BASELINE EVALUATION

Agriculture Dairy and Economic Development Project in Makueni and Kajiado Counties

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ACRONYMS AND ABBREVIATIONS

ADED	Agriculture, Dairy and Economic Development
ASAL	Arid and Semi Arid area
CAHWs	Community Animal Health Workers
CIDP	County Integrated Development Plan
CF Kenya	ChildFund Kenya
CF NZ	ChildFund New Zealand
CPD	Continuous Professional Development
EDCA	Emali Dedicated Children's Agency
EDP	Emali Dedicated Program
ERSWEC	Economic Recovery Strategy for Wealth and Employment Creation
FAO	United Nations Food and Agricultural Organization
FGD	Focus Group Discussion
GDP	Gross Domestic Product
Ha	Hectare
KALRO	Kenya Agricultural & Livestock Research Organization
Kgs	Kilograms
KII	Key Informant Interview
Kshs/KES	Kenya Shillings
KVB	Kenya Veterinary Board
MFAT	Ministry of Foreign Affairs and Trade
NCDs	Non Communicable Diseases
NGO	Non-Governmental Organization
SRA	Strategy for Revitalizing Agriculture
SPSS	Statistical Package for Social Scientists
ToR	Terms of Reference
ToTs	Trainer of Trainers
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

ChildFund Kenya, its local partner, the Emali Dedicated Children's Agency (EDCA) and ChildFund New Zealand are implementing a 4-year project that began on 1st June 2017 and is expected to end on 31st May 2021. The project is funded by the New Zealand Government, through the Ministry of Foreign Affairs and Trade (MFAT). The project 'Agriculture, Dairy and Economic Development Project in Emali, Kenya' is designed to deliver improved agriculture, diversified livelihoods and reliable and beneficial market pathways for 238 livestock farmers to engage in dairy production and 100 crop farmers engage in moringa production. By the end of the project, food security and incomes in Emali farming communities will be improved and Maasai and Kamba households will be more resilient to climatic and economic shocks.

In December 2018, ChildFund New Zealand and ChildFund Kenya commissioned a baseline survey collect baseline data against the outcomes of the ADED project. The baseline survey also provides information on the current diverse livelihoods, food insecurity and level of resilience to climate and economic shocks of the farming communities in Emali, Kenya.

The study adopted a mixed method approach using both qualitative and quantitative research techniques. Household surveys were used to collect quantitative data from individual moringa farmers and livestock farmers. Focus Group Discussion guides were developed and used in the collection of qualitative data from farmer groups while Key Informant Interview schedules were developed to collect qualitative data from key informants. Secondary data was collected by reviewing project documents and other relevant literature.

Key Findings on the Dairy Component

Generally, livestock farmers have some knowledge and experience in dairy production. This is illustrated by the fact that some farmers in the project area already own dairy livestock (pure and crosses), mainly Sahiwal and Fresian cross breeds. In addition, 47% of the farmers that responded to the survey had adopted either semi-intensive or zero grazing dairy production systems. This forms a foundation upon which the ADED project should build on.

Milk production per cow per day is 4.5 litres, lower than the national average of 5 litres per cow per day[1]. The low production may be attributed to poor feeding, animal diseases, drought, inadequate knowledge and skills in dairy production, poor breeds and limited options to sell milk in the counties. The ADED project interventions should address the aforementioned challenges.

The majority of livestock farmers sell their milk either to traders (over 60%) or at farm gate (36%), with no value addition occurring before the milk is sold. Only raw milk is sold with the average monthly income from raw milk sales of KES 6,087. The average monthly income from sale of livestock was KES 14,830. Farmers reported a milk glut during the wet season, when they have difficulty in accessing markets for their milk. This justifies the need for a farmers' owned co-operative society with access to milk cooling facilities and a processing facility.

[1] Kenya National Dairy Master Plan, 2010

Milk prices are not a major challenge in the project area. In the wet season the average prices are KES 40 at farm gate and KES 45 when sold to vendors and traders[2]. The prices increase by over 30% during the dry season because of increased demand due to the depressed supply as a result of drought. This may be an impediment to the co-operative society getting milk suppliers.

It was noted that there was a gap in access to veterinary services because of few Government staff are on the ground. The adoption of AI services is very low with only 9% of the farmers in the project area adopting AI services[3]. This may be attributed to inadequate knowledge and understanding of the importance of using AI for breeding purposes.

The following key recommendations are proposed for the Dairy Component:

i. A training needs analysis should be conducted to find out the most relevant and effective training modules, content and methods of training.
ii. For efficient milk production farmers in the project area should be capacity built to adopt good dairy farm practices related to proper feeding, animal health care, and adoption of improved breeds
iii. Exposure visits to breeders' shows, agricultural shows and to successful dairy farmers in areas with the same ecological characteristics such as the project area should be organized by the ADED project.
iv. When establishing a dairy co-operative, the ADED project should consider adopting the hub model that offers integrated services such as processing, packaging, inputs provision, AI provision, feeds, training, financial services, marketing, transport services and quality control. This approach will enable farmers to establish and sustain viable dairy business entities which would be instrumental in propelling smallholder farmers from poverty.
v. ADED project proposed beneficiaries produce approximately 1,000 litres of milk per day. Best practice in establishing an economically viable milk processing factory in Kenya, advocates for at least 2,000 litres of milk supplied to the factory per day. The co-operative society established by ADED should first prioritize on cooling/ chilling facilities. The chilled milk could be sold to established processing companies such as New KCC and Brookside. The processing facilities should be developed progressively as the production of milk increases to reach the threshold of 2,000 litres per day.
vi. ADED results framework should include an indicator "Volume of milk chilled and sold at market" to capture the short term outcome of the project before the processing facilities are set up.
vii. Farmers should be assured of a stable pricing regime and prompt payment from the dairy co-operative. This will be important in encouraging farmers to supply milk to the dairy co-operative.
viii. Qualified paravets who are registered and meet all the conditions set by the Kenya Veterinary Board should be engaged to fill the gaps resulting from few veterinary officers.
ix. Farmers need to be sensitized on adoption of AI and/or using exotic breeds for improving local cattle.

[2] Most processors and co-operatives buy raw milk at between KES 25 to KES 40 per litre
[3] Adoption of AI services were observed to be higher in the Makueni zones than in the Kajiado Zones

Key Findings on the Moringa Component

The level of awareness of moringa in the project area is very high at 92%, with most of the crop farmers reporting that it is used for medicinal purposes, as a vegetable and beverage. Almost half of the crop farmers interviewed (44%) were growing moringa but only 12 farmers had ever harvested moringa. The volume of moringa crop yield per hectare (kgs) is 46 kgs, much lower than the ideal production of 19.6 metric tons/ha/cutting for fresh matter (flowers and leaves) and 3.33 metric tonnes/ha for dry matter (seeds)[4]. Low production may be attributed to limited awareness on good agricultural practices of the moringa plant; lack of reliable information on nutritional and medicinal values; lack of information on the market; and pests and diseases.

Only 2 of the farmers interviewed reported selling their moringa and they sold it at farm gate to their neighbours. The farmers that sold the moringa leaves/twigs and flowers earned a monthly income of KES 2,054. Processing of moringa plants for commercial purposes is not being carried out in the project area because of the low volumes produced, lack of processing equipment, and limited knowledge on how to process and package. Farmers also lack knowledge on where they could market their processed moringa products. Farmers are willing to engage in the moringa enterprise as long as they are assured of a ready market for the moringa products.

The following key recommendations are proposed for the Moringa Component:

i. Farmers need to be sensitized, trained and taken for exposure visits to understand the benefits of the moringa crop.
ii. Farmers need to be trained on the production, value addition and marketing of moringa and its products.
iii. A market survey and mapping study should be carried out to assist in identifying marketing strategies for the moringa.
iv. Moringa farmers should be mobilized into a co-operative society for them to get integrated services such as marketing, value addition, inputs, financial services, and training.

The following are key recommendations on the implementation model and project evaluation:

i. The project should adopt an implementation model of working in close collaboration and partnerships with key relevant stakeholders and empowering the beneficiary community members through intensive trainings. This will enhance the sustainability of the project interventions and results.
ii. Mid-term and Endline evaluations should be conducted using the same methodology so as to allow comparison of findings and measuring of attribution/contribution of the project to the results.

[4] *Foidl, et. al. 2001*

1 INTRODUCTION

Agriculture is the backbone of Kenya's economy and therefore growth in this sector stimulates growth in other sectors. According to the Kenya Economic Survey 2018, agriculture directly contributes to 32.6% of the national GDP and another 27% indirectly through linkages with the processing industry. The sector accounts for 65% of Kenya's total exports and supports about 80% of the rural population livelihoods. In Makueni County, agriculture accounts for 78% of the total household income. The sector is the most important driver of economic growth within the County[5]. In Kajiado County, Agriculture and Livestock development sector is the most important sector in the county, which employs 75% of the total population and provides nearly 40% of the County's food requirements[6].

1.1 Background Information on the Dairy Sector

Livestock has been identified as an important component of the agricultural sector as recognized by the Government of Kenya through its various past and present national development policy documents such as the National Development Plan of 2002 to 2008, Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC) of 2003 to 2007, Strategy for Revitalizing Agriculture (SRA) of 2004 of 2014, and Kenya Vision 2030. It is estimated that 10 million Kenyans living in the ASALs derive their livelihood largely from livestock. Livestock play important roles in Kenya's socio-economic development and contribute towards household food and nutritional security and is vital in strengthening the resilience of households in ASAL areas such as Kajiado and Makueni counties to respond to drought-related shocks.

Dairy farming is a life line for the majority smallholder farmers and entire pastoral communities of Kenya (3 million households) as sources of food, employment, cash income, manure to support crop production, and financing cash needs for social status[7]. The opportunities for the dairy industry are immense considering that the milk demand was estimated at 4.5 billion litres in 2016 and is expected to increase to 12 billion litres by 2030[8]. Growth in local consumption is expected to grow by at least 2-3% per year driven by population growth, coupled with urbanization and improvements in household incomes.

Pastoralism is the main source of livelihood to majority of rural households in Kajiado County while Makueni County farmers mainly keep small stock. Dairy farming is gaining prominence in Kajiado and Makueni County due to increased demand for milk and on-going Government interventions.

The project area has the advantage of access to fast growing towns that are along the Nairobi – Mombasa highway. These include Emali, Sultan Hamud, Masimba, Kibwezi, and Makindu. These towns are popular resting places for truck drivers ferrying goods from the Mombasa Port to and from inland destinations such as Nairobi, Kampala, Kigali and even the Democratic Republic of

[5] Makueni Vision 2025
[6] Kajiado County Integrated Development Plan, 2013-2017
[7] Kenya National Dairy Master Plan, 2010
[8] Tegemeo Institute of Agricultural Policy and Development, Egerton University, Kenya, Consumption Patterns of Dairy Products in Kenya's Urban Centers: Report from an Urban Household Survey (April 2005)

Congo. Currently, the towns are experiencing massive infrastructure development both by the national government and the county governments of Kajiado and Makueni as well as various investments by the private sector. Both the standard railway gauge and the one-meter railway, pass through these towns. This implies that there may be potential demand for milk and milk products around the project area.

There are however, several challenges in the adoption of dairy farming such as inadequate fodder, drought, unreliable water, inadequate skills and experience in dairy farming, livestock diseases, poor access to markets, limited value addition and low quality breeds[9].

1.2 Background Information on the Moringa Plant

Moringa Oleifera Lam is a tree that grows widely in many tropical and subtropical countries. It is grown commercially in India, Africa, South and Central America, Mexico, Hawaii, and throughout Asia and Southeast Asia. It is known as the drumstick tree based on the appearance of its immature seed pods, the horseradish tree based on the taste of ground root preparations, and the ben oil tree from seed-derived oils. In some areas, immature seed pods are eaten, while the leaves are widely used as a basic food because of their high nutrition content (Thurber and Fahey, 2009; Mbikay, 2012; Razis et al., 2014).

Seeds, leaves, oil, sap, bark, roots, and flowers are widely used in traditional medicine. Moringa leaves contain a desirable nutritional balance of vitamins, minerals, amino acids, and fatty acids (Moyo et al., 2011; Teixeira et al., 2014; Razis et al., 2014). Additionally, the leaves are reported to contain various types of antioxidant compounds such as ascorbic acid, flavonoids, phenolics, and carotenoids (Alhakmani et al., 2013; Vongsak et al., 2014). According to several commentaries (Anwar et al., 2007; Mbikay, 2012; Razis et al., 2014), various preparations of moringa are used for their anti-inflammatory, antihypertensive, diuretic, antimicrobial, antioxidant, antidiabetic, antihyperlipidemic, antineoplastic, antipyretic, antiulcer, cardioprotectant, and hepatoprotectant activities. The therapeutic potential of moringa leaves in treating hyperglycemia and dyslipidemia was reviewed by Mbikay (2012). Razis et al. (2014) summarized the potential health benefits of moringa, focusing on their nutritional content as well as antioxidant and antimicrobial characteristics. Oil from Moringa seeds is used in foods, perfume, and hair care products, and as a machine lubricant. The seed cake remaining after oil extraction is used as a fertilizer and also to purify well water and to remove salt from seawater[10].

A study on challenges and opportunities for Moringa growers in southern Ethiopia and Kenya followed moringa-growing households that cultivated moringa as a food source as well as for animal feed, medicine, shade, agro forestry, shelterbelt and as a source of income[11]. Moringa farmers in Kenya and Ethiopia faced several challenges, including a lack of reliable information on its nutritional

[9] Makueni and Kajiado County CIDPs
[10] http://www.kenyaneem.com
[11] https://www.researchgate.net/publication/320968406_Challenges_and_opportunities_for_Moringa_growers_in_southern_Ethiopia_and_Kenya

and medicinal values, inadequate access to markets for their products, and pest and disease stresses to their plants.

There is growing demand for moringa leaf products. Cultivation systems are varied, from intensive monocropping to intercropping, from direct seeding to cuttings. It is important to make an appropriate choice according to the local context and available means[12].

In Kenya, moringa is grown mostly in ASAL areas because it is a drought resistant crop. Some of the counties where the crop is grown include Taita Taveta, Laikipia, and parts of Embu, parts of Meru, Makueni, Kilifi, and Kwale. Moringa is emerging as a crop of interest in the country as a result of its medicinal value, bearing in mind the high prevalence of Non- Communicable Diseases (NCDs) in Kenya.

1.3 About ChildFund

ChildFund International is a non-sectarian and non-profit development organization working in more than 30 countries worldwide to improve the well-being of about 15.2 million children and families, regardless of race, creed, religion and gender. ChildFund's core intent is to help deprived, excluded and vulnerable children have the capacity to improve their lives and the opportunity to become young adults, parents and leaders who bring lasting and positive change in their communities; and societies whose individuals and institutions participate in valuing, protecting and promoting the worth and rights of children.

In Kenya, ChildFund International operates through ChildFund Kenya, formerly Christian Children's Fund. ChildFund Kenya improves the lives of over 1.1 million needy children through 51 Community Based Organizations located in over 32 Sub-Counties in Kenya. ChildFund's integrated development model is made up of interventions in several sectors: Early Childhood Development; Child Protection; Education; Health and Nutrition; Livelihoods; Water and Sanitation; Environmental Conservation; and Emergency Relief.

In Emali, ChildFund Kenya partners with Emali Dedicated Children's Agency (EDCA), a local Non Governmental Organization (NGO) working towards the wellbeing and development of children in the Kajiado and Makueni counties.

1.4 Overview of the Project 'Agriculture, Dairy and Economic Development Project in Emali, Kenya'

'Agriculture, Dairy and Economic Development Project (ADED) in Emali, Kenya' is a 4-year project that began on 1st June 2017 and is expected to end on 31st May 2021. It is funded by the New Zealand Government through the the Ministry of Foreign Affairs and Trade (MFAT). The project is expected to deliver improved agriculture, diversified livelihoods and reliable and beneficial market

[12] *How to Produce Moringa Leaves Efficiently? Presented by Newton Amaglo, Kwame Nkrumah University of Science and Technology, Ghana*

pathways for 238 farmers to engage in dairy production and 100 farmers to be engaged in moringa production.

The project is being implemented by ChildFund Kenya in collaboration with EDCA. The project is operating in the Emali Dedicated Program (EDP) area in Makueni (Mulala Division) and Kajiado (Kenyewa Division) Counties. This area of operation is divided into 8 zones namely: Mulala, Tutini, Kwakakulu, Emali-Makueni, and Mwanyani in Makueni County and Emali-Kajiado, Game and Nkusso in Kajiado County. Kenya Vision 2030, Second Medium Term Plan 2013 – 2017, Sector Plan For Drought Risk Management and Ending Drought Emergencies and the Makueni and Kajiado Counties' Integrated Development Plans (CIDPs)-2013-2017 have identified the project area as a drought prone area.

Drought has for decades been the single most disastrous natural hazard in Kenya that has destroyed livelihoods and caused hunger, disease and even death with the effects being more pronounced in the 28 Arid and Semi Arid (ASAL) areas in Kenya. Drought related disaster; risk reduction by building resilience of drought-affected communities, through the ADED project interventions is a key ingredient in enhancing food security and improving incomes of the Maasai and Kamba farming communities in Emali as well as ensuring sustainable county and national development in Kenya.

The expected project outcomes and outputs are as illustrated in Table 1.1 below:

Table 1.1: Project Outcomes and Outputs

Long term outcome	Medium term outcomes (After 4 years)	Short term outcomes (1-4 years)	Outputs
Enhanced food security and livelihoods from agriculture	• Maximized livestock and crop returns; • Climate resilient communities; • Increased household income.	• Households practice climate-sensitive crop diversification; • Improved pasture and stronger herds; • Market pathways established and strengthened; • Value added to agricultural products through processing.	• 100 Farmers trained and resourced to introduce Moringa crops; • 238 Households supported with adaptation techniques and inputs for improved livestock and diversified livelihoods; • 638 Household members trained and resourced to generate income through innovative agri-business.

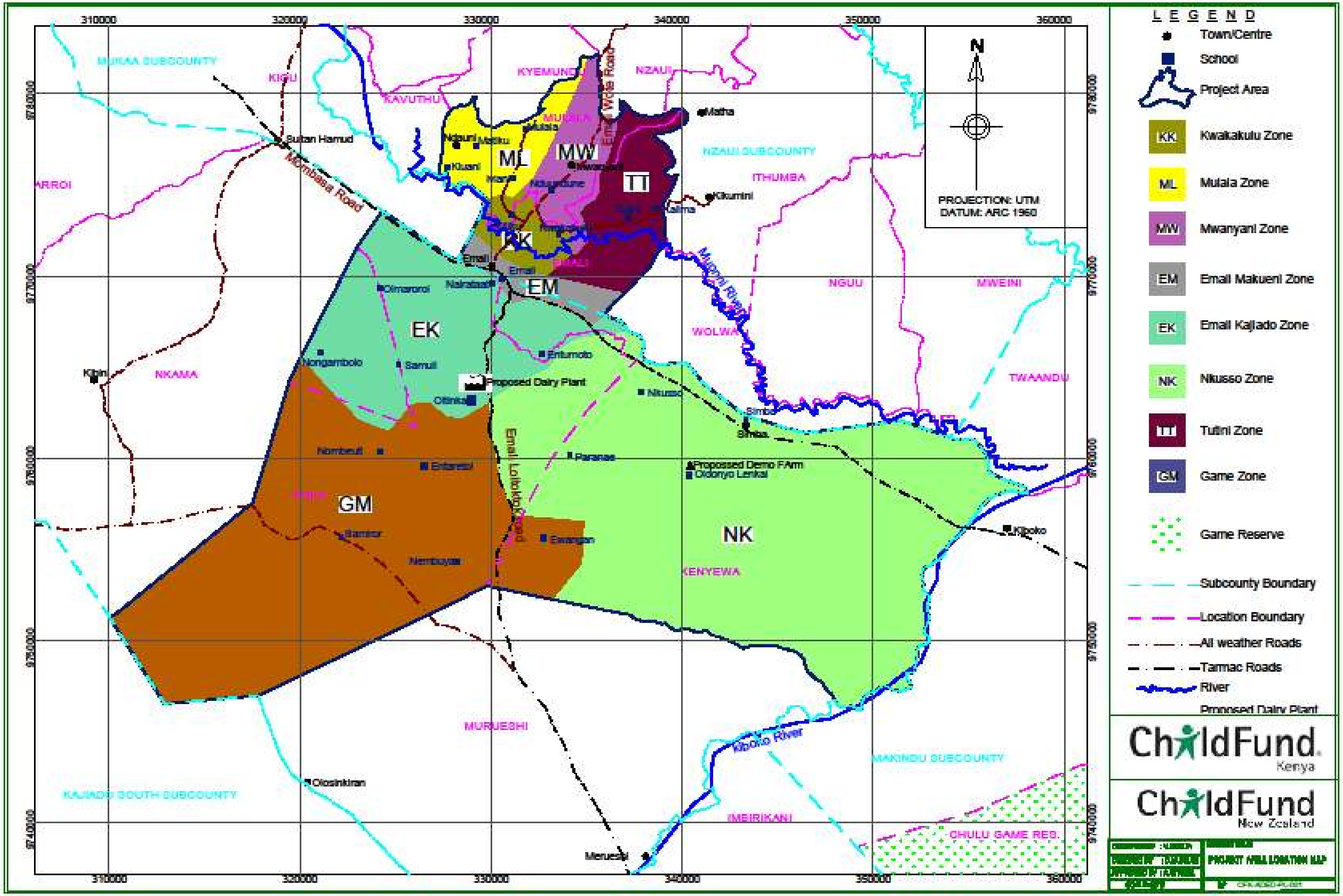

Figure 1.1: Project Area Map

1.5 Purpose and Objectives of the Baseline Survey

The purpose of the baseline survey was to collect baseline data against the outcomes of the ADED project. The baseline survey also provided information on the current diverse livelihoods, food insecurity and level of resilience to climate and economic shocks of the farming communities in Emali Kenya.

Data was collected against the indicators of the project's medium term and short term outcomes, as illustrated in Table 1.2 below.

Table 1.2 Project Indicators

Outcome	Indicator
Medium-term Outcome 1a	Volume of moringa crop yield per hectare
Medium-term Outcome 1b	Milk productivity per cow
Medium-term Outcome 2a	Monthly household income from the sale of moringa
	Monthly household income from the sale of livestock
	Monthly household income from the sale of milk
	Monthly household income from the sale of moringa products
	Monthly household income from the sale of milk products
Short-term outcome 3b	Volume of moringa processed
Short-term outcome 3d	Volume of milk processed and sold at market

1.6 Scope of Work

The specific activities of the evaluation included:

i. A desk review of the Activity Design Document.
ii. Development of all data collection tools.
iii. Training of the data enumerator team in survey administration, focus group interviewing and key informant interviewing.
iv. Field testing of data collection tools and making any necessary revisions.
v. Data collection in the field including surveying, focus group discussions, key informant interviews and Most Significant Change stories.
vi. Reporting to the project team on the progress of the evaluation including challenges encountered in the field that may have an impact on the quality of the final report.
vii. Data processing and analysis
viii. Preparation of a draft written report for comment by ChildFund.
ix. Delivery of the results of the draft report to key stakeholders.
x. Incorporation of the comments given by project staff and key stakeholders
xi. Submission of the final written report to ChildFund and;
xii. Hand over of the final report and data.

2 BASELINE SURVEY METHODOLOGY

This section describes the detailed methodology applied to the baseline survey of the ADED Project.

2.1 Overview of the Approach

A holistic multi-method approach was used for the baseline survey. Qualitative, quantitative and participatory evaluation techniques were employed to generate as much information as necessary on the current diverse livelihoods, food insecurity and level of resilience to climate and economic shocks of the farming communities in Emali, Kenya. The main methods used were: document review; Key Informant Interviews (KIIs); household surveys; personal observations; and Focus Group Discussions (FGDs).

2.1.1 Document Review of Secondary Data Collection

Secondary data collection included a desk review of various project reports and other relevant literature. The findings of the desk review were triangulated with the primary data. A literature reviewed provided some background information on the ADED project that was important in understanding the operational context of the project and also the dairy and moringa value chains both in the project area and nationally. A list of documents reviewed is presented in Appendix 4.

2.1.2 Primary Data Collection

Primary data was collected using both quantitative and qualitative techniques depending on the target respondents. Quantitative techniques were used for household surveying while qualitative techniques were used to conduct Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs), as well as gather case studies (success stories).

For collection of quantitative data, 2 sets of structured household surveys were conducted. One was for the moringa farmers at the household level and the other was for the dairy farmers at the household level. FGD interview guides were developed and used for the collection of qualitative data from moringa farmers and dairy farmers. Key Informant Interview guides (KIIs) were also developed to collect qualitative data from key informants that included agricultural officers, livestock officers, veterinary officers, community animal health workers, individual dairy farmers/traders, and moringa traders.

2.1.2.1 Sampling Design

Household survey data for the dairy farming was collected in all the Emali Dedicated Program (EDP) zones namely Emali Kajiado, Game, Nkusso in Kajiado County and Kwakakulu, Mulala, Tutini, Mwanyani, Emali Makueni in Makueni County because the dairy component is expected to benefit all the EDP zones. The household survey for the moringa farmers was conducted only in Kwakakulu, Mulala, Tutini, Mwanyani, Emali Makueni zones in Makueni County.

The total sample size for the baseline survey has been determined using the Yamane (1967:886) formula as below.

$$n = N/1+N(e)^2$$

Where:

- n is the sample size;
- N is the population size;
- e is the desired level of precision (Assumed to be 5%)

For the dairy component, the targeted beneficiaries are 238 farmers and therefore the proposed sample size was 156 farmers including a 5% increment to the sample size to cater for non-response and recording errors. The moringa component is expected to benefit 100 farmers; consequently, the proposed sample size was 85 farmers including a 5% increment to the sample size to cater for non-response and recording errors.

Cluster random sampling was employed to select households to be interviewed. The zones were allocated as the first tier cluster. In selecting households for the evaluation, the sampling frames comprising all the proposed beneficiaries of the dairy and moringa components of the project were used. From the sampling frame, respondents were selected randomly from each of the zones with the assistance of ChildFund Kenya staff and EDCA officials. At the household location, the survey team interviewed the listed beneficiary of the project. In case the household randomly selected to participate in the evaluation was not willing or was not available, a replacement household was found by selecting the next household in the sampling frame that had not previously been selected to participate in the survey.

Key informants and FGD participants were purposively selected based on the role they play in moringa and dairy value chains. The sample size distribution is illustrated in Table 2.2.

Table 2.2 Sample Size Distribution

Type of Data Collection	Types of Respondents	Proposed Sample Size	Achieved Sample Size

Household Survey	Dairy Beneficiaries at household level	• Kajiado-108
		• Makueni-48
			• Kajiado-113
			  ○ Emali Kajiado-32
			  ○ Game-42
			  ○ Nkusso-39
			• Makueni-46
			  ○ Kwakakulu-9
			  ○ Mulala-9
			  ○ Tutini-8
			  ○ Mwanyani-8
			  ○ Emali Makueni-12

Sub-Total for Dairy Household Survey		**156**	**159**

Household Survey	Moringa Beneficiaries at household level	• Makueni-85	• Makueni-81
			  ○ Kwakakulu-17
			  ○ Mulala-17
			  ○ Tutini-15
			  ○ Mwanyani-16
			  ○ Emali Makueni-16

Focus Group	Farmer groups	Total-10	Total-6

Type of Data Collection	Types of Respondents	Proposed Sample Size	Achieved Sample Size
Discussions		• Livestock keepers-6 • Crop farmers-4	• Livestock keepers- 4 • Crop farmers-2
Sub-total for FGDs		**10**	**6[13]**
Key Informant Interviews (KIIs)	Agricultural Officers	Total-2 • Kajiado-1 • Makueni-1	Total-2 • Kajiado-1 • Makueni-1
	Livestock Officers	Total-2 • Kajiado-1 • Makueni-1	Total-2 • Kajiado-1 • Makueni-1
	Veterinary Officers	Total-2 • Kajiado-1 • Makueni-1	Total-2 • Kajiado-1 • Makueni-1
	Chiefs	Total-2 • Kajiado-1 • Makueni-1	Total-2 • Kajiado-1 • Makueni-1
	Paravets	Total-0	Total-2
Sub-total for KIIs		**8**	**10**

2.1.2.2 Training and Pre-testing

Prior to the commencement of data collection, enumerators were trained on: The overview and objectives of the project; The purpose of the study/evaluation; Survey organization; Research ethics; Sampling methods; Tips for conducting interviews; and Questionnaires administration.

The training was conducted on 8th January 2018 at the EDCA boardroom in Emali by the consultant with support from Maclean Egesa, Simeon Rono and Harrison Kamau from ChildFund Kenya. After the training exercise, the evaluation team pre-tested the tools on 9th January 2018 in KwaKakulu (Makueni County) and Emali Kajiado (Kajiado County). The pretesting exercise helped to specifically identify weaknesses with the data collection tools, assessed the logical flow of the questions and helped to gauge the time required to administer each tool in the field. The team then made the necessary changes/corrections to the data collection tools and shared these with the client (ChildFund Kenya) for approval of use in the data collection phase.

2.1.2.3 Field Work for Primary Data Collection

Primary data collection was conducted from 10th January to 18th January 2018. The household survey was administered by ten (10) trained research assistants/enumerators, and 2 supervisors from the Emali Dedicated Program area. This was strategically planned to ensure acceptability and ease of data collection due to better knowledge of the local conditions and language. At the end of each day of data collection enumerators handed over the completed questionnaires to their respective supervisors. The supervisors then checked through each questionnaire for completeness, errors and authenticity of the collected data. To ensure data quality, supervisors also ensured that they spot checked or back-checked at least 10% of each enumerators questionnaires. The consultant also reviewed a sample of the

[13] Due to the limitation of time and vastness of the project are, as well as having only one consultant conducting the FGDs and KIIs, the consultant was not able to conduct all the FGDs.

questionnaires and back-checked a few of them. The consultant accompanied some of the enumerators when conducting the interviews for the purpose of quality control.

The FGDs were made up of 6-10 representatives from livestock and crops farmer groups. Key Informant Interviews (KIIs) were undertaken with Government stakeholders (Agriculture, Livestock, Veterinary Officers, Chiefs), Community Animal Health Workers (CAHWS).

2.2 Data Entry and Cleaning

All completed household questionnaires were forwarded by the supervisors to a central place (ChildFund Kenya's office in Emali), where the questionnaires were coded and data entered by three (3) qualified data entry clerks. Data entry occurred simultaneously alongside data collection, from 11th January to 20th January 2018. Quantitative data was entered into SPSS analysis software then cleaned by the consultant to check missing data, incorrectly entered data and outliers, before data analysis. Qualitative data from KIIs and FGDs was transcribed into MS Word.

2.3 Data Analysis and Report Writing

Qualitative and quantitative data analysis was conducted with the intention of addressing the specific objectives of the evaluation. The quantitative analysis was done using SPSS Version 20. Descriptive statistics such as frequencies and cross-tabulations were used to analyse the data. Qualitative data was analysed using a content analysis approach by reading through the interview or focus group transcripts, developing codes, coding the data, and drawing connections between discrete pieces of data. KII and FGD notes were reviewed with an eye for common themes, categories and patterns.

This final report was derived from the primary and secondary data collected and analysed. The report also incorporates comments and recommendations from the ChildFund New Zealand team, ChildFund Kenya team and other key stakeholders from the project area[14].

2.4 Study Limitations

The evaluation had a few limitations including:

i. The vast and rough terrain of the Kajiado zones presented a challenge to the survey team in reaching the respondents' households as well as organizing FGDs, thus slowing the data collection process.
ii. The use of paper-based data collection tools household survey took a little bit more time than if digital data collection data collection tools were adopted.

[14] A stakeholders' forum was held in New Generations Hotel in Emali on 16th March 2018. Stakeholders listed in appendix 6 of this report.

3 KEY FINDINGS ON THE DAIRY COMPONENT

This chapter presents the baseline findings of the dairy component. It also describes the socio-economic and demographic characteristics of the respondents.

3.1 Demographic and Socio-economic Characteristics of the Study Respondents-Dairy Component

Demographic and socio-economic characteristics of the respondents are presented in terms of sex, household size, age, and highest level of education achieved.

3.1.1 Sex of Respondents-Dairy Component

The proportion of females interviewed was 77% and the proportion of males interviewed was 23%, see Figure 3.1. This almost mirrors the project beneficiary target of 75% females, 20% males and 5% youth.

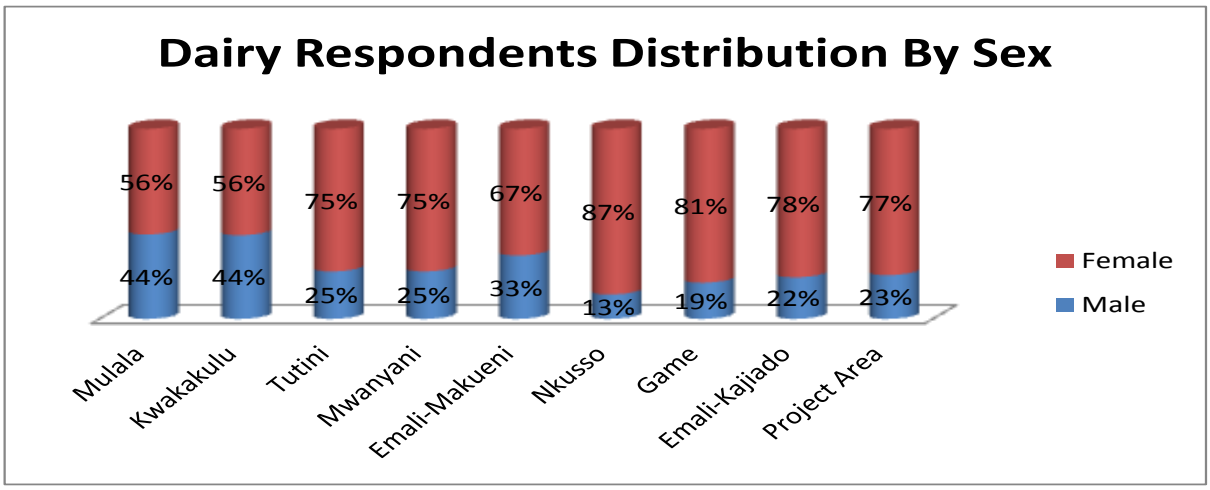

Figure 3.1 Sex of Respondents-Dairy Component
Source: Dairy Baseline survey data, 2018

3.1.2 Age Distribution-Dairy Component

Age data from the dairy household survey was categorized as shown in Table 3.2. The 18-35 years age group is referred to as the youthful and most productive category of the labour force of the population. This age group financially supports the other age groups in the household and is tasked with income generation. This accounted for 43% of dairy respondents. The ADED project has proposed to target at least 5% of the youthful population. The 36-60 years age group is also part of productive category or the labour force of the population together with the youth group (18-35). This age group also financially supports the other age groups in the household, is tasked with income generation and is also an owner of assets. This accounted for 50% of dairy respondents. The over 60 year's age group is referred as the elderly population. Household members in this age category together with those aged below 5 years are mostly dependant on other members of the household

for basic needs. However, it is important to note that those in this age group are also owners of assets such as land and livestock.

Table 3.2 Age Distribution-Dairy Component

Age of Respondent		Zone								Project Area
	Statistic	Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	
18-35 yrs	n[15]	3	1	4	2	3	20	22	14	69
	%	33.3	11.1	50.0	25.0	25.0	51.3	52.4	43.8	43.4
36-59 yrs	n	3	7	3	6	9	16	19	16	79
	%	33.3	77.8	37.5	75.0	75.0	41.0	45.2	50.0	49.7
60 yrs &above	n	3	1	1	0	0	3	1	2	11
	%	33.3	11.1	12.5	0.0	0.0	7.7	2.4	6.2	6.9
Total	n	9	9	8	8	12	39	42	32	159
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Dairy Baseline survey data, 2018

3.1.3 Education Level-Dairy Component

Education is a key determinant of the lifestyle and status an individual enjoys in a society. Studies have consistently shown that educational attainment has a strong effect on behavior and attitudes of household members towards health, nutrition, investments, income generation, expenditure and adoption of new technologies, among other socio-economic indicators.

Data from the livestock baseline survey indicates that only 28.6% of respondents had completed secondary school education or higher (see Table 3.3). Of the respondents, 19.5% had no formal education, and this was more prominent in the Maasai-dominated Kajiado zones. This information is important when the ADED project team design the training modules for livestock farmers.

Table 3.3 Highest Education Level Achieved by Respondents-Dairy Component

Level of Education	Statistic	Zone								Project Area
		Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	
No formal school Attended	n	0	0	0	0	0	13	14	4	31
	%	0.0	0.0	0.0	0.0	0.0	33.3	33.3	12.5	19.5
Adult Literacy education	n	0	0	0	0	0	0	6	1	7
	%	0.0	0.0	0.0	0.0	0.0	0.0	14.3	3.1	4.4
Some primary School	n	1	0	3	0	2	13	10	9	38
	%	11.1	0.0	37.5	0.0	16.7	33.3	23.8	28.1	23.9
Completed Primary School	n	1	2	1	3	3	8	2	5	25
	%	11.1	22.2	12.5	37.5	25.0	20.5	4.8	15.6	15.7

[15] n-represents numbers

Level of Education	Statistic	Zone								Project Area
		Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	
Some secondary/ High school	n	0	1	2	3	3	2	3	1	15
	%	0.0	11.1	25.0	37.5	25.0	5.1	7.1	3.1	9.4
Completed Secondary/ High school	n	5	5	2	1	4	2	5	5	29
	%	55.6	55.6	25.0	12.5	33.3	5.1	11.9	15.6	18.2
College/University	n	2	1	0	1	0	1	2	7	14
	%	22.2	11.1	0.0	12.5	0.0	2.6	4.8	21.9	8.8
Total	n	9	9	8	8	12	39	42	32	159
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Dairy Baseline survey data, 2018

3.2 Ownership and Utilization of Land

Data collected from livestock farmers shows that the average land size in the project area is 71 acres (28.4 hectares) with the large chunks of land found in the Kajiado zones of Nkusso, Game and Emali Kajiado. Most of the land in the Kajiado zones is for livestock keeping while in the Makueni zones of Mulala, Kwakakulu, Mwanyani and Emali Kajiado, most of the land is for crop farming. This means that there is a lot of potential for fodder growing and conservation more so in the Kajiado zones than in the Makueni zones. There is also more potential for farmers in the Makueni zones to utilize crop residues as fodder for their animals. Kajiado farmers also have a higher potential of keeping more dairy livestock as a result of larger land sizes.

Table 3.4 Ownership of Land among Dairy Beneficiaries

Zone	Average Farm Size (Acres)	Average Area under crops	Average area under livestock
Mulala	6	4	2
Kwakakulu	6	3	2
Tutini	5	3	2
Mwanyani	3	2	1
Emali-Makueni	2	1	1
Nkusso	100	5	89
Game	80	3	77
Emali-Kajiado	119	3	93
Project area	71	3	62
No of Respondents (N)	159	86	159

Source: Dairy Baseline survey data, 2018

3.3 Ownership of Livestock

Livestock keeping is the main economic activity for households in Kajiado County. The most common livestock kept are indigenous cattle, indigenous goats, sheep and poultry that are principally reared for meat and milk for sale and for home consumption (Table 3.5). It is worth noting that there are some farmers in all the zones except Tutini and Emali Makueni who already own dairy livestock

(pure and crosses), mainly Sahiwal and Fresian cross breeds. This reflects an opportunity for the ADED dairy production being a success because Friesian or Sahiwal dairy cattle can produce high milk yields, which can be greatly increased with improved feed and farming practices.

Table 3.5 Average Number of Livestock Owned by Zone[16]

Type of Livestock	Average number owned								
	Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	Project area
Dairy (pure & crosses) cattle	3	1	0	1	0	3	2	2	2
Indigenous cattle	2	5	3	2	2	13	7	19	10
Dairy (pure & crosses) goats	2	0	0	0	7	6	9	7	7
Indigenous goats	7	9	16	6	8	27	14	29	19
Donkeys	2	0	1	2	0	3	3	2	3
Sheep	4	5	5	6	5	31	15	22	20
Poultry	23	15	10	14	21	6	9	14	12
Oxen	2	3	2	2	2	4	7	7	4

Source: Dairy Baseline survey data, 2018

3.4 Dairy Production Systems

The main dairy production systems operating in the project area are (1) free range (53%), and (2) semi-intensive (43%). Only 4% of the livestock farmers interviewed practise zero grazing, all of whom come from zones in Makueni (see Table 3.6).

Table 3.6 Dairy Production Systems

Production System	Statistic	Zone								Project Area
		Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	
Zero grazing	n[17]	2	3	0	2	0	0	0	0	7
	%	22.2	33.3	0.0	25.0	0.0	0.0	0.0	0.0	4.4
Semi-intensive	n	6	2	5	3	6	15	4	28	69
	%	66.7	22.2	62.5	37.5	50.0	38.5	9.5	87.5	43.4
Free-Range	n	1	4	3	3	6	24	38	4	83
	%	11.1	44.4	37.5	37.5	50.0	61.5	90.5	12.5	52.2
Total	n	9	9	8	8	12	39	42	32	159
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Dairy Baseline survey data, 2018

[16] *Please note the baseline survey was conducted after there was a massive drought that led to the demise of many livestock*

[17] n-represents numbers

Nearly half of livestock farmers (47%) have adopted semi-intensive and zero grazing, reflecting some level of knowledge of dairy production amongst farmers. The majority of livestock farmers in Kenya practice zero or semi-zero grazing systems for efficient milk production (Bebe et al., 2003)[18]. There is therefore need to put a lot of effort in capacity building farmers in the project area to at least adopt semi-zero grazing, paddocking and zero grazing systems .

3.5 Milk Production

In the project area the average milk production per cow per day is approximately 5.9 litres during the wet season and 3.9 litres during the dry season (see Table 3.7). Higher milk production per cow per day is observed in the Kajiado zones as well as in Mulala zone in Makueni zone. In these zones, it was noted that there was higher adoption of dairy cows than in the other zones.

Table 3.7 Average Milk Production per Zone

Milk Production during Wet and Dry Seasons (litres)	Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	Project area
Average milk produced per cow during wet season in the morning	3.0	2.9	2.7	2.3	2.6	3.4	3.3	3.5	3.0
Average milk produced per cow during wet season in afternoon/ evening	3.0	2.6	2.7	2.6	2.5	3.3	3.3	3.5	2.9
Average milk produced per cow during dry season in the morning	2.3	1.7	1.7	1.6	1.8	2.5	1.1	2.9	1.9
Average milk produced per cow during dry season in the afternoon/ evening	2.1	1.6	2.1	1.5	1.9	2.4	1.2	2.8	1.9
Average milk produced per cow per day during wet season	6.0	5.6	5.4	4.9	5.1	6.7	6.6	7.0	5.9
Average milk produced per cow per day during dry season	4.4	3.3	3.8	3.1	3.7	4.9	2.3	5.6	3.9
Average Cows currently milked/lactation (all breeds)	1	1	1	1	1	3	3	3	2
Total milk produced per day during wet season	6.0	5.6	5.4	4.9	5.1	20.1	19.7	21.0	11.8
Total milk produced per day during dry season	4.4	3.3	3.8	3.1	3.7	14.7	7.0	16.9	7.8
Average milk given to your calves as feeds per day	1.3	1.0	0.9	0.5	1.0	2.4	1.8	2.7	1.5
Average milk consumed per day in household	1.6	2.1	2.1	1.1	1.5	2.6	2.2	3.2	2.1
Average milk sold per day	3.1	2.4	2.5	2.0	2.9	7.4	5.0	8.2	4.2

Source: Dairy Baseline survey data, 2018

[18] Bebe, O.B., Udo, H.M.J., Rowlands, G.J., Thorpe, W., 2003 Smallholder dairying systems in the Kenya highlands: cattle population dynamics under increasing intensification. Livest. Prod. Sci. doi:S0301-6226(03)00013-7

Focus group discussions with livestock farmers revealed that the dry season usually consists of about 7 months while the wet season usually consists of 3 months. The average milk production per cow per day is 4.5 litres as illustrated in Table 3.8. This is lower than the national average of around 5 litres per cow per day[19].

Table 3.8 Calculation of Average Milk Production Per Cow Per Day

Season	Average Production (Litres)	Months	Weights (Months/ lactation period-10 months)	Total
Wet season	5.9	3	0.3	1.8
Dry Season	3.9	7	0.7	2.7
Average milk production per cow per day				**4.5**

Source: Calculation from Dairy Baseline survey data, 2018

3.6 Milk Marketing and Value Addition

Survey data shows that in the project area the average milk sold per day is 4.2 litres, with the average milk sold per day during the wet and dry seasons being 5.0 and 3.3 litres respectively (see Table 3.9). This implies that the expected ADED beneficiaries are currently selling approximately 1,000 litres per day (1,218 litres per day during wet season and 802 litres per day during dry season)[20]. The amount of milk sold is expected to increase with the benefits accruing from the interventions of the ADED project.

Table 3.9 Average Milk Sold

Statistics (Litres	Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	Project area
Average milk sold per day-Wet season	3.5	3.0	2.9	2.5	3.4	8.5	7.3	9.1	5.0
Average milk sold per day-Dry season	2.6	1.8	2.0	1.5	2.4	6.2	2.6	7.3	3.3
Average milk sold per day-(Both wet and dry season)	3.1	2.4	2.5	2.0	2.9	7.4	5.0	8.2	4.2
Expected ADED beneficiaries	10	10	10	10	10	64	64	64	242
Total milk produced per day by ADED beneficiaries-wet season	60.0	55.7	54.0	49.3	51.0	1,072.0	1,050.2	1,120.0	3,512.2
Total milk produced per day by ADED beneficiaries-dry season	43.8	33.0	38.0	31.0	37.0	784.0	371.7	901.1	2,239.6
Total milk fed to calves per day by ADED beneficiaries	13.0	10.0	8.8	5.0	10.0	156.2	117.3	173.4	352.7
Total milk consumed by household per day by ADED beneficiaries	16.4	20.7	20.5	11.3	15.0	163.9	143.5	207.5	497.2

[19] Kenya National Dairy Master Plan, 2010
[20] Table 3.9

Statistics (Litres	Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	Project area
Total milk sold per day by ADED beneficiaries-wet season	35.3	30.2	29.0	24.5	33.6	545.4	468.2	583.8	1,217.6
Total milk sold per day by ADED beneficiaries-dry season	25.8	17.8	20.4	15.5	24.4	398.9	165.7	469.7	802.0
Total milk sold per day by ADED beneficiaries (Both wet and dry season)	30.6	24.0	24.7	20.0	29.0	472.1	317.0	526.8	1,009.8

Source: Dairy Baseline survey data, 2018

The majority of livestock farmers (over 60%) reported that they sell their milk through vendors and traders situated in the towns surrounding the project area such as Emali, Masimba, Makindu, Kibwezi, and Sultan Hamud. The remaining 36% of farmers sell their milk at farm gate, see Figure 3.2. These findings align with the results of studies conducted in Kenya that reveal that most small-scale dairy farmers (80%) sell their milk through informal channels, and the majority may not be affiliated to any dairy hub/co-operative/enterprise. Staal, S., Pratt, A., & Jabbar, M. (2008)[21] found that milk was being sold through three major milk marketing channels: direct sales to individual consumers; informal private traders; and sale through cooperatives and private dairy processors.

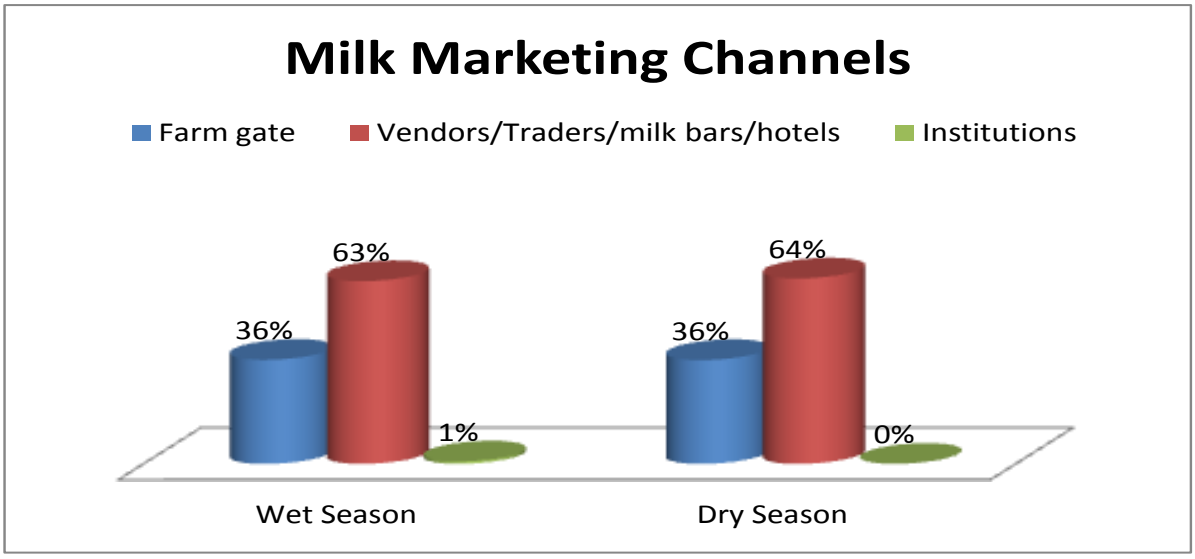

Figure 3.2 Milk Marketing Channels
Source: Dairy Baseline survey data, 2018

Focus group discussions with livestock farmers in the Kajiado zones revealed that farmers usually experience a milk glut during the wet season and sometimes milk goes to waste because of oversupply of milk in the market. It is noted that livestock farmers in the project area only sell raw

[21] Staal, S., Pratt, A., & Jabbar, M. (2008). Dairy Development for the Resources Poor - Part 2: Kenya and Ethiopia Dairy Development Case Studies. Rome, Italy: Pro-Poor Livestock Policy Initiative.

milk. Value addition is not a common practice among the farmers. However, livestock farmers reported that they: boil the milk; sometimes ferment the milk to prepare maziwa mala for home consumption; and use the milk cream for cooking.

Generally, milk prices in the project area are higher than the prices of raw milk in high milk-producing areas in Kenya[22]. In the wet season the average prices are KES 40 at farm gate and KES 45 when sold to vendors and traders, see Table 3.10. The prices increase by over 30% during the dry season because of the increased demand and a depressed supply as result of drought.

Table 3.10 Average Milk Prices

Outlet	Average Price per Litre (KES)		Maximum Price per Litre (KES)	
	Wet Season	Dry Season	Wet Season	Dry Season
Farm gate	40	55	50	80
Vendors/traders/milk bars/hotels	45	60	60	80

Source: Dairy Baseline survey data, 2018

3.7 Livestock Health

Animal diseases were identified as a challenge, both by livestock farmers and the livestock and veterinary officers interviewed. The main livestock diseases reported by farmers were foot and mouth (70% of farmers), Anthrax (52%), Lumpy skin diseases (31%), Bloat (31%), ECF (12%) and anaplasmosis (8%). This is illustrated in Table 3.11 below.

Table 3.11 Major Animal Disesases

Diseases	Statistic	Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	Project area
East Coast Fever (ECF)	n	2	1	0	1	2	3	4	6	19
	%	22	11	0	13	17	8	10	19	12
Anaplasmosis	n	1	0	0	0	0	1	1	9	12
	%	11	0	0	0	0	3	2	28	8
Foot and Mouth	n	2	6	6	4	2	30	34	28	112
	%	22	67	75	50	17	77	81	88	70
Anthrax	n	1	1	0	0	2	27	27	25	83
	%	11	11	0	0	17	69	64	78	52
Lumpy Skin Disease	n	1	3	4	5	1	12	13	11	50
	%	11	33	50	63	8	31	31	34	31
Tryponosomiasis	n	0	0	1	0	0	2	5	7	15
	%	0	0	13	0	0	5	12	22	9
Bloat	n	4	4	5	2	4	8	14	8	49
	%	44	44	63	25	33	21	33	25	31
Total	n	9	9	8	8	12	39	42	32	159
	%	100	100	100	100	100	100	100	100	100

Source: Dairy Baseline survey data, 2018

[22] Most processors and co-operatives buy raw milk at between KES 25 to KES 40 per litre

[24]n-represents numbers

Focus group discussions with livestock farmers in Kajiado zones revealed that the farmers mostly use indigenous knowledge of checking for symptoms to identify livestock diseases. The farmers then seek counsel from the agrovets in the nearby towns of Masimba and Emali. Most of the times the farmers prefer to treat the animals themselves, only calling the veterinary officers/paravets when the disease is severe. This may be a risk because the farmers may not give the dosage as prescribed, leading to resistance to some drugs by livestock. It was also noted that the veterinary officers in Kajiado County were very few so livestock farmers mostly rely on agrovets in town. It was also noted that the County Government of Kajiado sometimes conducts mass vaccination campaigns. Livestock farmers in Makueni County mostly rely on subsidized county animal health services. However, there is a shortage of veterinary officers so they sometimes seek services from private practitioners. It is worth noting that there are a number of agrovets in Emali and Masimba towns, some of which are manned by qualified paravets whom the ADED project may tap into to assist in providing animal health services to the project beneficiaries.

Paravets/veterinary para-professional would be an option for bridging the animal health gaps caused by the shortage of County Governments veterinary officers. Discussions with Veterinary officers in Kajiado and Makueni Counties revealed that the use of Community Based Animal Health workers is not an option because they are not approved by the Kenya Veterinary Board (KVB) as per the Veterinary Surgeons and Veterinary Para-Professional Act of 2011.

One encouraging finding is that over 70% of livestock farmers in the project area had adopted good livestock diseases prevention practices such as spraying, deworming, routine vaccination, routine health check-up (see Table 3.12).

Table 3.12 Livestock Health Practices Adopted

Practices	Statistic	Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	Project area
Spraying against ticks and ectoparasites	n	9	9	7	8	10	39	42	27	151
	%	100	100	88	100	83	100	100	84	95
Deworming	n	9	9	6	7	11	39	41	29	151
	%	100	100	75	88	92	100	98	91	95
Routine Health check-up	n	8	7	5	6	10	27	23	28	114
	%	89	78	63	75	83	69	55	88	72
Routine Vaccination	n	9	9	7	7	10	28	28	25	123
	%	100	100	88	88	83	72	67	78	77
Testing for mastitis before milking	n	5	3	4	6	5	17	17	16	73
	%	56	33	50	75	42	44	41	50	46
Total	n	9	9	8	8	12	39	42	32	159
	%	100	100	100	100	100	100	100	100	100

Source: Dairy Baseline survey data, 2018

3.8 Adoption of AI Services

Adoption of AI services is very low with only 9% of livestock farmers in the project area adopting AI services. The adoption rate is higher in the Makueni zones than the Kajiado zones, see Figure 3.3. This may be attributed to the subsidized AI services being provided by the County Government of Makueni where the farmers only pay KES 300 per serving. ADED should therefore play a big role in encouraging farmers to adopt use of AI services and/or using exotic breeds for improvement of local cattle.

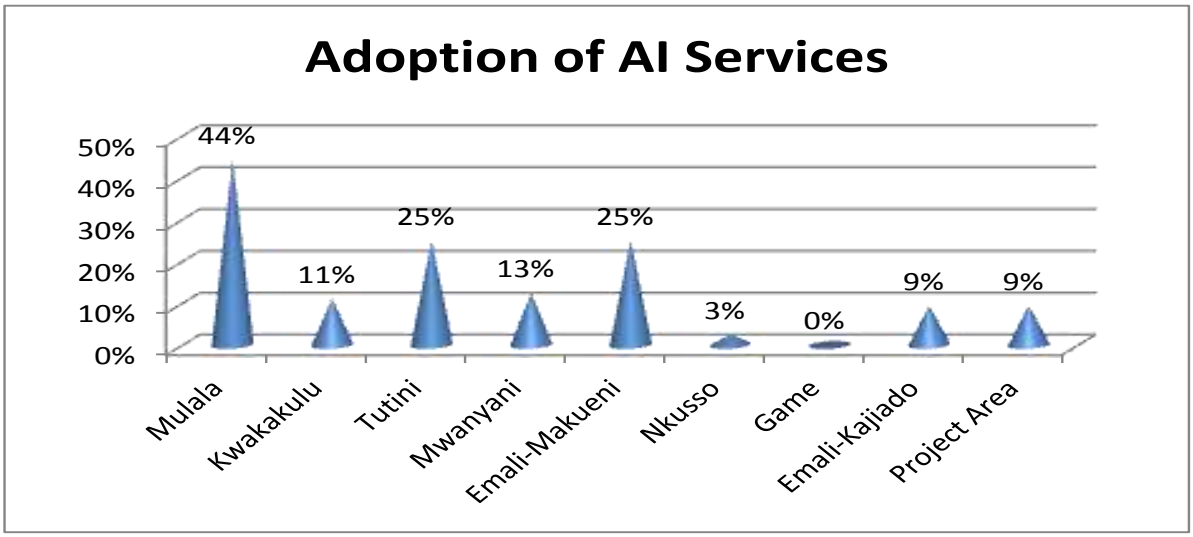

Figure 3.3 Adoption of AI Services

Source: Dairy Baseline survey data, 2018

3.9 Cattle Feeding Practices

Free range was noted to be the most common dairy production system in the project area more so in the Kajiado zones. It was however notable that farmers in the project area had adopted modern livestock feeding practices as illustrated in Table 3.13. Paddocking is being adopted by farmers, especially in Emali Kajiado and Nkusso. It was noted that in these zones there are farmers who benefitted from training on feed conservation (especially on paddocking) in previous ChildFund interventions, thus the higher adoption. Focus group discussions with the farmers that had adopted paddocking revealed that there is less movement of livestock during drought. A key challenge that farmers face is the influx of cattle from other areas during drought, thereby depleting the pasture conserved as standing hay in the field.

Supplementation of feed with minerals is commonly practiced by 86% of livestock farmers. Storing crop residue, storing/conserving hay and fodder and establishment of fodder tree nursery and supplementation with concentrates was most common in the Makueni zones. Makueni farmers mostly practise semi-intensive/semi-zero grazing and have to therefore source for fodder for their livestock through crop residues and growing fodder. Interventions from the County Government of Makueni have enhanced easier access to concentrates for the Makueni farmers.

Table 3.13 Livestock Feeding Practices Adopted

Feeding Practice	Statistic	Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	Project Area
Silage making	n	4	0	2	0	4	5	1	7	23
	%	44	0	25	0	33	13	2	22	15
Storing crop residue	n	9	9	6	6	9	6	5	14	64
	%	100	100	75	75	75	15	12	44	40
Storing/conserving hay/fodder	n	7	6	4	5	5	6	3	18	54
	%	78	67	50	63	42	15	7	56	34
Hay storage structure	n	7	6	3	4	6	6	8	16	56
	%	78	67	38	50	50	15	19	50	35
Supplementation with concentrates	n	8	2	0	3	3	14	21	18	69
	%	89	22	0	38	25	36	50	56	43
Supplementation with Minerals	n	8	6	4	8	9	35	37	29	136
	%	89	67	50	100	75	90	88	91	86
Establishment or fodder tree nursery	n	3	4	2	3	4	2	2	2	22
	%	33	44	25	38	33	5	5	6	14
Paddocking	n	3	3	2	1	3	17	8	27	64
	%	33	33	25	13	25	44	19	84	40
Zero grazing	n	2	3	0	2	0	0	0	0	7
	%	22	33	0	25	0	0	0	0	4
Total	n	9	9	8	8	12	39	42	32	159
	%	100	100	100	100	100	100	100	100	100

Source: Dairy Baseline survey data, 2018

The most common fodder crops grown in the Makueni zones are nappier grass, boma rhodes, buffel grass, maasai love, Kikuyu grass, couch grass and maize (see Table 3.14). In Kajiado zones, Maasai love, buffel grass and couch grass are the most common grasses for fodder.

Table 3.14 Types of Fodder Grown

Type of Fodder	Statistic	Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	Project Area
Napier grass	n	5	3	1	2	0	0	0	0	11
	%	56	33	13	29	0	0	0	0	7
Boma rhodes	n	2	1	0	0	0	1	0	5	9
	%	22	11	0	0	0	3	0	16	6
Masaai love	n	2	0	2	0	1	20	7	14	46
	%	22	0	25	0	8	51	17	44	28
Kikuyu grass	n	0	1	1	0	0	2	0	2	6
	%	0	11	13	0	0	5	0	6	4
Buffel grass	n	3	1	0	0	0	12	3	8	27
	%	33	11	0	0	0	31	7	25	17
Couch grass	n	1	1	1	1	0	18	3	10	35
	%	11	11	13	14	0	46	7	31	22

Type of Fodder	Statistic	Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	Project Area
Maize	n	1	3	1	1	2	5	4	6	23
	%	11	33	13	14	17	13	10	19	14
Desmodium	n	0	0	0	0	0	1	0	2	3
	%	0	0	0	0	0	3	0	6	2
Sweet potatoes vines	n	0	0	0	0	0	0	1	1	2
	%	0	0	0	0	0	2	3	0	1
Fodder trees	n	0	1	0	0	0	0	0	0	1
	%	0	11	0	0	0	0	0	0	1
Total	n	9	9	8	8	12	39	42	32	159
	%	100	100	100	100	100	100	100	100	100

Source: Dairy Baseline survey data, 2018

3.10 Training on Dairy Enterprise

Farmers in the project area had received some training on various aspects of dairy production and management as well as business training and financial literacy as illustrated in Table 3.15. It is noted that the proportion of farmers who had received training was higher in the Makueni zones than the Kajiado zones. There should therefore be some more intensive training of dairy production in the Kajiado zones. The main sources of training included the County department of livestock, FAO, ChildFund/EDCA, KALRO, Hand in Hand NGO, as well as hands on training from other farmers.

Table 3.15 Training Received by Livestock Farmers

Training topics	Statistic	Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	Project area
Financial literacy	n	5	5	5	3	8	5	10	8	49
	%	56	56	63	38	67	13	24	25	31
Animal health management	n	6	4	6	4	8	4	3	12	47
	%	67	44	75	50	67	10	7	38	30
Fodder production	n	5	3	4	3	5	5	1	9	35
	%	56	33	50	38	42	13	2	28	22
Forage conservation	n	5	4	4	3	7	5	1	11	40
	%	56	44	50	38	58	13	2	34	25
Breeding	n	6	3	6	4	5	4	2	10	40
	%	67	33	75	50	42	10	5	31	25
Milk hygiene	n	6	4	4	3	7	4	2	10	40
	%	67	44	50	38	58	10	5	31	25
Appropriate animal housing	n	6	4	2	2	6	4	2	10	36
	%	67	44	38	25	50	10	5	31	23
Using animal manure in crops	n	5	6	7	2	6	4	2	4	36
	%	56	67	88	25	50	10	5	13	23
Business plan	n	4	5	4	1	7	4	4	5	34
	%	44	56	50	13	58	10	10	16	21
Compost making	n	6	4	5	3	6	4	0	5	33

Training topics	Statistic	Mulala	Kwakakulu	Tutini	Mwanyani	Emali-Makueni	Nkusso	Game	Emali-Kajiado	Project area
	%	67	44	63	38	50	10	0	16	21
Record keeping	n	4	5	3	3	6	4	1	6	32
	%	44	56	38	38	50	10	2	19	20
Milk value addition	n	4	2	3	2	4	3	0	8	26
	%	44	22	38	25	33	8	0	25	16
Total	n	9	9	8	8	12	39	42	32	159
	%	100	100	100	100	100	100	100	100	100

Source: Dairy Baseline survey data, 2018

3.11 Gender Roles

Focus group discussions with livestock farmers revealed that there are different gender roles in the zones of Makueni and Kajiado. Livestock are mostly owned by men while milking of the cows and selling milk are roles carried out by women. Feeding and watering of animals is carried out jointly by both men and women in Makueni zones. Feeding/grazing of livestock in Kajiado County is mainly the role of men and boys while watering the animals is a shared responsibility between men and women. Animal health and breed selection is mostly carried out by men, with some consultation with their spouses.

3.12 Sources of Water for Livestock

Water is a very important ingredient to having healthy and productive dairy animals. When the livestock farmers were asked whether they had enough water for livestock use, 65% of them responded in the affirmative (see Figure 3.4).

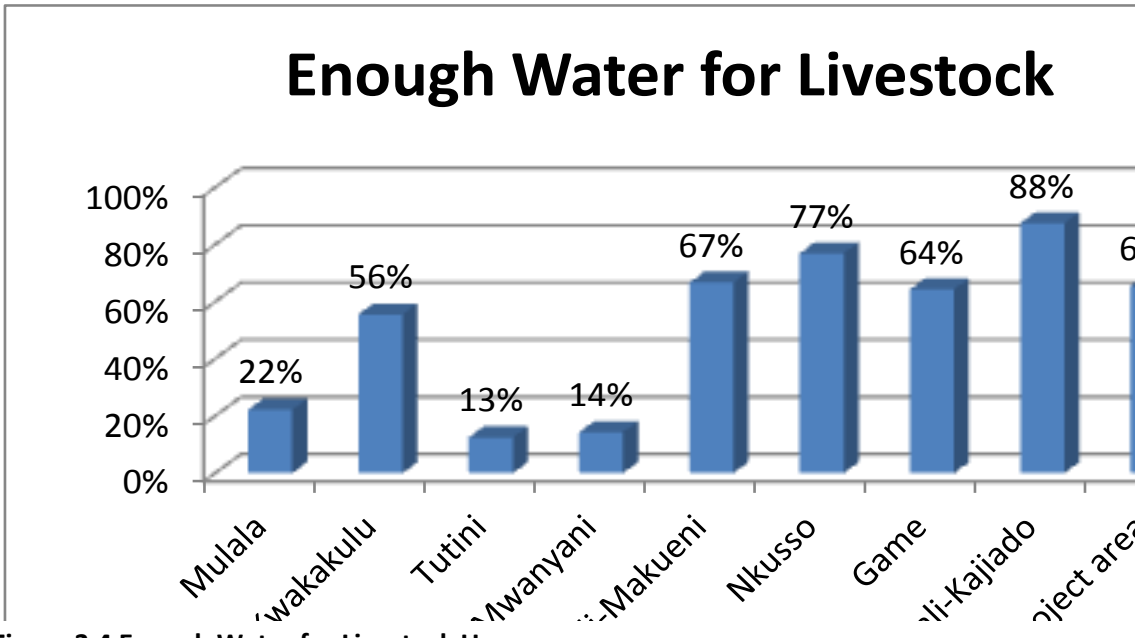

Figure 3.4 Enough Water for Livestock Use

Source: Dairy Baseline survey data, 2018

The Kajiado zones and Emali Makueni were noted to have a higher proportion of farmers with enough water for livestock. This may be due to access to piped water and boreholes near the project area. The biggest deficit of water for livestock use is noted in Mulala, Tutini and Mwanyani zones. Collaborative efforts should be put in place to ensure that the farmers have adequate water for their livestock.

3.13 Incomes from Sale of Livestock and Livestock Products

Baseline values for monthly incomes from sale of milk, sale of milk products, sale of livestock and livestock products are presented in Table 3.16 below.

Table 3.16 Incomes from Livestock Production

Descriptive Statistics			
Income	**Minimum (KES)**	**Maximum (KES)**	**Mean (KES)**
Monthly sale of milk produced from the farm	900	30,000	6,087[23]
Monthly sale of milk products	0	0	0
Monthly sale of livestock	2,500	50,000	14,830
Sale of livestock products	1,000	10,000	5,415

Source: Dairy Baseline survey data, 2018

Table 3.17 Calculation of Monthly Income from Sale of Raw Milk

Indices	Season	Farm gate	Traders	Weighted prices (KES)	Average milk sold per day	Monthly sales/ income (KES)
Average prices (KES)	Wet season	40	45			
	Dry season	55	60			
% of respondents selling	Wet season	36%	63%			
	Dry season	36%	64%			
Weighted prices (KES)	Wet season[24]			42.75	5.0	6,412.50
	Dry season[25]			58.20	3.3	5,761.80
	All season					6,087.15[26]

Source: Dairy Baseline survey data, 2018

3.14 Community Organization

Communities in the project area are well organized into zones with each zone having zonal leaders. The zonal leaders are well known and respected in the community and act as a link between the EDCA, County Government and National Government officials. The Chiefs, village elders, zonal leaders, livestock officials and the farmers already practising dairy farming are assets that can be mobilised in assisting communities to adopt dairy farming and in making decisions on common project issues.

[23] Calculation illustrated in Table 3.17 below.
[24] (Average price at farm gate during wet season *% of respondents selling at farm gate during wet season + Average price at traders*% of respondents selling at traders during wet season)
[25] (Average price at farm gate during dry season *% of respondents selling at farm gate during dry season + Average price at traders*% of respondents selling at traders during dry season)
[26] Average of monthly sales during wet season and dry season calculated using weighted prices.

4 KEY FINDINGS ON THE MORINGA COMPONENT

This chapter presents the baseline findings of the moringa component. It also describes the socio-economic and demographic characteristics of the respondents.

4.1 Demographic and Socio-economic Characteristics of the Study Respondents-Moringa Component

The demographic and socio-economic characteristics of the respondents are presented in terms of sex, household size, age, and highest level of education achieved.

4.1.1 Sex of Respondents-Moringa Component

The proportion of females interviewed was 73% and the proportion of males interviewed was 27%. This almost mirrors the project beneficiary target for the ADED Moringa component of 75% females, 20% males and 5% youth (See Figure 4.1).

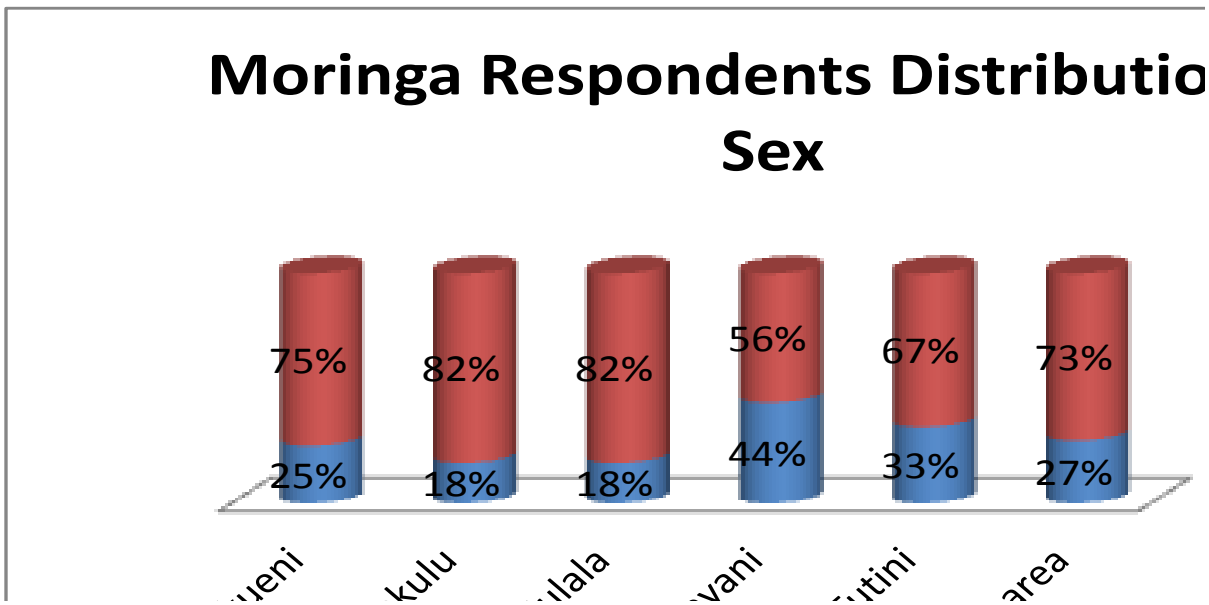

Figure 4.1Sex of Respondents-Moringa Component
Source: Moringa Baseline survey data, 2018

4.1.2 Age Distribution-Dairy Component

Age data from the moringa household survey is summarized in Table 4.1 below. The youthful group (18-35 years) comprised 28% of respondents while the aged (above 60 years) comprised 14% of the respondents.

Table 4.1 Age Distribution-Moringa Component

Age Category	Statistics	Emali-Makueni	Kwakakulu	Mulala	Mwanyani	Tutini	Project Area
18-35 yrs	n	8	4	5	1	5	23
	%	50	24	29	6	33	28
36-59 yrs	n	6	11	10	13	7	47
	%	38	65	59	81	47	58
60 yrs & above	n	2	2	2	2	3	11
	%	13	12	12	13	20	14
Total	n	16	17	17	16	15	81
	%	100	100	100	100	100	100

Source: Moringa Baseline survey data, 2018

4.1.3 Education Level –Moringa Component

Education is a key determinant of the lifestyle and status an individual enjoys in a society. Studies have consistently shown that educational attainment has a strong effect on behavior and attitudes of household members towards health, nutrition, investments, income generation, expenditure and adoption of new technologies, among other socio-economic indicators.

Data from the moringa baseline survey reveals that all of the respondents have some formal education (Table 4.2). This is important because it is evident that the targeted farmers could be able to adapt the technologies they are trained in.

Table 4.2 Highest Education Level Achieved by Respondents-Moringa Component

Highest Level of Education	Statistics	Emali-Makueni	Kwakakulu	Mulala	Mwanyani	Tutini	Project Area
Some primary School	n	8	1	2	1	5	17
	%	50	6	12	6	33	21
Completed Primary School	n	1	7	6	2	1	17
	%	6	41	35	13	7	21
Some secondary/High school	n	2	3	1	3	3	12
	%	13	18	6	19	20	15
Completed Secondary/High school	n	5	4	5	9	4	27
	%	31	24	29	56	27	33
College/Polytechnic/ University	n	0	2	3	1	2	8
	%	0	12	18	6	14	10
Total	n	16	17	15	16	17	81
	%	100	100	100	100	100	100

Source: Moringa Baseline survey data, 2018

4.2 Awareness of the Moringa Plant

The majority of respondents (92%) were aware of the moringa plant, see Figure 4.2.

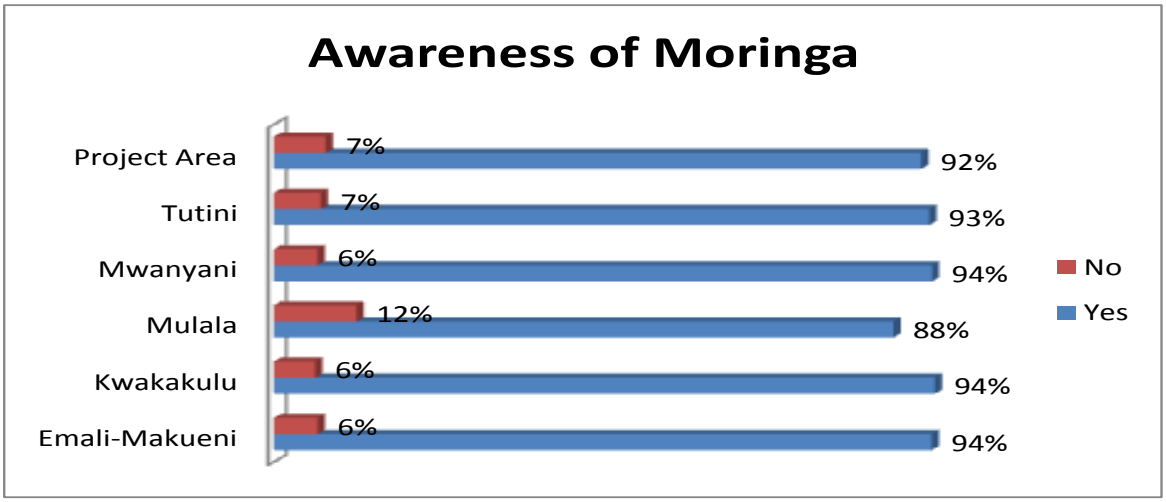

Figure 4.2 Awareness of the Moringa Plant
Source: Moringa Baseline survey data, 2018

Data collected from farmers revealed that 92% are using it for medicinal purposes, 65% are using it as a vegetable and 44% are using it as a beverage, see Figure 4.3. Focus group discussions also revealed that farmers use the moringa tree as a form of shade. The main sources of awareness were relatives and friends (65%); NGOs/development partner such as ChildFund, USAID, Africa Harvest, Excellent Development group (47%); the Ministry of Agriculture (12%); the Ministry of Health (10%); Kenya Forest Services (5%); KEFRI (4%); Private Company (4%) and Musyi FM radio (2%).

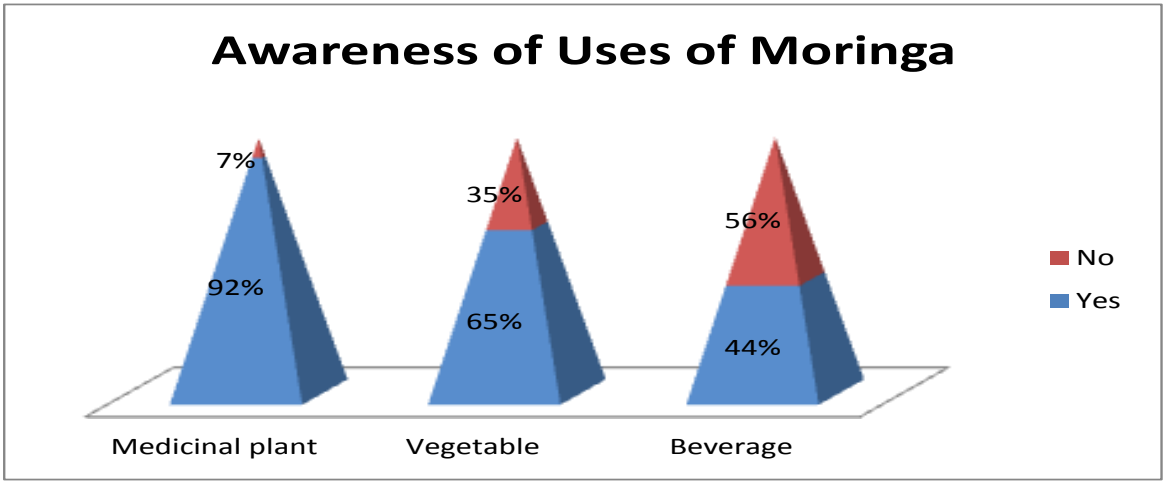

Figure 4.3 Awareness of Uses of Moringa Plant
Source: Moringa Baseline survey data, 2018

4.3 Production of Moringa

The proportion of farmers growing moringa in their farms was 44%. The average acreage for those who grow moringa is approximately 0.3 acres (0.12 hectares). Focus group discussions revealed that most farmers have 3 to 5 moringa trees in their farms, intercropped with other crops.

Table 4.3 Production Levels of Moringa

Product	N	Average production (kg)	Average Hectares	Total Production per Hectare (kgs)	Weights (N/ Total number of farmers producing-12)	Volume of moringa crop yield per hectare (kgs)
Moringa seed	5	5.6	0.12	46.7	0.4	19
Moringa flowers	3	4.3	0.12	36.1	0.3	11
Moringa leaves	4	6.3	0.12	52.1	0.3	16
Total	12					
Project Indicator						46

Source: Moringa Baseline survey data, 2018

Only 12 of the 36 farmers that have planted moringa have been able to harvest. The volume of moringa seed produced by farmers was 19kg/ha while the volume of moringa flowers and moringa leaves produced was 11kg/ha and 16kg/ha respectively. The volume of moringa crop yield per hectare was, therefore, 46 kgs, as shown in Table 4.3. This production is very low when compared with the best practices documented in Table 4.4. The minimum production with good agricultural practices should ideally be 19.6 metric tons/ha/cutting for fresh matter[27] and 3.33 metric tonnes/ha for dry matter[28].

Table 4.4 Production Parameters of Moringa at First Cutting

Plant density (Plants / ha)	Fresh Matter (Metric tons/ha/cutting)	Dry Matter (Metric tons/ha)	Loss of plants after first cutting
95,000	19.6	3.33	not determined
350,000	29.7	5.05	not determined
900,000	52.6	8.94	not determined
1,000,000	78	13.26	Approx. 2%
4 million	97.4	16.56	Approx. 25%
16 million	259	44.03	Approx. 40%

Source: Foidl, et. al. 2001

4.4 Marketing and Processing of Moringa Products

Focus group discussions with crop farmers indicated that there is very limited information on where to market the moringa products. Most farmers who have produced moringa products mainly consumed these at home as a vegetable, a beverage, or chewed the seeds. Only 2 of the farmers interviewed reported selling the moringa and they sold it at farm gate to their neighbours. These farmers sold the moringa leaves/twigs and flowers and earned a monthly income of KES 2,054. They also reported that the seeds are usually shared with their neighbours and friends because they have no marketing channel.

Processing of moringa plants for commercial purposes has not been conducted in the project area because of the low volumes produced, lack of processing equipment, and limited knowledge on how

[27] Flowers and leaves
[28] Seeds

to process and package. Crop farmers also lack knowledge of where they could market processed moringa products. However, it is important to note that some of the farmers crushed the seeds and leaves to make a powder that is utilized at home as a beverage and as a spice for food.

4.5 Challenges in the Moringa Enterprise

Discussions with crop farmers revealed that they had limited awareness on good agricultural practices for the moringa plant despite them having moringa in their farms for decades. Farmers lack reliable information on nutritional and medicinal values of the moringa plant. Farmers also lack information on where to market their products. Pests and disease were reported as a challenge to farmers growing moringa.

4.6 Willingness of Farmers to engage in the Moringa Enterprise

Crop farmers in the project area indicated that they are willing to participate in the moringa enterprise as long as they are assured there is a market for their products. The consultant observed that some farmers had already started preparing their farms for moringa growing after initial sensitization by ChildFund staff and Trainer of Trainers (ToTs) engaged by ChildFund. It was also noted that some of the farmers had visited the Muamko Moringa processors group in Taita Taveta County that has the same agro-ecological zone as Makueni. From the visit, farmers were optimistic about practising moringa production and marketing.

Agricultural officers in the project area were also enthusiastic about farmers in the project area engaging in moringa farming because it is a drought resistant plant that has immense medicinal and nutritional benefits. Literature reviewed also noted that oil from Moringa seeds is also used in foods, perfume, and hair care products, and as a machine lubricant. The seed cake remaining after oil extraction is used as a fertilizer and also to purify well water and to remove salt from seawater[29].

[29] http://www.kenyaneem.com

5 CONCLUSIONS AND RECOMMENDATIONS

This section provides an overall summary of what the baseline survey has highlighted and includes recommendations for ADED project donors and implementers to consider.

The Agriculture, Dairy and Economic Development Project (ADED) is designed to deliver improved agriculture, diversified livelihoods and reliable and beneficial market pathways for 1,250 farming households by engaging in interventions related to crops (moringa) and dairy enterprises. By the end of the project, food security and incomes in Emali farming communities will be improved and Maasai and Kamba households will be more resilient to climatic and economic shocks. The project beneficiaries are 75% female, 20% male and 5% youth.

The conclusions and recommendations for the project components are illustrated in the matrix below:

Summary of Findings and Conclusions	Recommendations
Dairy Component	
It is worth noting that farmers in both Kajiado and Makueni are already engaging in dairy production, albeit at a small level. This implies that there is great potential for enhancing their capacity in efficient dairy enterprises. Livestock farmers in the project area have received some training on various aspects of dairy production and management, business training and financial literacy.	A training needs assessment should be conducted to find out the most relevant and effective training modules and methods.
The adoption of semi-intensive, paddocking and zero grazing by farmers in the project area by 47% of respondents implies that there is some level of knowledge of dairy production.	For efficient milk production, the capacity of farmers in the project area should be built to adopt zero grazing or paddocking or semi-zero grazing dairy production systems.
The average milk production per cow per day is 4.5 litres. This is lower than the national average of about 5 litres per cow per day[30]. Low production may be attributed to a number of reasons such as poor feeding, animal diseases, drought, inadequate knowledge and skills in dairy production, and poor breeds.	• For efficient milk production, the capacity of farmers in the project area should be built to adopt good dairy farm practices related to proper feeding, animal health care, and adoption of improved breeds. • Exposure visits to breeders' shows, agricultural shows and to successful dairy farmers in areas with the same ecological characteristics such as the project area should be organized by the ADED project.
On average, farmers sell about 4.2 litres per farmer per day with most of the milk either being sold to traders (over 60%) or at farm gate (36%).	When establishing a dairy co-operative the ADED project should consider adopting the hub model that offers integrated services such

[30] Kenya National Dairy Master Plan, 2010

Summary of Findings and Conclusions	Recommendations
Most of the milk is sold raw and no farmer is adding value to the milk before selling. During the wet season there was milk glut that sometimes led to losses by the farmers due to lack of market. The average monthly income from raw milk sales is KES 6,087. The average monthly income from sale of livestock is KES 14,830.	as processing, packaging, inputs provision, AI provision, feeds, training, financial services, marketing, transport services and quality control. This approach will enable farmers to establish and sustain viable dairy business entities which would be instrumental in propelling smallholder farmers from poverty.
It is worth noting that the ADED project proposed beneficiaries produce approximately 1,000 litres of milk per day. Best practice in establishing an economically viable milk processing factory in Kenya, advocates for at least 2,000 litres of milk supplied to the factory per day.	• The co-operative society established by ADED should first prioritize on cooling/ chilling facilities. The chilled milk could be sold to established processing companies such as New KCC and Brookside. The processing facilities should be developed progressively as the production of milk increases to reach the threshold of 2,000 litres per day. • ADED results framework should include an indicator "Volume of milk chilled and sold at market" to capture the short term outcome of the project before the processing facilities are set up.
Milk prices are generally higher in the project area than the national average[31]. In the wet season the average prices are KES 40 at farm gate and KES 45 when sold to vendors and traders. The prices increase by over 30% during the dry season because of the increased demand and a depressed supply as result of drought.	Farmers should be assured of a stable pricing regime and prompt payment from the dairy co-operative. This will be important in encouraging farmers to supply milk to the dairy co-operative.
The main livestock diseases reported by farmers were foot and mouth as reported by 70% of the farmers, Anthrax (52%), Lumpy skin diseases (31%), Bloat (31%), ECF (12%) and anaplasmosis (8%). It was noted that there was a gap in access to veterinary services because of the few Government staff.	Qualified paravets who are registered and meet all the conditions set by the Kenya Veterinary Board should be engaged in the project.
The adoption of AI services is very low with only 9% of the farmers in the project area adopting AI services, particularly in the Kajiado zones. This may be attributed to inadequate knowledge and understanding of the importance of using AI for breeding purposes.	Farmers need to be sensitized on the adoption of AI and/or using exotic breeds for improving local cattle.

[31] Most processors and co-operatives buy raw milk at between KES 25 to KES 40 per litre

Summary of Findings and Conclusions	Recommendations
Moringa Component	
Numerous global and local studies have enumerated the myriad nutritional and medicinal benefits of the moringa plant and its products. Oil from moringa seeds is used in foods, perfume, and hair care products, and as a machine lubricant. The seed cake remaining after oil extraction is used as a fertilizer and also to purify well water and to remove salt from seawater.[32]	Farmers need to be sensitized, trained and taken for exposure visits to understand the benefits of the moringa plant.
The level of awareness of moringa in the project is very high at 92%, with most of the farmers reporting that it is used for medicinal purposes, as a vegetable and beverage. Almost half (44%) of farmers aware of moringa were growing moringa, but only 12 farmers have ever harvested moringa. The volume of moringa crop yield per hectare (kgs) is 46 kgs, much lower than the ideal production of 19.6 metric tons/ha/cutting for fresh matter (flowers and leaves) and 3.33 metric tonnes/ha for dry matter (seeds)[33]. Low production may be attributed to limited awareness on good agricultural practices of the moringa plant; lack of reliable information on nutritional and medicinal values; lack of information on the market; and pests and diseases.	
Only 2 of the farmers interviewed reported selling their moringa and they sold it at the farm gate to their neighbours. These farmers sold moringa leaves/twigs and flowers and earned a monthly income of KES 2,054. Processing of moringa plants for commercial purposes is not being carried out in the project area because of the low volumes produced, lack of processing equipment, and limited knowledge on how to process and package. It was not also clear to the farmers where they could market their processed moringa products.	Farmers need to be trained on the production, value addition and marketing of Moringa and its products.
Farmers are willing to engage in the moringa enterprise as long as they are assured of a ready market.	• A market survey and mapping study should be carried out to assist in identifying marketing strategies for the moringa. • Moringa farmers should be mobilized into a co-operative society for them to get

[32] http://www.kenyaneem.com
[33] *Foidl, et. al. 2001*

Summary of Findings and Conclusions	Recommendations
	integrated services such as marketing, value addition, inputs, financial services, and training.
Implementation Model	
The project should adopt an implementation model of working in close collaboration and partnerships with key relevant stakeholders such as Emali Dedicated Children's Agency (EDCA): County Government agencies (County Agricultural Officers, County Livestock Officers and County Veterinary Officers); Kenya Agricultural & Livestock Research Organization (KARLO); Private sector players; Community Animal Health Workers (CAHWs) and community leaders and opinion leaders. Beneficiary community members should be empowered through intensive training that increases the chances of sustainability of the project outcomes and impacts.	
Project Evaluation	
Mid-term and Endline evaluations should be conducted using the same methodology so as to allow comparison of findings and measuring of attribution/contribution of the project to the results	

6 APPENDICES

6.1 Appendix 1: Terms of Reference

ADED Baseline TOR .doc

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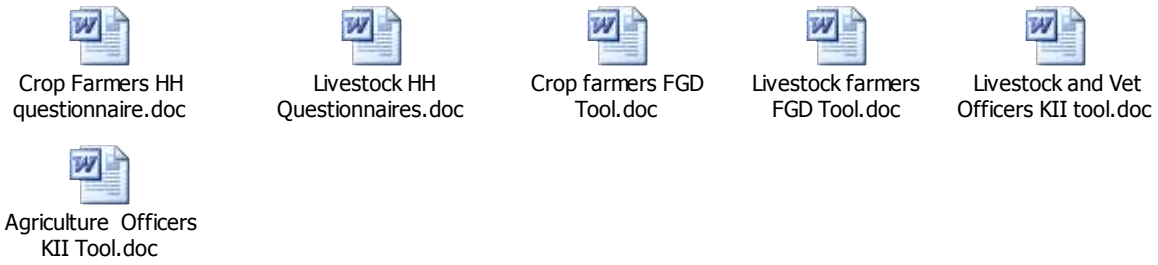
6.2 Appendix 2: Results Measurement Table

Outcome	Indicator	Baseline Value
Medium-term Outcome 1a	Volume of moringa crop yield per hectare	46 kgs
Medium-term Outcome 1b	Milk productivity per cow	4.5 litres
Medium-term Outcome 2a	Monthly household income from the sale of moringa	KES 2,055
	Monthly household income from the sale of livestock	KES 14,830
	Monthly household income from the sale of milk	KES 6,087
	Monthly household income from the sale of moringa products	0
	Monthly household income from the sale of milk products	0
Short-term outcome 3b	Volume of moringa processed	0
Short-term outcome 3d	Volume of milk processed and sold at market	0

6.3 Appendix 3: List of Documents Reviewed

i. Bebe, O.B., Udo, H.M.J., Rowlands, G.J., Thorpe, W., 2003 Smallholder dairying systems in the Kenya highlands: cattle population dynamics under increasing intensification. Livest. Prod. Sci. doi:S0301-6226(03)00013-7
ii. Building Resilience Baseline Survey Report, 2013.
iii. FOIDL, N., HARINDER, P. S. et K. BECKER, (2001). Potentiel du Moringa oleifera pour les besoins agricoles et industriels in L'arbre de la vie, Les multiples usages du Moringa. CTA et CWS, Dakar, pp.45 à 78.
iv. How to Produce Moringa Leaves Efficiently? Presented by Newton Amaglo, Kwame Nkrumah University of Science and Technology, Ghana, Workshop 2, Accra, Ghana, 16-18 November 2006
v. http://www.kenyaneem.com
vi. https://www.researchgate.net/publication/320968406_Challenges_and_opportunities_for_Moringa_growers_in_southern_Ethiopia_and_Kenya
vii. Kenya National Dairy Master Plan, 2010
viii. Kenya STEPwise Survey for Non Communicable Diseases Risk Factors 2015 Report
ix. Kenya Vision 2030, Second Medium Term Plan 2013 – 2017, Sector Plan For Drought Risk Management and Ending Drought Emergencies.
x. Makueni and Kajiado Counties' integrated development plans (CIDPs).
xi. Makueni Vision 2025
xii. Tegemeo Institute of Agricultural Policy and Development, Egerton University, Kenya, Consumption Patterns of Dairy Products in Kenya's Urban Centers: Report from an Urban Household Survey (April 2005)
xiii. Project Activity Design Document Evaluation plan.
xiv. Staal, S., Pratt, A., & Jabbar, M. (2008). Dairy Development for the Resources Poor - Part 2: Kenya and Ethiopia Dairy Development Case Studies. Rome, Italy: Pro-Poor Livestock Policy Initiative.
xv. The Veterinary Surgeons and Veterinary Para-Professional Act, 2011
xvi. The Veterinary Surgeons and Para-Professionals Regulations,2013

6.4 Appendix 4: Data Collection Tools



Double Click to open

6.5 Appendix 5: Evaluation Team

	Name	*Gender*	*Position*	*Zone*	*Phone No.*
1.	Maclean Egesa	M	ADED Project Manager	Emali	0729487071
2.	Simon Rono	M	ADED Moringa Project Officer	Emali	0718620982
3.	Harrison Kamau	M	ADED Livestock Project Officer	Emali	0715500831
4.	Timothy Waweru	M	Lead Consultant	Nairobi	0721782526
5.	Paita Kelelan Koinet	M	Supervisor- Kajiado	Nkusso	0723526869
6.	Lucia Mutono	F	Supervisor-Makueni	Tutini Zone	0723813785
7.	Elijah Ntalamia	M	Enumerator/Data Entry Clerk	Emali Kajiado	0710588317
8.	Denis Machariah	M	Data Entry Clerk	Emali Makueni	0715665508
9.	Felix Sitonik Sempeta	M	Enumerator	Game	0723415098
10.	Jane Nakaet Parsaoti	F	Enumerator/Data Entry Clerk	Emali Kajiado	0720154131
11.	Parsauti Duncan Tumpei	M	Enumerator	Emali Kajiado	0728047877
12.	Josephat Musyoka	M	Enumerator	Mwanyani	0707240923
13.	Alex Thomas Kioko	M	Enumerator	Kwakakulu	0727675023
14.	Joel Mulinge Sammy	M	Enumerator	Emali Makueni	0719350024
15.	Mercy Kitivo	F	Note taker	Emali Makueni	0715302441
16.	Alex Lemmy Kilonzi	M	Enumerator	Tutini Zone	0791778156
17.	Rose John	F	Enumerator	Mulala Zone	0714578044
18.	Felix Makui Sereka	M	Enumerator	Emali Kajiado	0726177394

6.6 Appendix 6: Stakeholders Consulted During Report Validation Workshop

No.	NAME	DESIGNATION	ZONE	CONTACT NO
1.	Maclean Egesa	ADED Project Manager	Emali	0729487071
2.	Lydia Muthoni	ADED Project Accounts Assistant	Emali	0729833401
3.	Pinochet M Musau	Secretary	Tutini	702072347
4.	Alfonse Muasya Ngaanga	Secretary	Kwakakulu	708163395
5.	Lucy Ndinda Muangi	Secretary	Mwanyani	724343256
6.	Patricia Ndunge Kathumo	Treasurer	Mwanyani	727040215
7.	Silvester Maundu Kinyua	Chairperson	Mwanyani	713677897
8.	Veronica Nzali Mukiti	Chairperson	Tutini	711318992
9.	Ruth Ndunge Muli	Treasurer	Emali Kajiado	721682948
10.	Duncan Mwinzi Musyoka	Chairperson	Kwakakulu	705429603
11.	Naomi Kavenge Mutuku	Chairperson	Mulala	714752476
12.	Esther Mutiso	Treasurer	Emali makueni	714556494
13.	Maxwell Letura Sereka	Chairperson	Game	724054950
14.	Seenta Ntirkwale Parseen	TOT	Game	727930707
15.	John Tinkoi	Env Officer	Game	723065390
16.	Elizabeth Sammy Mueni	Chairperson	Emali makueni	729251406
17.	Irene Benard	Secretary	Game	700932636
18.	Sylvia Mueni Mutua	Treasurer	Kwakakulu	718027131
19.	Mathias Nthikwa Mutiso	Secretary	Mulala	720602763
20.	Fredrick Koin Kutata	Chairperson	Nkusso	725842578
21.	Penninah Mwikali Keli	Secretary	Emali Makueni	724550232
22.	Robert Kaata Ketukei	Treasurer	Game	723888985
23.	Ann Nguyana Ramaita	Secretary	Emali Kajiado	729039873
24.	Risper Mwongeli Musau	Treasurer	Tutini	713000248
25.	Kamencu Richard	Agric Officer	Emali/Mulala	721551721
26.	Rebecca Maweu	Agric Officer	Emali/Mulala	712213089
27.	John Muhoro Mwaniki	Agric Officer	Poka/kenyewa	724659879
28.	Simon Mukuria Gitau	Livestock officer	Emali/Mulala	725735113
29.	Joseph Mutinda Sandi	Vet officer	Emali/Mulala	722585642
30.	Lenku Ole Peino	Area chief-poka	poka location	721558423
31.	Daniel Mutomba	Cooperative officer	Kajiado	713458687

6.7 Appendix 7: Roles and Responsibilities

Phase	Consultant	CF Kenya	CF New Zealand	EDCA	Enumerators and Data Entry Clerks
Planning	• Familiarise themselves with existing data • Develop and submit an evaluation plan/inception report for approval • Develop and submit data collection tools for approval • Lead sample selection	• Procure the services of a Consultant • Manage the contractual relationship with the Consultant • Allow access by the Consultant to existing data • Peer review and approve the evaluation plan/inception report • Participate in sample selection • Peer review and approve the data collection tools • Finalise the pool of data collectors in association with EDCA	• Participate in the process for procuring a Consultant • Peer review the evaluation plan/inception report • Participate in sample selection • Peer review the data collection tools	• Identify data collectors and make available • Participate in sample selection • Mobilise project beneficiaries to participate in the evaluation	• Apply for enumeration jobs at EDCA • Attend job interviews
Training and Testing	• Lead training of data collectors • Lead field testing of data collection tools	• Participate in data collection training and testing	• Participate in data collection training and testing	• Participate in data collection training and testing	• Participate in data collection training and testing
Data Collection	• Lead data collection in the field	• Participate in data collection	• Assist with data collection in the field (quality assurance) • Undertake key informant interviews	• Supervise data collection under the direction of the Consultant	• Collect data under the direction of the EDCA supervisors and the Consultant • Handover properly

Phase	Consultant	CF Kenya	CF New Zealand	EDCA	Enumerators and Data Entry Clerks
			and focus group discussions with project partners and CF Kenya staff		filled questionnaires to supervisors
Data Processing	• Oversee data processing	• Assist in data processing in the field • Provide translation services	• Lead data processing and provide datasets to Consultant	• Hand over data to ChildFund NZ for processing • Provide translation services	• Code the questionnaires • Data entry using SPSS
Data Analysis	• Conduct data analysis	• Be available to clarify any questions	• Assist with data analysis	• Be available to clarify any questions	
Report Writing	• Prepare a draft written report for internal purposes in English and circulate for comments • Prepare a final written report for internal purposes in English that incorporates feedback received	• Peer review the draft internal report • Approve the final internal report • Peer review the report for MFAT	• Peer review the draft written evaluation report • Peer review the final written evaluation report • Prepare a report for MFAT		
Sign off	• Hand over data to ChildFund • Prepare final invoice	• Receive data from the Consultant for ChildFund records • Approve final invoice			

6.8 Appendix 8: Photo Plates

Harvested Moringa Seeds in Tutini Zone

Land preparation for Moringa Growing in Mulala Zone

Moringa Plant in Mulala Zone

Cowshed in Mulala Zone

Crop residue conservation in Tutini Zone

Pasture conserved in Nkusso Zone

Paddocking in Emali Kajiado Zone

Dairy Cow in Nkusso Zone

Fodder Storage Structure in Emali Kajiado Zone

FGD with Women in Emali Kajiado Zone