storage.
12. In which months is sunflower planted and harvested? Find out how many times a year
13. How much seed is needed per acre?
14. What is the yield obtained from each acre?
15. If you processed from one acre, how much oil would you get?
16. What gives you better returns, selling seeds or oil?
17. Do you keep some oil for home use?
18. Has your sunflower productivity increased or reduced over the years? Why? (find out the reasons for each case)
19. What organizations assist you or provide you with any support in sunflower production? Please establish the type of service provided by each organization.
20. Do you have any sunflower producer associations in this community? Please get the names and objectives.
21. How many of you are members of any of these associations?
22. What benefits do you get from being a member of these associations?
23. Where do you sell your sunflower seeds or products from? Who is your most common buyer?
24. Do you have any contracts with processors?
25. Is it good to have contracts? If yes why and if no why?
26. How do you see sunflower production compared to other crops? Does it give better returns?
27. What are the factors or challenges that constrain the expansion of sunflower production?
28. What can be done to address these challenges?

## B. KEY INFORMANT INTERVIEW GUIDE

### ***Processors/Input dealers***

1. Which major crops are grown in this area?
2. What inputs do you use in sunflower production?
3. What type of seeds do most farmers use for sunflower production- improved or local?
4. Which sunflower varieties are available in this area?
5. Which are the preferred sunflower varieties (get all the names)?
6. If you process from one acre, how much oil would you get?
7. What gives better returns, selling seeds or oil?
8. Where is the largest market for processed oil?
9. How do you comment on the costs of inputs?
10. How do you comment on the costs of processing?
11. Do farmers like process or selling seeds? Why?
12. What are your perception of the government, Development Partners, and the private sector working together to enhance farmer access to agricultural loans in this area?

### ***Financial Institutions***

1. Are sunflower farmers your client?
1. Does your Institution have a special product for sunflower farmers? If yes which product? And If no special product why?
2. What are the challenges encountered to finance agricultural activities in this area?
3. What is your view of the loan services provided by your financial institution? (In terms of conditions, availability, and accessibility)
4. In your opinion, what needs to be done by the government and policymakers to improve financial institutions Sunflower and other agricultural value chain actors in the area? Who do you think is supposed to do this intervention? (e.g. government, NGOs, private sector, etc.)

### ***Project partner implementers***

1. Where do most farmers get their sunflower seed from?
1. What variety is most preferred by farmers?
2. What did the project do to sunflower farmers?
3. What were the effects of the project (positive/negative, intended/unintended)?
4. What were the challenges in implementing the project?
5. How is the sustainability of the results assured?



## ANNEX II: ANALYTICAL TABLES

**Table 4: Households covered in each region**

| S/No | Region       | Number of households | % of households | Number of FGDs | KII       |
|------|--------------|----------------------|-----------------|----------------|-----------|
| 1    | Dodoma       | 123                  | 13.87           | 4              | 4         |
| 2    | Iringa       | 92                   | 10.37           | 2              | 1         |
| 3    | Lindi        | 103                  | 11.61           | 3              |           |
| 4    | Manyara      | 71                   | 8               | 2              | 10        |
| 5    | Mtwara       | 106                  | 11.95           | 3              | 5         |
| 6    | Njombe       | 97                   | 10.94           | 2              |           |
| 7    | Rukwa        | 114                  | 12.85           | 3              | 2         |
| 8    | Singida      | 101                  | 11.39           | 4              |           |
| 9    | Songwe       | 80                   | 9.02            | 3              | 8         |
|      | <b>Total</b> | <b>887</b>           | <b>100</b>      | <b>26</b>      | <b>30</b> |

**Table 5: Age distribution per region**

| Region       | >=18_<=35    | >=36         | Total      |
|--------------|--------------|--------------|------------|
| Dodoma       | 8.13         | 91.87        | 100        |
| Iringa       | 10.87        | 89.13        | 100        |
| Lindi        | 14.56        | 85.44        | 100        |
| Manyara      | 15.49        | 84.51        | 100        |
| Mtwara       | 12.26        | 87.74        | 100        |
| Njombe       | 12.37        | 87.63        | 100        |
| Rukwa        | 16.67        | 83.33        | 100        |
| Singida      | 18.81        | 81.19        | 100        |
| Songwe       | 20           | 80           | 100        |
| <b>Total</b> | <b>14.09</b> | <b>85.91</b> | <b>100</b> |

**Table 6: Cultivated landholding per region**

| Region       | Cultivated land (owned) in acres |
|--------------|----------------------------------|
| Dodoma       | 3.0                              |
| Iringa       | 1.9                              |
| Lindi        | 1.4                              |
| Manyara      | 3.7                              |
| Mtwara       | 1.7                              |
| Njombe       | 1.8                              |
| Rukwa        | 3.1                              |
| Singida      | 2.1                              |
| Songwe       | 1.9                              |
| <b>Total</b> | <b>2.2</b>                       |



**Table 7: Average acres of crops grown on cultivated land**

| Crops grown on cultivated land | Average Acres |
|--------------------------------|---------------|
| Sunflower                      | 2.1           |
| Beans                          | 1.7           |
| Cowpea                         | 1.0           |
| Coffee                         | 1.3           |
| Groundnuts                     | 1.6           |
| Cashewnuts                     | 4.1           |
| Maize                          | 2.7           |
| Millet                         | 2.1           |
| Finger millet                  | 1.7           |
| Sorghum                        | 2.6           |
| Peas                           | 1.0           |
| Pigeon pea                     | 1.2           |
| Sweet potatoes                 | 2.0           |
| Rice                           | 2.1           |
| Sesame                         | 2.0           |
| Irish potatoes                 | 1.0           |
| Cassava                        | 1.4           |
| Onions                         | 1.6           |
| Wheat                          | 2.0           |
| Tomato                         | 0.9           |
| Soya beans                     | 1.4           |
| Other (Specify)                | 1.2           |
| <b>Total</b>                   | <b>2.2</b>    |

**Table 8: Education level of farming households**

| Level of education | Frequency  | Percentage |
|--------------------|------------|------------|
| None               | 67         | 7.55       |
| Pre school         | 1          | 0.11       |
| Some Primary       | 80         | 9.02       |
| STD 7              | 642        | 72.38      |
| Some Secondary     | 17         | 1.92       |
| Form-4             | 68         | 7.67       |
| Form-5             | 1          | 0.11       |
| University         | 11         | 1.24       |
| <b>Total</b>       | <b>887</b> | <b>100</b> |

**Table 9: Household off-farm sources of income**

| Activity name                            | Freq.      | Percent    | Cum.  |
|------------------------------------------|------------|------------|-------|
| Salary earner (e.g., teacher, policeman) | 36         | 8.11       | 8.11  |
| Casual wage earner                       | 72         | 16.22      | 24.32 |
| Farm labourer                            | 59         | 13.29      | 37.61 |
| Transportation business                  | 21         | 4.73       | 42.34 |
| Bicycle repair/mechanics                 | 1          | 0.23       | 42.57 |
| Brewing business                         | 21         | 4.73       | 47.3  |
| Brick making                             | 3          | 0.68       | 47.97 |
| Butcher                                  | 3          | 0.68       | 48.65 |
| Carpentry                                | 14         | 3.15       | 51.8  |
| Charcoal burning                         | 1          | 0.23       | 52.03 |
| Clothes business (trading)               | 7          | 1.58       | 53.6  |
| Construction                             | 18         | 4.05       | 57.66 |
| General-kiosk owner                      | 28         | 6.31       | 63.96 |
| Miller                                   | 2          | 0.45       | 64.41 |
| Trading farm produce                     | 23         | 5.18       | 69.59 |
| Trading fish                             | 2          | 0.45       | 70.05 |
| Trading livestock                        | 12         | 2.7        | 72.75 |
| Trading firewood                         | 4          | 0.9        | 73.65 |
| Trading non-food goods                   | 12         | 2.7        | 76.35 |
| Tailor                                   | 14         | 3.15       | 79.5  |
| Pension                                  | 9          | 2.03       | 81.53 |
| Remittance                               | 15         | 3.38       | 84.91 |
| Rent                                     | 2          | 0.45       | 85.36 |
| Other (don't specify)                    | 65         | 14.64      | 100   |
| <b>Total</b>                             | <b>444</b> | <b>100</b> |       |

**Table 10: Main types of lighting**

| The main type of lighting | Freq.      | Percent    | Cum.  |
|---------------------------|------------|------------|-------|
| Electricity               | 282        | 31.79      | 31.79 |
| Pressure lamp             | 6          | 0.68       | 32.47 |
| Tin lamp                  | 77         | 8.68       | 41.15 |
| Lantern                   | 65         | 7.33       | 48.48 |
| Solar power               | 397        | 44.76      | 93.24 |
| Other, specify)           | 60         | 6.76       | 100   |
| <b>Total</b>              | <b>887</b> | <b>100</b> |       |

**Table 11: Asset endowment**

| Asset                     | Frequency | Percent | Cum.  |
|---------------------------|-----------|---------|-------|
| House                     | 852       | 18.69   | 18.69 |
| Stores                    | 73        | 1.6     | 20.29 |
| Poultry houses            | 119       | 2.61    | 22.9  |
| Piggery houses            | 68        | 1.49    | 24.4  |
| Zero-grazing units        | 175       | 3.84    | 28.24 |
| Wheelbarrow               | 39        | 0.86    | 29.09 |
| Radio                     | 538       | 11.8    | 40.9  |
| TV                        | 209       | 4.59    | 45.48 |
| Solar panels              | 405       | 8.89    | 54.37 |
| Battery                   | 110       | 2.41    | 56.78 |
| Land line telephone       | 2         | 0.04    | 56.82 |
| Mobile phone              | 786       | 17.24   | 74.07 |
| Weighing machine          | 4         | 0.09    | 74.16 |
| Pestle and mortar         | 177       | 3.88    | 78.04 |
| Water tanks               | 5         | 0.11    | 78.15 |
| Beehive                   | 8         | 0.18    | 78.32 |
| Water pump (powered)      | 45        | 0.99    | 79.31 |
| ploughs for tractor       | 1         | 0.02    | 79.33 |
| harrow/tiller             | 118       | 2.59    | 81.92 |
| Cart                      | 37        | 0.81    | 82.73 |
| Trailer                   | 3         | 0.07    | 82.8  |
| Tractor                   | 2         | 0.04    | 82.84 |
| Car                       | 7         | 0.15    | 83    |
| Boom sprayer              | 115       | 2.52    | 85.52 |
| Irrigation equipment      | 10        | 0.22    | 85.74 |
| Water tanks               | 1         | 0.02    | 85.76 |
| Storage facility          | 13        | 0.29    | 86.05 |
| Milling machine (grinder) | 5         | 0.11    | 86.16 |
| Bicycle                   | 385       | 8.45    | 94.6  |
| Motorcycle                | 100       | 2.19    | 96.8  |
| Harrow/tiller             | 5         | 0.11    | 96.91 |
| Ridger/weeder             | 5         | 0.11    | 97.02 |
| Planter                   | 1         | 0.02    | 97.04 |
| Combine harvester         | 1         | 0.02    | 97.06 |
| Generator                 | 1         | 0.02    | 97.08 |
| Saw                       | 6         | 0.13    | 97.21 |
| Donkey                    | 4         | 0.09    | 97.3  |
| Business premises         | 10        | 0.22    | 97.52 |
| Others                    | 113       | 2.48    | 100   |

**Table 12: Cooking fuel**

| Cooking fuel | Freq.      | Percent    | Cum.  |
|--------------|------------|------------|-------|
| Electricity  | 2          | 0.23       | 0.23  |
| Firewood     | 809        | 91.21      | 91.43 |
| Gas          | 21         | 2.37       | 93.8  |
| Charcoal     | 54         | 6.09       | 99.89 |
| Solar power  | 1          | 0.11       | 100   |
| <b>Total</b> | <b>887</b> | <b>100</b> |       |

**Table 13: Amount of purchased food in a food deficit the period**

| Amount            | Freq. | Percent | Cum.  |
|-------------------|-------|---------|-------|
| Less than 100,000 | 81    | 46.29   | 46.29 |
| More than 100,000 | 75    | 42.86   | 89.14 |
| Cannot remember   | 13    | 7.43    | 96.57 |
| None              | 6     | 3.43    | 100   |

**Table 14: Access to productive assets and services**

|                    | Male | Female | Female as % of male |
|--------------------|------|--------|---------------------|
| House              | 656  | 196    | 23.0%               |
| Storage facility   | 57   | 16     | 21.9%               |
| Wheelbarrow        | 33   | 6      | 15.4%               |
| Radio              | 428  | 110    | 20.4%               |
| TV                 | 170  | 39     | 18.7%               |
| Mobile phones      | 618  | 168    | 21.4%               |
| Pounding machine   | 134  | 43     | 24.3%               |
| Water tanks        | 4    | 1      | 20.0%               |
| Dug well water     | 32   | 13     | 28.9%               |
| Tractor            | 1    | 0      | 0.0%                |
| Animal plough      | 105  | 13     | 11.0%               |
| Vehicle            | 7    | 0      | 0.0%                |
| Spray pump         | 99   | 16     | 13.9%               |
| Bicycle            | 332  | 53     | 13.8%               |
| Motorbike          | 91   | 9      | 9.0%                |
| <b>Services</b>    |      |        |                     |
| Extension services | 689  | 521    | 43.1%               |
| Access to credit   | 125  | 95     | 43.2%               |
| Irrigation         | 21   | 15     | 41.7%               |

**Table 15: Sources of water for domestic use and irrigation**

| Sources of water   | Frequency  | Percent    | Cumulative |
|--------------------|------------|------------|------------|
| Does not irrigate  | 5          | 0.56       | 0.56       |
| Pond               | 2          | 0.23       | 0.79       |
| Dam/Sand dam       | 67         | 7.55       | 8.34       |
| stream/river       | 38         | 4.28       | 12.63      |
| Unprotected spring | 5          | 0.56       | 13.19      |
| Protected spring   | 1          | 0.11       | 13.3       |
| Well               | 114        | 12.85      | 26.16      |
| Borehole           | 9          | 1.01       | 27.17      |
| Piped              | 242        | 27.28      | 54.45      |
| Roof catchments    | 397        | 44.76      | 99.21      |
| Others, specify    | 7          | 0.79       | 100        |
| <b>Total</b>       | <b>887</b> | <b>100</b> |            |

**Table 16: Access to information on markets, extension services, and weather**

| Source of Information for Climate-Smart Agriculture Practices<br>Information source |        | Market Information             |                           |              |        | Access to Extension services        |     |
|-------------------------------------------------------------------------------------|--------|--------------------------------|---------------------------|--------------|--------|-------------------------------------|-----|
|                                                                                     |        | Commodity prices               | Potential markets/ buyers | Input prices |        |                                     |     |
| Farmer                                                                              | 68.50% | Marketing information point    | 1.75%                     | 5.38%        | 2.37%  | Nearest extension service provider  | 83% |
| Family/friend                                                                       | 56.10% | Family/friend                  | 15.96%                    | 16.49%       | 15.57% | Nearest veterinary service provider | 58% |
| Radio                                                                               | 19.70% | Farmer                         | 30.18%                    | 22.22%       | 8.71%  |                                     |     |
| TV                                                                                  | 3.20%  | Radio                          | 2.81%                     | 3.23%        | 2.90%  |                                     |     |
| Newspaper                                                                           | 4.30%  | TV                             | 0.18%                     | 0.00%        | 0.00%  |                                     |     |
| Extension worker                                                                    | 28.60% | Extension worker               | 4.74%                     | 3.23%        | 14.78% |                                     |     |
| Agro-dealer                                                                         | 8.30%  | Agro-dealer                    | 7.02%                     | 8.24%        | 50.66% |                                     |     |
| Community meeting                                                                   | 13.60% | Farmer group                   | 1.93%                     | 2.51%        | 1.32%  |                                     |     |
| Field day                                                                           | 1.60%  | Cooperative                    | 0.70%                     | 3.58%        | 0.79%  |                                     |     |
| Brochures/pamphlets                                                                 | 1.60%  | Research institute/ University | 0.00%                     | 0.00%        | 0.53%  |                                     |     |
| University/Research institution                                                     | 0.80%  | Crop buyers                    | 34.21%                    | 31.90%       | 2.11%  |                                     |     |
| Faith based Groups                                                                  | 0.00%  | Commodity exchange             | 0.00%                     | 0.36%        | 0.00%  |                                     |     |
| Producer associations                                                               | 1.40%  | Other Sources                  | 0.53%                     | 2.87%        | 0.26%  |                                     |     |
| Community-Based Organizations (CBO)                                                 | 3.80%  |                                |                           |              |        |                                     |     |
| Farmer groups                                                                       | 3.90%  |                                |                           |              |        |                                     |     |
| Women groups                                                                        | 0.20%  |                                |                           |              |        |                                     |     |
| Other Sources                                                                       | 0.60%  |                                |                           |              |        |                                     |     |



## ANNEX III: LIST OF RESPONDENTS FOR THE KIIS FOR EACH REGION

| Name                    | Designation                                                      | Organization                                      | Contacts        |
|-------------------------|------------------------------------------------------------------|---------------------------------------------------|-----------------|
| <b>MANYARA REGION</b>   |                                                                  |                                                   |                 |
| Benedict Njau           | Director                                                         | Manyara Regional Office                           | 255 754 945 242 |
| Samweli Dahaye          | Regional Agriculture Advisor                                     | Manyara Regional Office                           | 255 783 824 200 |
| Eng. Norbert Kyomushula | Sunflower Project Liaison officer                                | Manyara Regional Office                           | 255 789 560 462 |
| Luther Daniel           | District Agriculture, Irrigation and Cooperative Officer (DAICO) | Babati Township Council                           | 255 688 368 258 |
| Florence Mkone          | Sunflower Project Liaison Officer                                | Babati Township Council                           | 255 778 953 690 |
| Domotila John Bugomba   | Assistant Planning Officer                                       | CRDB Credit Department                            | 255 754 881 118 |
| Vanginoti Mawazo        | Assistant Planning                                               | CRDB Credit Department                            | 255 752 717 873 |
| Omary H. Gogo           | Credit Officer                                                   | National Microfinance Bank (NMB)                  | 255 787 578 787 |
| Antipas Nnko            | Branch Manager                                                   | National Microfinance Bank (NMB)                  | 255 752 717 873 |
| Charles Woiso           | Branch Manager                                                   | TPB Bank Plc                                      | 255 754 275 317 |
| Tumaini Elibariki       | Manager                                                          | Farm Africa                                       | 255 758 832 299 |
| Janerose Frank Minja    | Manager                                                          | Input Supplier                                    | 255 784 544 191 |
| Athumani Karunde        | Chairperson                                                      | Manyara Sunflower Processors Association (MASUPA) | 255 784 397 456 |
| Julian Kaambata         | Secretary                                                        |                                                   | 255 762 368 870 |
| Abdulah Hussein Kaloli  | Secretary                                                        | UMAMBE Sunflower Oil Cluster Initiative           | 255 785 556 262 |
| Mbeseri Edward          | Chairperson                                                      | UMAMBE Sunflower Oil Cluster Initiative           | 255 683 794 959 |
| Janerose Frank Minja    | Seed Supplier                                                    | Proprietor                                        | 255 784 544 191 |
| <b>IRINGA REGION</b>    |                                                                  |                                                   |                 |
| Marco Mwansondola       | District Agriculture, Irrigation and Cooperative Officer (DAICO) | Kilolo District Council                           | 255 757 650 656 |
| <b>SONGWE REGION</b>    |                                                                  |                                                   |                 |
| Nickson Sanga           |                                                                  | Mbozi District Council                            | 255 762 357 497 |
| Joseph Michael Lugwira  |                                                                  | Songwe District Council                           | 255 763 805 397 |
| Stephen Mbiza           |                                                                  | Momba District Council                            | 255 062 592 159 |
| Christian Narsis Simba  |                                                                  | Songwe District Council                           | 255 767 386 180 |
| Thomas Taniel Mampas    |                                                                  | Mbozi District Council                            | 255 757 740 958 |
| <b>RUKWA REGION</b>     |                                                                  |                                                   |                 |

| Name                 | Designation                                                                | Organization                     | Contacts                |
|----------------------|----------------------------------------------------------------------------|----------------------------------|-------------------------|
| Frasto Mwasongola    | Assistant District Agriculture, Irrigation and Cooperative Officer (DAICO) | Kalambo District Council         | 255 756 451 900         |
| Dura Hamari          | Agricultural Officer                                                       | Kalambo District Council         | 255 755 415 171         |
| <b>SONGWE REGION</b> |                                                                            |                                  |                         |
| Lyidia Shonyela      | District Agriculture, Irrigation and Cooperative Officer (DAICO)           |                                  | 255 754 047 669         |
| Gidion Kayange       | Input Dealer                                                               |                                  | 255 754 513 990         |
| Mr Godfrey Waluse    | Loan Officer                                                               | GOLDGIVER                        | 255 768 481 234         |
| Fadhili Amosi        | Self Employed                                                              |                                  | 255 717 734 254         |
| Joel Kibona          | Self Employed                                                              |                                  | 255 768 066 826         |
| Ruth Kayange         | Self Employed                                                              |                                  | 255 746 736 524         |
| <b>MTWARA REGION</b> |                                                                            |                                  |                         |
| Efenia Komba         | DAICO                                                                      | Mtwara Rural District Council    | 255 788 767 767         |
| Alex Peter Msalenge  | District Agriculture, Irrigation and Cooperative Officer (DAICO)           | Mtwara Rural District Council    | 255 715 665 957         |
| Raphael J. Mihilito  | Acting Zonal Relationship Manager – Southern (Agricultural Sector)         | National Microfinance Bank (NMB) | 255 759 596 864         |
| Mr. Mohamed Longoi   | District Agriculture, Irrigation and Cooperative Officer (DAICO)           | Mtwara Town Council              | 255 786 859 097         |
| Mariam Mapunda       | Extension Officer                                                          | Mtwara Town Council              | 255 715 313 944         |
| Tarcile Mballa       | Inclusion Program Manager                                                  | Mtwara Town Council              | Tarcile.Mballa@akdn.org |
| <b>DODOMA REGION</b> |                                                                            |                                  |                         |
| David Mattaya        | Self Employed                                                              | Sunflower Processor              |                         |
| Chani Hagulwa        | Self Employed                                                              | Sunflower Processor              |                         |
| Mr. Kedmund Mgalonje | Self Employed                                                              | Sunflower Processor              |                         |
| Mr. Helius Clement   | Self Employed                                                              | Input Supplier                   |                         |
| Hortensia Peter      | Branch Manager                                                             | National Microfinance Bank (NMB) |                         |
| Emil Mruma           |                                                                            | National Microfinance Bank (NMB) |                         |
| Mr. Godfrey Mnyamale | District Agriculture, Irrigation and Cooperative Officer (DAICO)           | Chamwino District Council        |                         |









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