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Sesame Value Chain Assets Creation Among Women in Magwi County, South Sudan

Johnny Dennis Okeny[1*], Salah Jubarah [2], Tony Ngalamu [3]
1.PhD Candidate, Department of Agricultural Sciences, School of Natural Resources and Environmental Studies, University of Juba, Juba, South Sudan
2.Professor, Dean School of Natural Resources and Environmental Studies, University of Juba, Juba, South Sudan
3.Associate Professor, Department of Agricultural Sciences, School of Natural Resources and Environmental Studies, University of Juba, Juba, South Sudan
* E-mail of the corresponding author: johnny_okeny @yahoo.com

Abstract

Sesame is an important food and cash crop cultivated by the majority of smallholder women farmers in Owinykibul locality in Magwi County and Pajok in Payam in Magwi County. The purpose of this study was analyze women's participation in the sesame value including production, value addition and marketing in the study area The study also assessed the types of assets and extent of asset creation among small holder women farmers in the study area. In addition, the study sought to identify and evaluate the specific constraints and propose gender-responsive strategies and policy recommendations to overcome identified barriers and maximize women's opportunities for sustainable asset creation in the study area. This study was conducted in Owinykibul locality in Magwi Payam and in Pajok Payam in Magwi County, Eastern Equatoria State, South Sudan. Primary data were collected using a household survey design. The study used descriptive survey design as it allowed analysis of quantitative data. A sample of 409 households' heads were interviewed using structured household questionnaires in the study areas; out of the 409 household heads 168 (41.1%) were women. The findings of the study indicate that overall, the incomes from the sales of sesame was the prime source of income used by smallholder women farmers for accumulation of assets including livestock, physical productive assets used in sesame production, means of transport and protective/household assets. Similarly, the results of this study also revealed that incomes from the sales of sesame was the second most important source for major investment such as improving the structures of family housing including roofs, floors and walls of the main house. Overall, this study provides evidence that the participation of smallholders' women farmers in the sesame value chain contributed significantly to improving their livelihoods in terms of improved and greater accumulation of physical assets. Hence the need for strategies to alleviate challenges that limit assets accumulation among smallholder women farmers to enhance the positive impact of the sesame value chain on their asset ownership and overall social and economic empowerment of women in the study areas in Magwi County.

Keywords: Sesame, value chain, asset creation, smallholder farmer, women

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1. Introduction

The African Development Bank-AfDB (2013) argued that agriculture is the backbone of the economy of South Sudan. About 80% of the population lives in rural areas, with agriculture, forestry and fisheries providing the primary livelihood for a majority of the households in the country. On the other hand, Kose Musa and Kongas Kuyu (2023) explained that South Sudanese agricultural sector is characterized by a subsistence-based approach, low productivity, a lack of infrastructure and market institutions, low levels of technology and inputs, and a high degree of rainfall sensitivity. The USAID (2022) pointed out that sesame and groundnuts are among the 10 leading crops based on area cultivated in South Sudan. Moreover, both groundnuts and sesame paste are the only ones perceived to have a moderate-to-high potential in all the targeted counties. According to FAO (2023), the

local demand is growing for processed sesame seeds and byproducts, most of which are currently imported from neighboring countries.

The productivity of sesame in South Sudan remains low and fragmented, due to a combination of lack of production inputs, lack of access to extension services, minimal policy intervention, and low yields, inadequate land preparation, inadequate storage and processing facilities, no proper national policy regarding sesame, and lack of adequate national standards (Summer, 2020). On the other hand, the small and fragmented nature of landholdings, climate shocks, and insufficient availability of quality inputs, traditional farming methods, and limited processing are major constraints in the sesame value chain in South Sudan (Whitepeak (2023). Among smallholder farmers in Uganda, sesame is labor-intensive and characterised by the heavy involvement of women at every stage. Women in Uganda are exclusively responsible for planting, weeding, harvesting, drying, threshing/sorting and marketing of small volumes. Men are responsible for land opening and marketing of large volumes of the crop. However, women control the decision-making and marketing of small volumes (that can be transported on their heads) and retain this income (CASA, 2020). Similarly, women are significantly involved in agriculture across South Sudan, they are the ones mostly involved in farming. However, sometimes, due to logistics and technical reasons, women's work can be canceled or postponed. For example, in Yambio, because the topography is composed of thick forests. women might refrain from agricultural work because they cannot cut trees and do not have plowing equipment (UNDP, 2020.

Regarding marketing, Ferris Shaun et al., (2014) pointed out that in most developing countries, 80–90% of agricultural goods are sold informally, through transactions at the farm gate, roadside sales, village and rural assembly markets, and urban wholesale and retail markets. Having few regulations and often no taxation, these markets are the most accessible to smallholder farmers. Whereas, in their study of oil seeds value chain in Northern Uganda Dalipagic and Elepu (2014) found that the marketing constraints of small holder farmers included among others poor infrastructure, lack of appropriate storage facility, low market opportunities, poor market information, and high marketing costs on account of the poor conditions of roads and the lack of access to means of transportation. A major obstacle that agribusinesses face in South Sudan is the information asymmetry, defined by suppliers and consumers lacking the necessary information about the market. In another way, the consumers do not have access to information about the prices offered for services and products; simultaneously, suppliers are not able to estimate the demand for the services and products they are offering. which results in situations that could exploit either party. However, the market for sesame in South Sudan is quite small domestically. Trader channels are largely informal and cash-based deal with small quantities of sesame and represent a high portion of the market. A number of informal village traders collect sesame seeds from farmers. paying them in cash. They then sell the sesame to processors or exporters or sell them in domestic markets (UNDP, 2020)

According to Woller *at al*., (2011) six types of assets are generally recognized: human, physical, social, financial, natural, and political. Furthermore, another useful way to think about livelihood assets is to differentiate between ‘productive assets’ and ‘protective assets.’ Productive assets are physical assets that increase the household’s labor productivity and production thereby enabling it to increase its income and food security over time. Whereas, protective assets include physical, financial, and social assets that can readily be converted into cash or goods in time of need. The common types of protective assets are held as a store of value (e.g. livestock, jewellery, seed or grain, land) and moveable household assets (e.g. TVs, radios, furniture, clothing). On the other hand, the productive assets include agricultural land, tools and equipment, dairy and draft animals and rental properties. The WFP, FAO and UNICEF (2025) report for South Sudan identified assets a household owned out of a list of 25 common household items in the country. Potential assets owned by households included bed, mattress, sleeping mat, chairs, tables, kitchen utensils, radio, television, cell phone, lighting devices (e.g. lamp, torch), wheelbarrow, mosquito net, blanket, motorbike, bicycle, flat iron, stove, solar panel, fishing equipment, seeds, grain grinding tools, agricultural tools, other construction and repair tools, vehicles, etc. Nationally, households owned an average of 5.3 assets. Asset ownership was highest in Western Bahr el Ghazal (6.2 assets), Western Equatoria (6.5 assets), and Eastern Equatoria (5.8 assets). Asset ownership was lowest in Jonglei (3.6 assets) and Upper Nile (3.7 assets). This research attempts to analyse women's participation in the sesame value including production, value addition and marketing in the study area and how it contributed to asset creation and accumulation at the household level effect of the sesame value chains on the livelihoods of smallholder farmers in relation to production and marketing of sesame. The primary objectives of this research are threefold; i. to analyze women's participation in the sesame value including production, value addition and marketing in the study area review the current methods of sesame production and marketing of smallholder farmers in the study areas, ii. to assess the types of assets and extent of asset creation among small holder women farmers in the study area and, iii. To identify and evaluate the specific constraints and propose gender-responsive strategies and policy recommendations to overcome identified barriers and maximize women's opportunities for sustainable

asset creation in the study area.

2. Literature review

2.1 Value Chain Framework

A value chain is defined as a set of interlinked activities that work to add value to a product and consists of actors and functions that improve the product while linking commodity producers to processors and markets, which includes final consumers (World Bank,2007). There are three main levels of actors in the value chain, namely, core value actors, business development services and regulatory agencies (Shriver et al., (2019) A typical agricultural value chain comprises production; harvesting and transport; primary processing and storage; secondary processing; distribution, packaging and handling and; wholesale and retail market (Gutsi et al., 2016). Millions of low-income people, a large proportion of whom are women, participate in agricultural value chains as producers, traders, processors, and retailers (Devaux et al., 2016).

A value-chain analysis (VCA) systematically maps the actors participating in the production, distribution, marketing and sales of a particular product(s) and in addition it attempts to identify how each of the actors benefit from their participation in the particular product or value chain (Kaplinsky and Morris (2001). On the other hand, a value chain analysis also describes the existing system and context, and enables identification of challenges, problems, and bottlenecks at various points within the value chain. In addition, the researcher can identify potential solutions to problems or constraints across different levels of the value chain for different target groups (Smith et al., 2020). Conversely, strengthening value chains entails resolving the marketing challenge for sesame farmers through the provision of reliable market information to facilitate smallholder's market participation. Furthermore, organized group marketing could be a strategy to avoid considerable price fluctuation and collective action would help coordinate production and marketing functions (Dossa et al., 2017). The measures and actions required to be taken by governments to provide a conducive enabling environment for greater Agricultural Value Chain (AVC) Integration in Africa among others include: addressing the shortcomings in infrastructure, including unreliable energy, ineffective urban-rural road network and a business and regulatory environment will be crucial for Africa's beneficial participation in AVCs; providing farmers with appropriate financing schemes for better access to financial facilities will need to be complemented by financial literacy training to avoid the over-indebtedness; make the necessary efforts to encourage the connection of small-scale farmers with large commercial farmers through mutually beneficial contract farming (also called out-grower schemes) and; organizing smallholder farmers in cooperatives and groups for better integration into agriculture value chain (Moyo et al., 2015).

Regarding the concept of Smallholder farmers, Amosah et al, (2023) maintained that the idea of small, as implied by the name "smallholder," may be applied to all characteristics of the smallholder, including labor input, capital assets (natural, physical, human, financial, and social), access to markets, and market orientation. Whereas, Kamara et al. (Ali 2019) considered smallholder farmers generally, as cultivating 2ha, relying mainly on family labor, with limited capital (natural, physical, social, financial, and human), low-input-technology, and having limited access to markets.

2.2 Sustainable Livelihoods Conceptual Framework (SLF)

A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term" (Chambers and Conway,1991).The typical infrastructure that are essential for sustainable livelihoods include access to road and transport; housing and safe buildings; access to water and sanitation; clean and affordable energy; and access to information (communication) (UNDP, 2017).

The five major components of Sustainable Livelihoods Framework are: (a)vulnerability context, (b) livelihood assets, (c) structures and processes, (d) livelihood strategies, and (e) livelihood outcomes (DFID, 2000). Livelihood Strategies comprise the range and combination of activities and choices that people undertake in order to achieve their livelihood goals. (Woller et al 2011). The top five livelihoods which are central to households' access to food and income in South Sudan are agriculture (37.7 percent), livestock production (14.2 percent), unskilled casual labour activities (7.7 percent) brewing/sale of alcoholic beverages (7.1 percent) and food assistance (6.5 percent) (WFP, FAO and UNICEF, 2021).On the other hand, livelihood outcomes are the achievements of livelihood strategies, such as more income (e.g. cash), increased well-being (e.g. non material goods, like self-esteem, health status, access to services, sense of inclusion), reduced vulnerability (e.g. better

resilience through increase in asset status), improved food security (e.g. increase in financial capital in order to buy food) and a more sustainable use of natural resources such as appropriate property rights (Kollmair and Gamper 2002).

2.3 Assets endowment at household level

The South Sudan Baseline Household Survey (NBHS) in early 2009 collected data on assets owned by households including motor vehicle, motorcycle, bicycle, canoe/boat, animal transport, television/sat. dishes, radio, phone, computer, refrigerator, fan and air-conditioner. The interpretation of the information simply informs about the relative frequencies of household assets endowments in the sample. The results explain how certain assets are owned by more households than others at the time of data collection. For example, more households (32%) owned radios while fewer (5.2%) had livestock (Lokosang L.B et al..2014). Whereas, the South African Demographic and Health Surveys (DHS) categorize individuals in terms of their possession (or otherwise) of "real" assets. Some of the household assets assessed in the South African DHS include radio, television, refrigerator, bicycle, motorcycle, car, telephone, personal computer (PC), washing machine, donkey/horse and sheep/cattle (Wittenberg Martin and Leibbrandt Murray, 2017) In the Guatemala survey, information on contextually appropriate durable assets which were contextually appropriate was collected from households with a cohort member residing in any of the four villages (as part of village censuses conducted) in the 1967, 1975, 1987 and 2002 study waves, and from households of all cohort members. The study assessed ownership (yes/no) of radio, record player, sewing machine, refrigerator, television, bicycle, motorcycle and automobile, quality of housing construction (floor, roof, walls). The survey also imputed ownership of land, record player, sewing machine, television, motorcycle and automobile (Varghese Jithin Sam et al., 2021).

3. Materials and Methods

3.1 The Study Area

The study was conducted in Magwi County in Eastern Equatoria State, South Sudan. Note that Magwi County comprises six Payams, namely, Lobone, Magwi, Mugali, Nimule, Pageri and Pajok. The County fall in Longitudes: 31.715° E and 32.887° E, and Latitudes: 3.3.497° N and 4.395°N. Its altitude ranges from 514-2,223m above sea level.

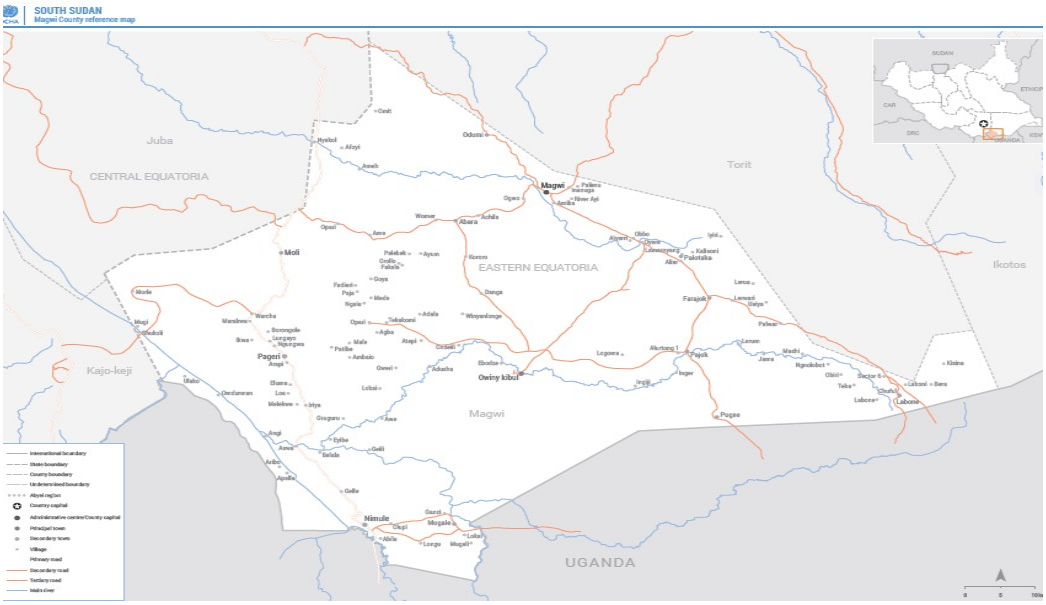

Figure 1: Map of Magwi County

The County covers an area of 5,202 km with a population of about 296,326 persons as at 2020 (National Bureau of Statistics, NBS, 2015). Magwi Payam has a population of 72,823 (36,604 males and 36,219 females), while Pajok Payam has 37,300 persons (18,748 males and 37,300 females). The study areas in Magwi County falls in the Equatorial Maize and Cassava (SS01) livelihood zone. The zone is largely found in the Greenbelt agro-ecological zone and is characterised by a bi-modal rainfall pattern with two reliable seasons and average annual

precipitation of 1100-1600 millimetres (mm); although the seasonal averages range 600-900 mm each season (FEWS NET, 2018).

3.2 Sampling procedure and data collection

Multi-stage sampling procedure was used for this study. Within the first stage, Pajok Payam and Owinykibul locality in Magwi Payam which are the potential sesame producing areas in Magwi County were purposively selected for the study. During the second stage, six (6) Bomas with sesame producing potentials in Pajok and Magwi Payams were selected randomly. In Pajok Payam the four Bomas/locations of Saigon, Pajok, Lagii and Lawaci were selected and similarly in Magwi Payam we selected the localities of Owinykibul and Owinykibul Center. The specified samples of household heads were selected randomly, using probability proportionate to size. The required sample size was determined using Yamane's (1967) formulae, at 95% Confidence Level with +/- 7% level of precision to represent the population. n=N/1+N(e2). Where **n**= is the sample size N=Population in the selected Payam e=level of precision (0.07). Simple random sampling techniques was employed to draw sample respondents. Chain sampling, network sampling or snowballing sampling was used for the qualitative study design. Snowball sampling begins with one or more study participants. It then continues on the basis of referrals from those participants. This process continues until you reach the desired sample, or a saturation point (Radford M. Neal, 2000). The survey employed both mixed methodology combining qualitative and quantitative methods. The tools used for quantitative research included structured households' questionnaires and individual survey questionnaires. The qualitative data collection tools included key informant interviews (KII)and Focus Group Discussions (FGD) checklists. Whereas, secondary data were obtained from literature review including books, journals and conferences.

The researcher identified, selected and trained a research assistant/supervisor and 11 enumerators comprising 6 males and 5 females from Pajok and Owinykibul. They were trained for two days on the data collection tools and on research methodology and carried out pretesting of the tools. As to their educational qualifications, the data collectors or enumerators have all completed their secondary education. The data collection was conducted in Pajok, Owinykibul and Magwi between 22 January to 31 January 2025. The enumerators used KOBO Collect to obtain primary data from households, while paper based questionnaires were used for quantitative survey with traders/distributors, processors, consumers and en-users of sesame products. Conversely, key informants interview and focus group discussion guides/checklist were used to collect data from key stakeholders. Structured household questionnaires were used for face to face collection of primary data from a total of 409 households; 223 in Pajok Payam and 186 Owinykibul localities in Magwi Payam. Similarly, quantitative date was collected from input suppliers, collectors/local traders, processors, wholesalers, retailers and consumers/end-users (individuals/households and restaurants) in the study areas using individual surveys tools. On the other hand, key informant interviews were conducted with the Director for Agriculture and Forestry and the Principal Magwi Business College of Agri-Business and Management Studies. Whereas, focus group discussions were held with representatives of the local community and members of a cooperative society.

3.3 Ethical Considerations

Informed consent was obtained from all participants prior to engagement, ensuring that respondents clearly understand the purpose of the review, the voluntary nature of their participation, and their right to withdraw at any point without any consequence. Strict confidentiality and data protection protocols were applied throughout the process to safeguard the identity and personal information of all respondents.

All interviews and focus group discussions were guided by the Do No Harm principle to ensure that the study does not expose participants—particularly women or girls—to any physical, emotional, or social risks.

3.4 Validity and reliability of data

Validity refers to the degree to which a tool measures what it is intended to measure. It is crucial for ensuring that research outcomes are accurate and meaningful, Whereas, reliability refers to the consistency and stability of a measurement across time, items, or raters. A reliable measure yields the same results under consistent conditions (Andersson Mira et al., 2024). To increase the chances of data validity, the survey team administered similar tools and all tools contain multiple questions that are aimed at answering the same questions. Importantly, the survey team pre-tested data collection tools to ensure high validity and reliability. The survey team used multiple methods of data collection and analysis (triangulation), which allows for validation across multiple methods and sources.

3.5 Methods of data analysis

The analysis, irrespective of whether the data is qualitative or quantitative, may be to describe and summarize the data, identify relationships between variables, compare variables, identify the difference between variables and forecast outcomes (Dawit DA, 2020). Data analysis involved the systematic organization, comparison and synthesis of information and data derived across and through all methods mentioned above. The researcher triangulated information using various methods of data collection and sources of information to ensure robust findings. Ultimately, conclusions were based on evidence. The study employed a combination of qualitative and quantitative data analysis techniques to summarize and present data collected through KIIs, FGDs, desk review, and structured household interviews. Data from the household interviews was analysed using SPSS version 22.0 software and MS Excel. The cleaned quantitative data were subjected to descriptive analysis. Simple descriptive statistical techniques like frequency distribution, percentages and mean were produced using computer software tools. Value chain analysis approach was also used to analyse survey data. Value chain analysis is a process that involved, data collection and research, value chain mapping, analysis of opportunities and constraints, and recommendations for future actions. The research delineated the value chain actors, identified their roles and linkages among them.

4. Results and discussion

4.1 Demography characteristics of smallholder women farmers

The sex of the household's head surveyed in Magwi and Pajok Payams of the Magwi county are presented in Table 1. A total of 409 households were interviewed in Magwi County, about 58.9% (n=214) males and 41.1% (n=168). About 186 (45.5%) households were reached in Owinykibul in Magwi Payam, while 223 (54.5%) were interviewed in Pajok Payam.

Table 1: Sex of household heads, Magwi (Owinykibul) and Pajok Payam in Magwi County

Household head	Magwi Payam(Owinykibul)		Pajok Payam		Total	
	Frequency	%	Frequency	%	Frequency	%
Male	111	59.7	130	58.3	241	58.9%
Female	75	40.3	93	41.7	168	41.1%
Total	186	100%	223	100%	409	100%

Source: Household survey data, 2025

The results in Table 2 indicate that 32.7% of women were in the 25-34 years' category, 31.5% were 35-44 years old, while 22.0% were in the 45-54 years' age bracket. On the other hand, 8.9% and 4.2% of women were 18-24 and 55-64 years old respectively and 0.5% were 65 years and above. The majority 86.2% of women fall in the age range 25-54 years. In the context of the study areas this is the age group that is most active and productive in sesame farming. Conversely in Sudan, the majority (61.2%). of interviewed women are in the middle age (31-50) and the findings imply women are more likely to be more motivated to be more responsible to engage in economic activities related to food security for their families (Ibnouf Fatma Osman ,2009).

The majority (73.2%) of women were married, whereas 11.3% were separated and 6.5% were widowed and divorced respectively. On the other hand, 2.4% of women were never married.

The findings of the survey revealed that about 23.2% of women completed primary education, 14.9% had some primary education. Conversely, 20.8% of women had some secondary education while 20.2% completed secondary education. On the other hand, only 0.6% of women attained vocational (Certificate) and vocational (Diploma) and had some College or University (no completion) respectively. However, 19.0% of women respondents never attended an education programme. In general, 38.1% of interviewed women had some and completed primary while 41.0% had some and completed secondary. Overall 79.1% of women had some or completed studies up to secondary levels. Conversely, in Torit County, in Eastern Equatoria State, 38% of farmers are not educated, 41% possess primary education level, while 22% had secondary education. Among all respondents (farmers) interviewed none of them reported that they possessed tertiary education level (Diploma or degree education level). This low level of education among the agricultural producers in Torit County negatively impact crop productivity and production. This means that all the capacity building and training activities must be simplified so that all the farmers benefit. (Endalamaw Teshale, 2019). The level of illiteracy of women farmers at 19.0 % in the study areas in Magwi County is lowered compared to 38% for all respondents in Torit County. On the other hand, about 79.1% of Women in Magwi County had primary to secondary level education compared to 73% for all respondents interviewed in Torit County. This means that most of the women across the study areas in Magwi County are able to read and write and therefore could easily be trained on

improved agricultural technology and practices using print materials (leaflets, pamphlets etc,). On the other hand, in Northern Kordofan State, Sudan, the majority of the interviewed women are moderately educated (62.4%) (Ibnouf Fatma Osman, 2009), this is contrasted with 79.1% of women in the study areas in Magwi County who are better educated at the primary and secondary level education.

Approximately, 48.8% of females had household sizes of 4-6 adults (18 years and above), 35.7% had 1-3 members, while 13.7% mentioned 7-9 members. The mean number of adults (18 years and above) among female household was 4.5 persons. On the other hand, for South Sudan as a whole, the average household size was found to be 7.3 members with most households having between 6 and 9 members (WFP, FAO and UNICEF, 2025). The low mean adult members in the female households may have implication in their access to adequate family labor for agricultural and other livelihood activities.

Table 2: Demographic characteristics of women farmers across the study area in Magwi County

Variables **Age (years)**	**Frequency**	**Percentage**
18-24 years	15	8.9%
25-34 years	55	32.7%
35-44 years	53	31.5%
45-54 years	37	22.0%
55-64 years	7	4.2%
65 years and above	1	0.6%
Total	**168**	**100.0%**
Marital status		
Married	123	73.2%
Widowed	11	6.5%
Divorced	11	6.5%
Separated	19	11.3%
Never married/single	4	2.4%
Total	**168**	100.0%
Education		
Never attended an education programme	32	19.0%
Some primary education (no completion)	25	14.9%
Primary completed	39	23.2%
Some secondary (no completion)	35	20.8%
Secondary completed	34	20.2%
Vocational (Certificate)	1	0.6%
Vocational (Diploma)	1	0.6%
Some College or University (no completion)	1	0.6%
Household size: number of adults (18 years and above)		
1-3	60	35.7%
4-6	82	48.8%
7-9	23	13.7%
10-12	1	0.6%
More than 13	2	1.2%
Total	**168**	100.0%

Source: Household survey data, 2025

4. 2 Women's participation in the sesame value including production, value addition and marketing in the study area

Women role in sesame production

Cultivation of sesame: Across the study areas**,** 98.2% of women as opposed to 98.3% males cultivated sesame during the 2024 cropping season. Likewise, in Ethiopia, sesame is mainly produced for household food and as a source of cash. It is predominantly grown by smallholders (95.5%) and medium-to-large commercial farmers (0.5%) under rainfed conditions (Teklu Desawi Hdru et al., 2021)

Table 3: Cultivation of sesame across the study areas in Magwi County

Cultivation of sesame crop in 2024-All Payams	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Yes	237	98.3%	165	98.2%	402	98.3%
No	4	1.7%	3	1.8%	7	1.7%
Total	**241**	**100%**	**168**	**100%**	**409**	100%

Source: Household survey data, 2025

Experience in farming: About 27.5% of women respondents said they have average experiences of 3 years in sesame farming, whereas 28.1% cited average of 6 years, while 16.8, % mentioned above 10 years. The mean length of time household heads was engaged in sesame farming was 5.9 years compared to 6.9 years for men. Whereas in Northern Benin, the Republic of Benin, about 91% of the respondents had more than 10 years of farming experience, whereas 82.5% had an average of 3 years producing sesame. This was a strong indicator that, in the absence of production hurdles, productivity might be boosted (Dossa Kossivi Fabrice et al., 2023). In comparison to Northern Benin, women farmers in the study areas in Magwi County have lesser average years of experiences in sesame farming

Table 4: Length of time farmers engaged in sesame production across the study areas

Length of time have been engaged in sesame production	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Less than 2 years	15	6.3%	24	14.4%	39	9.6%
2-4 years	65	27.0%	46	27.5%	111	27.3%
5-7 years	63	26.3%	47	28.1%	110	27.0%
8-10 years	32	13.3%	22	13.2%	54	13.3%
Above 10 years	65	27.1%	28	16.8%	93	22.9%
Total	**240**	**100.0%**	**167**	**100.0%**	**407**	**100.0%**

Source: Household survey data, 2025

The main reasons for engaging in sesame farming by women smallholders were: to provide food for household consumption (83.9%), main sources of income (75.0%) being extra source of income (70.2%) and to accumulate wealth (16.7%). Key informants interview with the Director for Agriculture and Forestry at the County Agriculture Department in Magwi revealed that about 75% of farmers cultivate sesame, whereas about 35% grow groundnuts in Magwi County. He remarked that opportunities for marketing sesame in greater than that of groundnuts crop. Furthermore, he said that the sesame crop has comparative advantage for production in Pajok Payam and in Magwi Payam (Abara, Owinykibul and Obbo localities) as the climatic conditions and soils of the above mentioned areas greatly favor sesame growth. The Director stressed that sesame is important to the economy of Magwi County since it contributes to income generation for farmers, traders and other sesame value chain actors, the crop is also exportable and is one of the important sources of revenue (taxes and fees) for the local government.

Table 5: Main reasons households engage in sesame farming

Main reasons for engaging in sesame farming	Males		Females		Total	
	Frequency	%	Frequency	%	Frequency	%
Food for household consumption	217	90.0%	141	83.9%	358	87.5%
Main source of income	213	88.4%	126	75.0%	339	82.9%
Extra source of income	157	65.1%	118	70.2%	275	67.2%
To accumulate wealth	46	19.1%	28	16.7%	74	18.1%
Not applicable	2	0.8%	2	1.2%	4	1.0%
Other	0	0.0%	1	0.6%	1	0.2%

Source: Household survey data, 2025

Access to land for farming

Land is an important natural asset needed by farming households to grow their crops and rear their animals. About 93.5% of females in contrast with 97.1% males own land for cultivation indicating that access to land is not much of a problem even for women in the study area. Overall, 90 percent of sampled households in South Sudan reported having access to land for cultivation as follows: highest in Western Equatoria, Warrap and Northern Bahr el Ghazal, with each accounting for 97 percent, Western Bahr el Ghazal (94 percent), Lakes (93 percent), Eastern Equatoria (93 percent), Unity (92 percent), Central Equatoria (87 percent), Jonglei (81 percent) and lastly, Upper Nile (79 percent) (WFP, FAO and UNICEF, 2021).Nevertheless, in some communities in South Sudan, women often face challenges concerning land ownership. Interviewed female farmers noted one of the challenges is that although legally. as per the transitional constitution, women have the right to own property. they do not own assets or lack control over their assets due to cultural obstacles The majority of the property's owned and controlled by men. An interviewee noted. "Many women are simply not allowed to own property or land" (UNDP ,2020). Similarly, women in Chikwana, Malawi are a lot less likely to own land, especially in patrilineal societies. Land ownership and inheritance favors men over women. Only 32% of women are individual holders of agricultural land (Dr Maxi Ussar, 2016). In South Sudan, land is communally owned; total size of land cultivated per household on average is 1.4 Feddans (0.588 ha) which is very small, and in turn results to lower production levels. Only households in Torit County in Eastern Equatoria State cultivated a marginally bigger piece of land at 1.5 Feddans (0.63 ha) compared to 1.4 Feddans (0.588 ha) in the other two counties of Bor and Yambio (Endalamaw Teshale al.2019). Conversely, in Mali, land holdings are on average 0.5 hectares (ha) for women, compared with 1.5 ha for men (Baden Sally and Pionetti Carine, 2011). In general, average land holdings of 9.53 Feddans (4.0 ha) for women in the study areas in Magwi County are about 8, times bigger than for Mali (0.5 ha) and 6 times larger compared to those of Torit County (1.5 Feddans).

Table 6. Access to land for farming, by sex of household head across the study areas

Ownership of land for farming-by sex of household head	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Yes	234	97.1%	157	93.5%	391	95.6%
No	7	2.9%	11	6.5%	18	4.4%
Total	241	100.0%	168	100.0 %	409	100.0%

Amount of arable land holding for the household	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
1-4 Feddan	36	14.9%	38	22.6%	74	18.1%
5-8 Feddan	38	15.8%	58	34.5%	96	23.5%
9-12 Feddan	47	19.5%	23	13.7%	70	17.1%
13-16 Feddan	31	12.9%	10	6.0%	41	10.0%
17-20 Feddan	15	6.2%	14	8.3%	29	7.1%
21 Feddan and above	70	29.0%	22	13.1%	92	22.5%
Not applicable	2	0.8%	3	1.8%	5	1.2%
Don't know	2	0.8%	0	0.0%	2	0.5%
Total	241		168		409	100.0%

Source: Household survey data, 2025

Methods of land preparation

About 36.3% of women compared to 46.9% men used oxen/animal draught for land preparation. The charges of ox-traction ploughing were 120,000 SSP/Feddan in 2024 and thus many resource poor smallholder women farmers could not afford the cost. On the other hand, it is costly for most smallholders to own an ox plough and bullocks; a plough sells for SSP 400,000, while a pair of oxen cost 3.6 million- 5 million Ugandan Shillings (about 990-1,370 USD). Interviewed women in Yambio County, South Sudan, revealed that advanced tools. such as oxen and tractors. would make their work much more efficient – however, they lack access to these tools and are often not the priority when they are available (UNDP,2020). In Ethiopia, the base line information collected across ten *Pilot Learning Woreda* (PLWs) revealed that female headed households are resource poor; the majority owned one or no oxen. Even a few better off female headed households who owned land with sufficient traction animals (two or more oxen) to draw the plow couldn't plow as women are culturally inhibited to plough. (Aregul Lemlem and Pusku Ranjitha, 2011).

Table 7: Main method used by houses to prepare/ plough land for sesame crop in 2024

Main method used to prepare/ plough land, by sex of household head	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Oxen/animal draught	113	46.9%	61	36.3%	174	42.5%
Traditional hand tools/manual	127	52.7%	105	62.5%	232	56.7%
Not applicable	1	0.4%	2	1.2%	3	0.7%
Total	**241**	**100.0%**	**168**	**100.05**	**409**	**99.9%**

Source: Household survey data, 2025

Inputs used in sesame farming and their sources

The three main sources of sesame seeds planted by women farmers in 2024 were own saved seeds (91.6%), other farmers (61.1%) and rural stockists/shops (28.7%) and social network (18.6%). In Humera district, Tigray, Ethiopia, the predominantly small-scale farmers apply traditional way of farming including the use of recycled seed that they have saved from their previous production. for sesame production (Mengstu et al, 20l9). Similarly, in Mozambique, farmers typically rely on local seed recycled from their harvest or purchased in the local market (CEFA, 2019).

Table 8: Main sources of sesame seeds planted by women farmers in 2024 across the study areas

Main sources of sesame seed planted in 2024	Frequency	%
Own saved seeds	153	91.6%
Other farmers	102	61.1%
Rural Stockists/shops	48	28.7%
Social network (relatives and friends)	31	18.6%
UN/NGOs	5	3.0%
Government distribution network	1	0.6%
Seed Company	6	3.6%
Cooperatives	23	13.8%
Agro-enterprises	4	2.4%
Others	2	2.4%

Source: Household survey data, 2025

The three main sources of labor accessed by women farmers for sesame production in 2024 were family labor (91.6%), hired labor (25.7%, own+ hired labor (16.2%) and traditional labour pooling systems (10.8%).

Table 9: Main sources of labor for sesame production across the study areas

The main sources of labor for sesame production in 2024	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Family labor	221	92.1%	153	91.6%	374	91.9%
Hired Labor	71	29.6%	43	25.7%	114	28.0%
Own+ hired labor	40	16.7%	27	16.2%	67	16.5%
Traditional labour pooling systems	27	11.3%	18	10.8%	45	11.1%
Cooperative labor	0	0.0%	2	1.2%	2	0.5%
Other	0	0.0%	2	1.2%	2	0.5%

Source: Household survey data, 2025

Area planted and yields of sesame

Across the study areas in 2024, about 33.7% of women planted areas of 4-10 Feddans with sesame, 24.7% planted 2-4 Feddans, while 17.5% cultivated 10 Feddans and above. The mean area planted by women with sesame in the study area was 5.49 Feddans (2.3 Hectares) compared to 7.19 Feddans (3.0 ha) for men. Whereas, in Uganda, the majority of sesame Small Holder Farmers (SHF) allocate only about 2 acres (0.8ha) for sesame production (CASA.2020).

Table 10: Area planted with sesame in 2024 cropping season across the study areas

Area planted (Feddans)	Male		Female		Total	
Marginal: 0-1 Feddan	5	2.1%	12	7.2%	17	4.2%
Small: 1-2 Feddans	19	7.9%	28	16.9%	47	11.6%
Semi-medium: 2-4 Feddans	52	21.7%	41	24.7%	93	22.9%
Medium: 4-10 Feddans	86	35.8%	56	33.7%	142	35.0%
Large: 10 Feddans and above	78	32.5%	29	17.5%	107	26.4%
Total	240	100.00%	166	100.00%	406	100.10%

Source: Household survey data, 2025

The yield of sesame obtained by women farmers from the 2024 harvests were as follows: under 700 kg (54.8%), 700-less than 1,000 kg (13.7%) and 1,000-less than 1,300 kg (10.1%). The mean yield of sesame for women farmers in 2024 at 1,100.9 kilograms was lower compared to 1,178.0 kg for male farmers. The mean area planted with sesame by women in 2024 was 5.49 Feddans (2.3 hectares) and the estimated yield obtained from that area was 1,100.9 kilograms. Based on the above, the study estimated the average yield of sesame seeds for women farmers across the study areas at 200.3 kg/Feddan or 477 kg/hectare in 2024. On the other hand, in Tanzania during the 2021 cropping season the average area cultivated with sesame was 2.6 ha with estimated average yield of 405.6 kg/ha (Lukurugu Gerald Alex et al., 2023). Sesame yields were low in Northern Benin, average productivity was 318 kg in 2020 (Dossa Kossivi et al., 2023) and in Mozambique, yields were 300 Kg/ha (CEFA, 2019). The average yield of sesame in Uganda was about 700 kilograms per hectare (FAOSTAT, 2018). Similarly, in Ethiopia yields of sesame were high; sesame productivity varied under a narrow band of 0.7 MT/ha-0.85 MT/ha during the period 003/04-2020/21(Kassie Girma et al., 2022). Morocco ranks among the last producers in the world with 663 t in 2020, which makes it the 22nd largest producer of sesame seeds in Africa. However, in terms of seed yield, it ranks third after China (1.62 t/ha) and Nigeria (0.79 t/ha), with a mean value of 0.78 t/ha that is higher than the overall average yield recorded in the top 10 producers (0.65 t/ha) (Kouighat Mohamed et al., 2022). The estimated sesame yields of 477 kg/hectare for women in the study areas were higher compared to all farmers in Tanzania (405.6 kg/ha), Mozambique (300 Kg/ha) but lower to those of Morocco (650 kg/ha) and Nigeria (790 kg/ha), Ethiopia, (775kg/ha) and Uganda (700kg/ha)

Table 11: Quantity of sesame seeds harvested in 2024 by households across the study areas

Estimated yield (quantity in kg) of sesame produced from the area you planted in 2024?	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
0 Kgs	4	1.7%	4	2.4%	8	2.0%
Under 700 kg	158	65.6%	92	54.8%	250	61.1%
700-less than 1,000 kg	25	10.4%	23	13.7%	48	11.7%
1,000-less than 1,300 kg	26	10.8%	17	10.1%	43	10.5%
1,300-less than 1,600 kg	3	1.2%	11	6.5%	14	3.4%
1,600-less than 1,900 kg	2	0.8%	1	0.6%	3	0.7%
1,900 -less than 2,200 kg	4	1.7%	8	4.8%	12	2.9%
2,200 -less than 2,500 kg	1	0.4%	0	0.0%	1	0.2%
2,500 -less than 2,800 kg	1	0.4%	2	1.2%	3	0.7%
2,800 -less than 3,100 kg	1	0.4%	0	0.0%	1	0.2%
3,400-less than 3,700 kg	1	0.4%	0	0.0%	1	0.2%
3,700 -less than 4,100 kg	3	1.2%	2	1.2%	5	1.2%
4,100 kg and above	12	5.0%	8	4.8%	20	4.9%
Total	**241**	100.0%	**168**	100.0%	**409**	100.0%

Source: Household survey data, 2025

Women participation in value addition to sesame

The main post-harvest value addition activities for sesame crop carried out by women farmers were drying of seeds (70.1%), winnowing and cleaning of seeds (67.7%), post-harvest handling and storage (61.1%), sorting and grading of sesame seeds (41.9%), processing of sesame seeds into paste (41.3%), and the use of appropriate bags for packaging (23.4%). However, only 6.6% of women extracted oil from sesame seeds. The findings of the survey indicate that to a moderate extent, women do perform value addition activities to improve the quality of the sesame they market and sell. In Nigeria, sesame seeds are locally processed and used in diverse forms such as local snacks and pap known as “kantun ridi” and “kunun ridi”, respectively. Additionally, oil is extracted from the seed and the cake is made into “kulikuli’’, which together with sesame leaves are used to prepare a local soup known as “miyar taushe”. Oil is used for cooking and medicinal purposes such as the treatment of ulcers and burns (Muthoni Jane and Shimelis Hussein, 2025).

Table 12: Post-harvest value addition activities of sesame across the study area

Value addition activities of sesame seeds	Male		Female		Tota1	
	Frequency	%	Frequency	%	Frequency	%
Post-harvest handling and storage	115	47.7%	102	61.1%	217	53.2%
Drying of seeds	174	72.2%	117	70.1%	291	71.3%
Winnowing and cleaning of seeds	177	73.4%	113	67.7%	290	71.1%
Sorting and grading of sesame seeds	81	33.6%	70	41.9%	151	37.0%
Processing of sesame seeds into paste	98	40.7%	69	41.3%	167	40.9%
Oil extraction from sesame seeds	16	6.6%	11	6.6%	27	6.6%
Use of appropriate bags	71	29.5%	39	23.4%	110	27.0%
Construction of improved rodent proof storage structures	24	10.0%	18	10.8%	42	10.3%
None	42	17.4%	23	13.8%	65	15.9%

Source: Household survey data, 2025

Women participation in marketing of sesame seeds

Method of selling sesame seeds: About 98.8% of women compared to 95.8% of men sold their sesame individually, while only 1.2% of women sold through Farmer Group or cooperative. The findings pointed to the yet limited roles of farmers groups or cooperative societies in marketing of smallholder women farmers' sesame in the targeted locations of Magwi County. Similarly, in Mozambique, approximately 77 percent of the sesame produced is sold on an individual basis, while 23 percent of total production is collectively marketed through farmers' organizations. Farmers typically market their harvested sesame crop- on average less than 100 kg—on an individual basis to local traders who then transmit them to large-scale buyers (USAID, 2016). Likewise, in Mali and Senegal farmers predominantly market their sesame seed stock individually and not through farmer's groups or organization (Dossa et al., 2017). On the other hand, the absence of a clear market opportunity within close proximity may be a disincentive to engaging in any form of collective action (CA). The specific barriers to women 's participation in CA cited by respondents were the lack of financial resources, lack of information about opportunities, time factor and the negative attitudes towards women 's engagement in collective activity, noted particularly in Ethiopia and Tanzania (Baden Sally and Pionetti Carine, 2011).

Table 13: Method of marketing and selling sesame by households across the study areas

Method you used to sell your sesame seeds in the past 2-3 months (November 2024 to January 2025)?	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Individually	228	95.8%	161	98.8%	389	97.0%
Through Farmer Group or cooperative	10	4.2%	2	1.2%	12	3.0%

Source: Household survey data, 2025

Income obtained by women from sales of sesame in the past 10 months: In the past 10 months (between November 2023 and August 2024), about 52.0% of women obtained income of 500,000-1,750,000 from the sales of sesame seeds. However, about 7.2% of women did not sell any sesame seeds. The mean income earned by women from sales of sesame was 974,700 SSP in contrast with 1,208,700 SSP for men. The improved earnings for men could be attributed to their increased engagement with cooperatives societies in marketing of their sesame unlike women. About 4.2% of men unlike 1.2% of women sold their sesame through farmers' groups/cooperatives. This finding indicate that women earn less than men by 24% and the disparity in income distribution has implications for gender equality and women empowerment. The World Bank Group (2024) reported that 75.9 percent of the population in South Sudan was living in households with annual per capita consumption expenditure below the poverty line of SSP 358,724, and 67.3 percent of the population was living in extreme poverty, that is, below the food poverty line of SSP298,478 a year. Nevertheless, the findings of this study show that the mean annual income of SSP 974,700 SSP obtained by women farmers in the study areas in Magwi County from the sales of sesame was about three times above the poverty line of SSP 358,724 for South Sudan.

Table 14: Income obtained by smallholder farmers from the sales of sesame in the past 10 months

Income (in SSP) obtained from sales of sesame seeds between November 2023 and August 2024	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Less than 500,000 SSP	18	7.5%	19	11.4%	37	9.1%
500,000- less than 750,000 SSP	33	13.7%	27	16.2%	60	14.7%
750,000 -less than 1,000,000 SSP	22	9.1%	23	13.8%	45	11.0%
1,000,000-less than 1,250,000 SSP	27	11.2%	16	9.6%	43	10.5%
1,250,000-less than 1,500,000 SSP	24	10.0%	5	3.0%	29	7.1%
1,500,000-less than 1,750,000 SSP	16	6.6%	14	8.4%	30	7.4%
1,750,000-less than 1,000,000 SSP	15	6.2%	8	4.8%	23	5.6%
2,000,000 -less than 2,250,000 SSP	14	5.8%	9	5.4%	23	5.6%
2,250,000 -less than 2.500,000 SSP	9	3.7%	3	1.8%	12	2.9%
2,500,000-less than 2,750,000 SSP	2	0.8%	5	3.0%	7	1.7%
2,750,000-less than 3,000,000 SSP	4	1.7%	3	1.8	7	1.7%
3,000,000-less than 3,250,000 SSP	2	0.8%	3	1.8	5	1.2%
3,250,000-less than 3,350,000 SSP	1	0.4%	1	0.6%	2	0.5%
3,500,000-less than 3,750,000SSP	3	1.2%	0	0.0%	3	0.7%
3,750,000-less than 4,000,000 SSP	3	1.2%	0	0.0%	3	0.7%
4,000,000 SSP and above	7	2.9%	4	2.4%	11	2.7%
Did not earn any income	15	6.2%	12	7.2%	27	6.6%
Only in Ugandan Shillings	26	10.8%	15	9.0%	41	10.0%
Total	**241**	**100%**	**167**	**100%**	**408**	**100%**

Source: Household survey data, 2025

4. 3 Types of assets owned and extent of asset creation among small holder women farmers through their participation in sesame value chain

As mentioned above, in the past 10 months (between November 2023 and August 2024), the mean income obtained by women from sales of sesame was SSP 974,700. As will be explained in this section the earnings from the sales of sesame largely contributed to women acquisition and ownership of physical assets including productive assets, livestock, means of transport and household assets as well as making improvements to family housing/structures. Baden Sally and Pionetti Carine (2011) reported that in Mali, the specific benefits for women engaged in sesame production through collective action include: access to production equipment (ploughs, bullock carts and cattle); access to market; increased incomes (collective marketing at negotiated rate), assets creation (personal assets).

Livestock assets

Ownership patterns: The findings of the study revealed that in January 2025, 78.6% of females unlike 85.1% of males own livestock. The ownership patterns of livestock by women farmers in the study areas across Magwi County in January 2025 were as follows: Chickens (78.0%); Goats (61.1%); Cattle (33.5%); ducks (30.1%); Sheep (28.7%); oxen for ploughing (27.7%); and pigs (21.0%**)**. Globally for South Sudan, 56 percent of the sampled households reported owning livestock. The proportion of households keeping livestock was highest in Warrap (77 percent), Unity (71 percent), Lakes (70 percent), Eastern Equatoria (65 percent), Northern Bahr el Ghazal (58 percent), while Central Equatoria had the lowest proportion (31 percent) of households keeping livestock at the time of the survey (WFP, FAO and UNICEF, 2021). As shown in the Table below, the ownership of almost all types of livestock except ducks were higher among men compared to women. This skewed pattern of livestock asset ownership in favor of men could has long run implication for women in access to productive assets and income from disposal of the animals.

Table 15: Ownership of livestock by households as of January 2025,

Ownership of domestic animals	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Yes	205	85.1%	132	78.6%	337	82.4%
No	36	14.9%	36	21.4%	72	17.6%
Total	**241**	**100%**	**168**	**100%**	**409**	**100%**
Livestock assets owned	**Frequency**	**%**	**Frequency**		**Frequency**	**%**
Cattle	112	47.6%	56	33.5%	168	41.7%
Sheep	102	43.4	48	28.7%	150	37.3%
Goats	176	73.64	102	61.1%	278	68.4%
Pigs	73	30.8%	35	21.0%	108	26.7%
Chickens	189	78.8%	131	78.0%	320	78.4%
Ducks	72	30.0%	50	30.1%	122	30.1%
Oxen for ploughing	93	39.2%	46	27.7%	139	34.5%

Source: Computed from Household survey (2025)

Main sources of money for purchase of livestock in the past 24 months: As shown in the Table below, in the past 24 months (December 2022 to November 2024) about 60.5% of females as opposed to 74.2% of males indicated that the sales of sesame were their main source of money for livestock purchases. Other important sources of money used by women to purchase livestock were from sales of other crops (49.1%), sales of livestock (52.1%), remittances (36.5%), petty trading (15.6%), savings from salary/wages (17.4%) and income from non-agricultural business (13.8%). However, 16.8% of women did not purchase any livestock during the period under review. The findings of the survey point to the important contribution of income from sesame (60.5%) to livestock asset building of the majority of women farmers in study areas in Magwi County

Table 16: Main sources of money used by households to purchase livestock

Main sources of money used by households to purchase livestock	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Income from livestock sales (goats. sheep, poultry, pigs)	114	47.5%	87	52.1%	201	49.4%
Remittances from relatives	91	37.9%	61	36.5%	152	37.3%
Income from sesame sales	178	74.2%	101	60.5%	279	68.6%
Income from sales of other crops	120	50.0%	82	49.1%	202	49.6%
Income from non-agricultural business	32	13.3%	23	13.8%	55	13.5%
Loans from formal financial institutions (e.g. bank, Micro-finance institution)	1	0.4%	2	1.2%	3	0.7%
Loans from informal financial institutions (e.g. money lender, Village Savings and Loans Association,)	6	2.5%	12	7.2%	18	4.4%
Grants (financial and material) from NGO	1	0.4%	1	0.6%	2	0.5%
Gathering and Selling of Non-Timber Forest product	2	0.8%	1	0.6%	3	0.7%
Savings from salary/wages	41	17.1%	29	17.4%	70	17.2%
Income from fishing activities	13	5.4%	5	3.0%	18	4.4%
Petty trading	51	21.3%	26	15.6%	77	18.9%
Commercial business	27	11.3%	9	5.4%	36	8.8%
Not applicable/did not purchase	26	10.8%	28	16.8%	54	13.3%
Total count	**240**		**167**		**407**	**100.0%**

Source: Household survey data, 2025

Productive Assets holdings

Ownership patterns: The following productive assets were owned by women as of January 2025: hoe (97.6%), axe (83.7%), Panga (81.4%), slashers (66.5%), rake (64.1%) and sickle (55.7%), spade/shovel (47.0%), wheelbarrow (34.1%), ox-plough (29.3%) and pickaxe (21.0%). As shown in the Table below women had less of all the mentioned productive assets except pickaxes in contrast to men indicating the lower extent of productive asset creation among women.

Table 17: Ownership of productive assets by households across the study areas

Productive asset	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Sickle	168	71.2%	93	55.7%	261	64.7%
Ox-plough	105	44.3%	49	29.3%	154	38.1%
Hoe	237	98.3%	164	97.6%	401	98.0%
Axe	219	91.6%	139	83.7%	358	88.4%
Slashers	204	86.1%	111	66.5%	315	77.9%
Rake	163	68.5%	107	64.1%	270	66.6%
Pickaxe	42	17.6%	34	21.0%	77.0%	19.0%
Spade/shove	140	59.1%	79	47.0%	219	54.1%
Panga	209	87.1%	136	81.4%	345	84.7%
Wheel/ Barrow	112	47.3%	57	34.1%	169	41.8%
Knapsack sprayer	10	4.2%	3	1.8%	13	3.2%

Source: Household survey data, 2025

Main sources of money used by household to purchase productive assets in the past 24 months: As illustrated in the Table below, the four main sources of money used by women to purchase productive assets during the period December 2022 to November 2024 were from sales of sesame (67.9%), sales of other crops and livestock at 64.9%) each, remittances from relative (44.0%) and petty trading (25%). The results of this study revealed that sesame in the major contributor to sources of income used by women to acquire productive assets.

Table 18: Main sources of money used by households to purchase the productive assets

Main sources of money used by households to purchase livestock	Male	Female	Total
Income from livestock sales (goats. sheep, poultry, pigs)	53.8%	64.9%	58.1%
Remittances from relatives	40.4%	44.0%	41.9%
Income from sesame sales	79.2%	67.9%	74.5%
Income from sales of other crops	60.4%	64.9%	62.3%
Income from non-agricultural business	18.8%	20.2%	19.4%
Loans from formal financial institutions (e.g. bank, Micro-finance institution)	1.3%	1.2%	1.2%
Loans from informal financial institutions (e.g. money lender, Village Savings and Loans Association,)	2.9%	7.1%	4.7%
Grants (financial and material) from NGO	0.4%	1.2%	0.7%
Gathering and Selling of Non-Timber Forest product	0.0%	0.0%	0.0%
Savings from salary/wages	19.6%	23.2%	21.1%
Income from fishing activities	4.6%	4.8%	4.7%
Petty trading	25.8%	25.0%	25.5%
Commercial business	16.7%	13.7%	15.4%
Other (specify)	0.0%	0.6%	0.2%
Not applicable/did not purchase	3.8%	2.4%	3.2%

Source: Household survey data, 2025

Ownership of transport vehicles

Ownership patterns: As of January 2025, the means of transport owned by women included bicycles (46.7%), motorcycles (42.4%), tri-cycle and car at 1.2% each and lorry at 0.6%.
females possess motorcycles unlike 69.0% of males. Generally, the ownership of motorcycles and bicycles were lower among women than men. This is understandable as the mean income from the sales of sesame in the past 10 months (November 2023 to August 2024) was lower at SSP 974,700 for women compared to SSP 1,208,700 for men.
In the Tongogara Refugee Camp (TRC), Chipinge District, Zimbabwe, only a few households have means of transport such as car (1.3%), bicycle (1.2%), lorry and motor scooter (0.9%), and mini-bus (0.5%). Similarly, in South Sudan (Lokosang *et al.,* 2014) observed that the ownership of semi-durable and durable assets among households were as follows: motor vehicle (3.0%), motor cycle (4.8%), bicycle (29.0%) and canoe/boat (1.4%) (UNHCR, 2018). The findings of this study revealed that women ownership of motorcycle at 42.4% and bicycle at 46.7% in January 2025 were higher compared to that of South Sudan. Similarly, only 1.2% of households in Tongogara Refugee Camp (TRC), Chipinge District, Zimbabwe owned bicycle compared to 46.7% in the study areas in Magwi County.

Table 19: Household ownership of means of transport across the study areas

Types of means of transport owned	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Bicycle	146	61.1%	77	46.7%	223	**55.5%**
Motorcycle	103	69.0%	132	42.4%	235	58.2%
Tri-cycle	2	0.8%	2	1.2%	4	1.0%
Truck	1	0.4%	1	0.6%	2	0.5%
Car	0	0.0%	1	1.2%	1	0.5%

Source: Household survey

Main source of money households used to purchase the means of transport in the past 24 months (from December 2022 to November 2024)
The four main sources of income used by women to purchase means of transport during the period December 2022-November 2024 were from sales of sesame (64.7%), livestock sales (69.8%%), sales of other crops (60.4%) and remittances from relatives (44.6%). About 64.7% of females in contrast with 82.9% of males used the incomes obtained from sales of sesame to purchase of means of transport. Mbatha (2024) argued that in small-scale farming, rural farmers in South Africa, do not engage in agriculture to produce for their household consumption only, but they also produce to sell the product to the market so that they will be able to get money for other expenditures and wealth accumulation. The findings of this study show that the sale of sesame was the second most important contributor after livestock sales for purchase of means of transport among women farmers. Hence the need to support women to diversify their sources of livelihoods and incomes especially through the rearing of small ruminants (goats, sheep and pigs) and poultry.

Table 20: Main sources of money used by households to purchase means of transport

Main sources of money used by households to purchase means of transport	Male	Female	Total
Income from livestock sales (goats. sheep, poultry, pigs)	59.3%	69.8%	63.6%
Remittances from relatives	42.7%	44.6%	43.5%
Income from sesame sales	82.9%	64.7%	75.4%
Income from sales of other crops	55.8%	60.4%	57.7%
Income from non-agricultural business	15.1%	20.9%	17.5%
Loans from formal financial institutions (e.g. bank, Micro-finance institution)	3.0%	2.2%	2.4%
Loans from informal financial institutions (e.g. money lender, Village Savings and Loans Association,)	4.5%	7.9%	5.9%
Grants (financial and material) from NGO	0.0%	0.0%	0.0%
Gathering and Selling of Non-Timber Forest product	0.0%	0.0%	0.0%
Savings from salary/wages	4.5%	7.9%	5.9%
Income from fishing activities	5.5%	5.8%	5.6%
Petty trading	24.6%	22.3%	23.7%
Commercial business	15.6%	12.9%	14.5%
Other (specify)	0.0%	0.0%	0.0%
Not applicable/did not purchase	0.0%	0.0%	0.0%

Source: Household survey data, 2025

Protective/Household Assets

Ownership pattern: As of January 2025, women owned the following major household/protective assets: plastic chairs (91.5%), sponge mattress (81.6%), mobile phone (81.5%), table-small (75.9%), bed-wooden/metallic (71.9%), radio (63.2%), chairs-wooden (48.8%), stove-charcoal/traditional (46.2%), solar panel (36.9%) and Table-dinning/large (15.5%). Overall, the ownership of such household assets as table (small), bed-wooden/metallic, sponge mattress, radio, solar panel, mobile phones and stove-charcoal/traditional were lower among women compared to men across the study areas in Magwi County. UNHCR (2018) pointed out that, among the refugees and asylum seekers in the Tongogara Refugee Camp (TRC), Chipinge District, Zimbabwe, the consumer durables owned by households include blankets and water containers (100%), cooking pots and pans (84.5%) and chairs (80.1%), table (49.7%), mattress (33.4%), radio wireless and kerosene/paraffin stove (24.6%), solar panel (7.9%), and sewing machine. Similarly, in South Sudan, the ownership of semi-durable and durable assets among households were as follows: television/sat. dishes (6.4%), radio (32.0%), phones (25.7%), computer (1.2%), refrigerator (1.7%), fan (2.2%), and Air conditioner (0.9%). In the study area, women ownership of households' assets was as follows; table-small (75.9%:), chairs-wooden (48.8%), mattress (81.6%) and solar panel (36.9%) (Lokosang et al., 2014). Whereas, in Tongogara Refugee Camp (TRC) the assets owned were as follows: table (49.7%), chairs (80.1%), mattress (33.4%) and solar panel (7.9%) (UNHCR, 2018). On the other hand, women ownership of such semi durable and durables assets like mobile phones (81.5%) and radio (63.2%) were higher across the study areas compared to those of South Sudan at 25.7% for phones and 32.0% for radios. However, the ownnership of refrigerators at 1.7% for South Sudan was higher compared to that owned by women in the study area at 0.6%%.

Table 21: Ownership of household/protective assets, by households across the study area

Household assets	Male		Female		Total	
	Frequency	%	Frequency	0%	Frequency	%
Table (small)	216	90.0%	126	75.9%	343	84.3%
Sofa set	33	13.8%	10	6.0%	43	10.6%
Bed-wooden/metallic	202	83.8%	120	71.9%	322	78.9%
Chairs (plastics)	210	87.1%	162	91.5%	363	88.8%
Chairs (wooden)	110	46.0%	82	48.8%	192	47.2%
Sponge mattress	224	93.3%	137	81.6%	361	88.5%
Refrigerator	5	2.1%	1	0.6%	6	1.5%
Radio	118	64.5%	141	63.2%	259	63.8%
Stove-charcoal (traditional)	129	69.7%	103	46.2%	232	56.8%
Solar panel	148	62.4%	62	36.9%	210	51.8%
Mobile phone	213	89.1%	137	81.5%	350	86.0%
Table (dinning/large)	59	24.7%	26	15.5%	85	20.9%
Electric generator	8	3.4%	3	1.8%	11	2.7%

Source: Household survey data, 2025

Main sources of money for purchase protective/household assets in the 24 months: The four main sources of money used by women to purchase the protective/household assets were from: sales of sesame (67.9%), sales of other crops (64.9%), sales of livestock (64.3%) and remittances from relatives (44.0%). More females than males sourced their money for purchases of household assets from sales of other crops, sales of livestock and remittances from relatives. The findings of the survey highlights that incomes from the sales of sesame crop was the prime contributor to acquisition of protective/household assets among women farmers in the study areas in Magwi County.

Table 22: Main sources of money used by households for purchase of protective/household assets

Main sources of money used by households to purchase protective/household assets in the past 24 months (December 2020-November 2024	Male	Female	Total
Income from livestock sales (goats. sheep, poultry, pigs)	53.8%	64.3%	58.1%
Remittances from relatives	40.4%	44.0%	41.9%
Income from sesame sales	79.2%	67.9%	74.5%
Income from sales of other crops	60.4%	64.9%	62.3%
Income from non-agricultural business	18.8%	20.2%	19.4%
Loans from formal financial institutions (e.g. bank, Micro-finance institution)	1.3%	1.2%	1.2%
Loans from informal financial institutions (e.g. money lender, Village Savings and Loans Association,)	2.9%	7.1%	4.7%
Grants (financial and material) from NGO	0.4%	1.2%	0.7%
Gathering and Selling of Non-Timber Forest product	--	--	-
Savings from salary/wages	19.6%	23.2%	21.1%
Income from fishing activities	5.0%	4.8%	4.7%
Petty trading	25.8%	25.0%	25.5%
Commercial business	16.7%	13.7%	15.4%
Other (specify)	0.0%	0.6%	0.2%
Not applicable/did not purchase	3.8%	2.4%	3.2%

Source: Household survey data, 2025

Condition of housing/dwelling for women farmers (January 2025)

Roofing materials of main house

On the types of major roofing materials 94.6% of females compared to 81.3% males had thatch/grass. Whereas only 4.8% of females unlike 18.3% of men had metal/iron sheet roofs. Note that increased use by households of metal/iron sheet for roofing is a proxy indicator of improvement in their incomes. Generally, with more money in their hands households are more likely to use metal/iron sheet roofing, an indication of improved standards of living. The results of this study point to the lower socioeconomic status of women vis-avis men in terms of roofing materials used. Note that having a house with metal/iron denotes higher social status across the study areas in Magwi County.

Table 23: Major roofing materials of main house as of January 2025 across the study areas

Type of roofing materials	Male		Females		Total	
	Frequency	0%	Frequency	0%	Frequency	0%
Thatch/grass	196	81.3%	**159**	94.6%	355	86.8%
Metal/iron sheet	44	18.3%	**8**	4.8%	52	12.7%
Tiles	1	0.4%	**0**	0.0%	1	0.2%
Plastic sheeting	0	0.0%	**1**	0.6%	1	0.2%
Total	**241**	**100%**	**168**	**100%**	**409**	100%

Source: Household survey data, 2025

Floor materials of main house

Regarding the major floor materials of the main house, 92.8% of females as opposed to 76.3% males had dirt/mud/sand floors. On other hand, only 4.8% women in contrast with 18.3% men had concrete/stone/cement floors. The results again indicate the lower social status of women compared with men in the standard of housing as reflected in the types of floor materials used.

Table 24: Major floor materials of main house as of January 2025 across the study areas

Type of roofing materials	Male		Female		Total	
	Frequency	0%	Frequency	0%	Frequency	0%
Dirt/mud/sand	184	76.3%	156	92.8%	340	83.1%
Wood	2	0.8%	3	1.8%	5	1.2%
Concrete/stone/cement	44	18.3%	8	4.8%	52	12.7%
Tiles/bricks	11	4.6%	1	0.6%	12	2.9%
Total	**241**	**100%**	**168**	**100%**	**409**	100%

Source: Household survey data, 2025

Wall materials of main house

About 29.2% of women compared with 39.8% men used burnt brick for walling their main house. On the other hand, 70.2% of women unlike 58.9% of men had their main house walled with mud bricks (sundried/not burnt). The results denote the poor quality of the main houses owned by women in that more of them used mud brick (sundried/not burnt) for wailing as opposed to burnt bricks. This again reflects their lower socioeconomic status of women in the standards of their main house in comparison to men across the study areas in Magwi County.

Table 25: Major wall materials of main house as of January2025 across the study areas

Type of roofing materials	Male		Female		Total	
	Frequency	0%	Frequency	0%	Frequency	0%
Burnt bricks	96	39.8%	49	29.2%	145	35.5%
Mud brick (sundried/not burnt)	142	58.9%	118	70.2%	260	63.6%
Stone wall	0	0.0%	1	0.6%	1	0.2%
Cement blocks	3	1.2%	0	0.0%	3	0.7%
Total	**241**	**100%**	**168**	**100%**	**409**	100%

Source: Household survey data, 2025

Changes in the condition of housing of women farmers

On changes in the conditions of their housing, 35.7% of women compared to 46.1% of men indicated that it had improved. However, 47.6% said it had remained the same, while 16.7% of women pointed out that the conditions of their housing and amenities had not improved over the period December 2022 to November 2024.

Table 26: Perceived changes in the conditions of housing and amenities across the study areas

Changes in the condition of your housing and amenities Now compared to two years ago	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Improved	111	46.1%	60	35.7%	171	41.8%
About the same	93	38.6%	80	47.6%	173	42.3%
Did not improve	35	14.5%	28	16.7%	63	15.4%
Don't know	2	0.8%	0	0.0%	2	0.5%
Total	**186**	**100%**	**223**	**100%**	**409**	100%

Source: Household survey data, 2025

Main sources of money women used to make improvements in the condition of their housing: As shown in the Table below, 54.2% of women commented that income from livestock sales was the prime source of money they used to make improvements in the condition of their housing and amenities in the past 24 months (December 2022-Novembe 2024**).** The second source was income from sesame sales (53.0%) followed by income from sales of other crops (46.4%) and remittances from relatives (36.1%). The findings of the study show that was money obtained from the sales of sesame was the second most important source used by women to make improvements in the conditions of their housing.

Table 27: Sources of money used for improvements in the condition of their housing and amenities

Main sources of money used by households to make improvements in the condition of their housing and amenities	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Income from livestock sales	106	44.0%	90	54.2%	196	48.2%
Remittances from relatives	74	30.7%	60	36.1%	134	32.9%
Income from sesame sales	146	60.6%	88	53.0%	234	57.5%
Income from sales of other crops	108	44.8%	77	46.4	185	45.5%
Income from non-agricultural business	26	10.8%	25	15.1%	51	12.5%
Loans from formal financial institutions (e.g. bank, Micro-finance institution)	5	2.1%	5	3.0%	10	2.5%
Loans from informal financial institutions (e.g. money lender, Village Savings and Loans Association,)	5	2.1%	9	5.4%	14	3.4%
Gathering and Selling of Non-Timber Forest product	1	0.4%	0	0.0%	1	0.2%
Savings from salary/wages	37	15.4%	21	12.7%	58	14.3%
Income from fishing activities	12	5.0%	9	5.4%	21	5.2%
Petty trading	46	19.1%	32	19.3%	78	19.2%
Commercial business	26	10.8%	20	12.0%	46	11.3%
Other	1	0.4%	0	0.0%	1	0.2%
Not applicable/did not purchase	63	26.1%	42	25.3%	105	25.8%
Total	**241**		**166**		**407**	

Source: Household survey data, 2025

4. 4 Constraints that limit assets creation among women and proposed gender-responsive strategies to overcome identified barriers and maximize women's opportunities for sustainable asset creation in the study area

Prevailing constraints and challenges in sesame production

Based on their importance and as reported by women farmers, the eight main events that seriously affected sesame farming in the past two years included the following: lack of ox-plough (60.2%), pests and crop diseases (59.6%), limited access to land (54.2%), poor soil fertility (51.2%), lack of access to ox-ploughing services (49.4%), shortage of labor (47.0%) and lack of/ or poor road infrastructure (39.8%), and variable rain/drought/dry spells (35.5%). Other events of importance that affected sesame farming were heavy weed infestation (30.7%), erratic rainfall (38.6%), lack of access to high quality sesame seeds (34.9%), lack of knowledge on good agricultural practices (34.3%), excessive rains/flooding and shortage of storage facilities at 31.3% each, the high cost of improved sesame seeds (29.5%)%), land for farming too far away and the absence of extension service/technical support at 28.9% each. More females in comparison to males faced challenges of limited access to land, lack of access to ox-ploughing services and the lack of own ox-plough. Globally, for South Sudan, the reported crop production challenges include plant diseases (65%),heavy weed infestation (37%), shortage of agricultural tools (34%), high cost of seeds (34%) and plant pests (33%), shortage of seeds in the market (22%), uncontrolled grazing of animals (18%), floods/too much rains (14%:) and the lack of tractors and other machinery for hire (11%) (WFP, FAO and UNICEF, 2025). The major abiotic and biotic constraints to sesame production in Eastern and Southwestern Ethiopia identified included lack of access to improved seeds (82.5%), low yield (73.75%), insect pests (59.38%), weeds (47.50%), high cost of seeds (50.0%) and low quality seeds (41.86%) and climate change (40.0%) (Teklu Desawi Hdru et al., 2021). Conversely, in Northern Kordofan South Sudan, women cultivate food crops (sorghum and millet:) and cash crops (groundnuts, sesame and rosella). However, the main problems that constrain the role of women in crops production and food security include the lack of extension services (94%), insects and pests' infestation (91%), high illiteracy rate of women farmers and lack of access to formal credit at 59%) insufficient access to land and insufficient and fluctuating rainfall at 19% respectively (Ahmed Adam Elhag et al., 2012). In the northern region of the Republic of Benin extension workers only work with farmers that grow national cash crops such as cotton, rice, cashew nuts etc. Whereas, the majority of the sampled farmers are unable to get information about the most recent advancements in agricultural technology, pest control, and the appropriate and timely application of agricultural inputs for growing sesame (Dossa Kossivi Fabrice et al., 2023). As for Sub-Saharan Africa, the challenges faced by Smallholder Farmers include: climate change (high temperatures, droughts, bush fires, floods, soil salinity, and shifts in the onset and end of the rainy season); limited and/or inadequate access to capital assets for sustainable and adequate food production (natural, physical, financial, and human) and; poor road network (Kamara Alie et al. (2019).

Nonetheless, the challenges of fluctuation and insufficiency rainfall faced by women farmers in Northern Kordofan could be resolved by adopting water harvesting techniques as well as growing drought resistant and early maturing varieties of food and cash crops. (Ahmed Adam Elhag et al., 2012). Whereas, in Eastern and Southwestern Ethiopia there is the imperative need to improve the sesame value chain through incorporating improved and high-yielding varieties into the formal seed system, more expansive use of the best agronomic practices and strengthening the extension services. These attributes can motivate farmers to produce higher quantities of better-quality seed to the market. On the other hand, demonstrating improved varieties with the full package of agronomic practices through on-farm trials and FTCs, strengthening the extension services, and increasing availability of sesame seeds through engaging government seed enterprises and private seed producers would boost sesame production and productivity in the study areas (Teklu Desawi Hdru et al., 2021).

Table 28: Constraints and challenges in sesame production across the target areas in Magwi County

Events that seriously affected sesame farming	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Limited access to land	100	41.5%	90	54.2%	190	46.7%
Lack of access to ox-ploughing services	107	44.4%	82	49.4%	189	46.4%
Lack of own ox-plough	130	53.9%	100	60.2%	230	56.5%
Shortage of labor	123	51.0%	78	47.0%	201	49.4%
Poor soil fertility	96	39.8%	85	51.2%	181	44.5%
Erratic rainfall	98	40.7%	64	38.6%	162	39.8%
Pests/crop diseases	147	61.0%	99	59.6%	246	60.4%
Excessive rains/ flooding	99	41.1%	52	31.3%	151	37.1%
Variable rain/drought/dry spells	110	45.6%	59	35.5%	169	41.5%
Lack of access to high quality sesame seeds	103	42.7%	58	34.9%	161	39.6%
Absence of extension service/technical support	88	36.5%	48	28.9%	136	33.4%
Lack of knowledge on good agricultural practices	97	40.2%	57	34.3%	154	37.8%
Shortage of storage facilities	94	39.0%	52	31.3%	146	35.9%
Death or loss of draught animals/oxen	54	22.4%	36	21.7%	90	22.1%
Increased prices of on-farm inputs (sesame seeds, hand tools, etc.	84	34.9%	37	22.3%	121	29.7%
Human disease epidemic	76	31.5%	47	28.3%	123	30.2%
Heavy weed infestation	112	46.5%	51	30.7%	163	40.0%
Violent conflict in the community	47	19.5%	34	20.5%	81	19.9%
Land for farming too far away	97	40.2%	48	28.9%	145	35.6%
Conflict over access to land for cultivation	52	21.6%	42	25.3%	94	23.1%
Land being take away by foreigners	50	20.7%	34	20.5%	84	20.6%
Lack of/ or poor road infrastructure	125	51.9%	66	39.8%	191	46.9%
High cost of improved sesame seeds	93	38.6%	49	29.5%	142	34.9%
Damage to growing sesame crop from strong wind	91	37.8%	43	25.9%	134	32.9%
Inadequate access to credit/loans	77	32.0%	35	21.1%	112	27.5%
Pilfering/theft	76	31.5%	32	19.3%	108	26.5%
Limited own capital	59	24.5%	23	13.9%	82	20.1%
None	22	9.1%	7	4.2%	29	7.1%
Don't know	4	1.7%	4	2.4%	8	2.0%

Source: Household survey data, 2025

Challenges in sesame value addition/simple processing

The main constraints to sesame processing faced by women were the lack of access to simple processing equipment (65.3%), limited access to semi-industrial processing machines (59.9%) and poor knowledge on postharvest handling and value addition (57.5%), the lack of postharvest handling equipment such solar driers (37.7%) and lack of tarpaulins for drying sesame seeds (25.1%). It was reported that in Mozambique, there is poor post-harvest practices among smallholder farmers resulting in excess of humidity. Smallholders do not clean and sort the sesame due to poor post-harvesting handling practices such as farm-level threshing against the ground, which introduces extraneous material (USAID, 2016). On the other hand, in Senegal and Mali, local processing of sesame seeds into oil is rudimentary and limited (Dossa et al., 2017). Whereas, in Northern Uganda, sesame farmers have poor knowledge on postharvest handling and value addition and also lack postharvest handling equipment such solar driers, tarpaulins for drying, gunny bags, and even traditional granaries for their produce (Dalipagic and Elepu, 2014).

Table 29: Constraints to value addition/processing of sesame seeds among households

Constraints to processing of sesame seeds	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Limited access to semi-industrial processing machines (sesame oil/paste processing machine)	146	61.1%	100	59.9%	246	60.6%
Lack of simple processing equipment for home processing (manual sesame paste makers)	163	68.2%	109	65.3%	272	67.0%
Poor knowledge on postharvest handling and value addition	123	51.5%	96	57.5%	219	53.9%
Lack of postharvest handling equipment such solar driers,	82	34.3%	63	37.7%	145	35.7%
Lack of tarpaulins for drying,	48	20.1%	42	25.1%	90	22.2%
Not applicable	54	13.3%	27	6.7%	81	20.0%

Source: Household survey data, 2025

Marketing challenges

About 60.5% of women compared to 60.0% indicated that they faced difficulties in finding buyers for their sesame. The main challenges faced by women farmers in marketing of their sesame were: the lack of or/poor road infrastructure (58.8%), low price of sesame (57.5%), transport cost too high (55.0%) and no reliable information about the market for sesame (53.1%), lack of and/or low demand for sesame (45.0%); taxes too high (40.6%); price fluctuations (35.0%); high losses during transport (32.5%); long distances to markets, the lack of properly constructed market center/structure, the lack of access to means of transportation and the lack of appropriate storage facility at 30.6% respectively; loses due to store pests, lack of access to loans/credit facilities, lack of own capital/finance and limited knowledge on agricultural marketing at 26.9. % respectively. For South Sudan, WFP, UNICEF and FAO (2025) maintained that the most common challenges faced by households when accessing the markets included long distances to the market (60%), struggles to carry purchased items from the market (27%), inaccessibility to the market due to flooding (11%), and insecurity along the way to the market (10%). Among households with access to markets, roughly 19% travel for more than half a day to reach the market. Travel time were particularly long in Eastern Equatoria, Jonglei, and Upper Nile States of South Sudan. Whereas, in the study areas in Eastern and Southwestern Ethiopia, there were no market infrastructures or market information delivery systems, and the growers were forced to sell their produce at a lower price. The market value chain is not well-developed, which often highly discourages farmers from producing the crop (Teklu Desawi Hdru et al., 2021). Generally, Hine J. L et al. (2001) asserted that if transport services are infrequent, of poor quality or expensive then farmers will be at a disadvantage when they attempt to sell their crops. In Zambia, transport operating costs, are higher on rough roads than on good quality bitumen roads and generally this will be reflected in passenger fares and freight tariffs. On the other hand, the difficulties faced by farmers in accessing markets are due to the poor road network, lack of other transport modes and nuisance taxes and charges, including bribes and the lack of a critical mass of farmer and rural producer associations as a means of entering the market place with the aim of minimizing the cost of inputs, accessing loan finance at affordable rates and influencing farm-gate prices (Ndwiga Juliek (2018). On the other hand, rural roads promote

agricultural produce marketing through rapid and frequent access to market centers, accelerated delivery of farm inputs and products, easy movement of people, increased production and productivity, crop diversification and increased profitability. Without an efficient road network, movement of people and agricultural produce are impeded hence stifling agricultural and economic growth (Hine et al., 2001; cited in Morgan Anthony Kwame et., 2019.).

In Ghana, an improvement of rural road systems and transport services in general for many farming communities means improved access to market centers and expedite domestic and international trade (for communities sharing borders with neighboring countries (Morgan Anthony Kwame et., 2019). Moreover, a well-aligned transport logistics is necessary for efficiency in marketing (CASA,2020). Improving infrastructure, finance, and property rights can deliver broad benefits across the community. For example, improving roads helps firms get their goods to market—but it also helps poor people obtain access to health, education, and other services, and connects them to other communities (World Bank, 2004). In Kenya government has attempted to improve the enabling environment for agribusiness by expanding and upgrading the infrastructural facilities, providing and improving water, electric power, sewers and sanitation, telecommunication facilities and roads (FAO, 2008)

Table 30: Challenges faced by households in marketing of sesame seeds across the study areas

Difficulties in finding buyers when you wanted to sell your sesame seeds Now (January 2025)-by sex of household head	**Male**		**Female**		**Total**	
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**
Yes	144	60.0%	101	60.5%	245	60.2%
No	95	39.6%	63	37.7%	158	38.8%
Did not sell	1	0.4%	3	1.8%	4	1.0%
Total	**240**		**167**		**407**	
Challenges in marketing your sesame seeds in the past 2-3 months (Nov-Dec 2024 to January 2025)?	**Male**		**Female**		**Total**	
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**
No reliable information about the market for sesame	133	58.1%	85	53.1%	218	56.0%
Lack of and/or low demand for sesame	115	50.2%	72	45.0%	187	48.1%
Lack of or/poor road infrastructure	155	67.7%	94	58.8%	249	64.0%
Low price of sesame	142	62.0%	92	57.5%	234	60.2%
Brokers interference with sales	86	37.6%	45	28.1%	131	33.7%
Transport cost too high	142	62.0%	88	55.0%	230	59.1%
Lack of access to means of transportation.	89	38.9%	49	30.6%	138	35.5%
Too much insecurity	67	29.3%	40	25.0%	107	27.5%
Lack of appropriate storage facility	91	39.7%	49	30.6%	140	36.0%
Taxes too high	121	52.8%	65	40.6%	186	47.8%
Lack of access to loans/credit facilities	80	34.9%	43	26.9%	123	31.6%
Lack of own capital/finance	82	35.8%	43	26.9%	125	32.1%
Limited knowledge on agricultural marketing	82	35.8%	43	26.9%	125	32.1%
Traders using inaccurate weights and measures	74	32.3%	36	22.5%	110	28.3%
Long distances to main market	94	41.0%	49	30.6%	143	36.8%

Loses due to storage pests	93	40.6%	43	26.9%	136	35.0%
High losses during transport	102	44.5%	52	32.5%	154	39.6%
Price fluctuations	100	43.7%	56	35.0%	156	40.1%
Lack of properly constructed market center/structure	93	40.6%	49	30.6%	142	36.5%
Lack of information on quality standards	77	33.6%	38	23.8%	115	29.6%
Theft/pilferage	76	33.2%	40	25.0%	116	29.8%
No problem	34	14.8%	16	10.0%	50	12.9%
Others	0	0.0%	1	0.6%	1	0.3%
Don't know	3	1.3%	4	2.5%	7	1.8%
Count	**229**		**160**		**389**	

Source: Household survey data, 2025

4.5 Gender-responsive strategies and policy recommendations to overcome identified barriers and maximize women's opportunities for sustainable asset creation and economic empowerment within the sesame value chain in the study area.

The proposed strategies and policy recommendations to alleviate constraints faced by women farmers on account of their participation in the sesame value chain delved particularly on the production, value addition and marketing aspects.

Sesame production

This study recommends that the government, NGOs and development should consider the following course of actions to improve the production and yields of sesame for women farmers and thereby enabling them to realise surplus products for the market. The increased incomes from sales of the sesame is expected to be used to achieve the goal of increased assets creation and women economic empowerment

1) Training of women farmers in integrated pest management and improved disease control methods including on the production and use of organic pesticides using available local materials
2) Promote and support the application of Climate Smart Agriculture (CSA) in the smallholder sesame production. Encourage women farmers to use approved certified high yielding sesame seeds that are drought tolerant for improved production and productivity
3) Encourage women farmers to organize themselves in groups or association/cooperatives for collective procurement of inputs such as certified sesame seeds, hand tools and implements, bagging/packaging materials and agro-chemicals for members. The cooperative will in addition enable members have improved access to finance and extension/advisory and related services
4) Support Agro- dealers/village stockists with seed money to procure and avail quality seeds, tools, packaging materials, fertilisers, pesticides etc. to women famers on credit. The loans to be recovered from the proceeds of the sesame crops sold through the input dealers or repaid through other means.
5) Facilitate the establishment of Farmer Field Schools (FFS) which are important venues for practical learning, where women farmers learn through hand on practice and compare the technology with their traditional ones and hopefully adopt in their farming practices for increase sesame yields and production.
6) To counter the limitations of inadequate availability of own labor and high cost of hired labor, facilitate the establishment of ox-traction groups among the young women farmers. Train women farmers on land preparation using animal draught power and provide them with revolving fund for accessing oxen ploughs and other related inputs.
7) The County Agriculture Department to select and train female extension agents to provide effective extension and rural advisory services to women farmers through a variety of extension methods including radio, ICT, farmer field schools, method and result demonstrations, exposure visits and field days.
8) Support and strengthen the village savings and loans association to enable women farmers save money and obtain low interest loans for investments in sesame agri-business or purchases of productive and protectives assets

Value addition/simple processing of sesame seeds

The following interventions to be considered by the government and NGO partners in regards to building the

capacity of women farmers in value addition for sesame

1) Improved access of women to postharvest handling equipment and materials such solar driers, tarpaulins/plastic sheets
2) Training for women farmers on the proper drying of sesame on tarpaulins/plastic sheets to avoid pollution with stones, earth and dust which compromise sesame quality.
3) Support women farmers to construct large open concrete dryers so as to obtain good quality sesame seeds for the market.
4) Capacity building for women to enhance their knowledge, skills and practices on improved methods of postharvest handling and value addition/processing
5) Currently women largely buy imported oil from the market, they need to be equipped with semi-industrial processing machines (sesame oil/paste processing machine) for local processing of sesame seeds into paste/butter and unrefined sesame oil for the market.

Marketing of sesame

The study recommends the government, NGOs and development to consider the following course of actions to improve the marketing of sesame to achieve the goal of women economic empowerment:

1) Initiate and support the formation of smallholder women marketing cooperatives and encourage them to embark on collective output marketing
2) Establish a national marketing information system that ensures structured dissemination of information on improved production practices, market intelligence, value addition, better post-harvest handling and demands on quality and standards in different markets as this could lead to better returns to traders and farmers.
3) Facilitate enhanced market access to organised women farmers' groups through innovative means such as online farmer's markets or creating linkages with private sector including wholesalers, processors exporters, schools, hotels/restaurant among others at the county, state and national levels with the aim of improving their incomes.
4) Assist the women marketing cooperatives in the construction of off-farm storage facilities and train them on proper stores management including the control of storage pests to reduce losses. Improved storage will enable women to keep and sell their crops during the off season when prices are more favorable and remunerative
5) Ensure improved access of women farmers to timely and reliable market information on prices of sesame at different markets, sesame quality standards, market place information, demand/potential buyers' information and supply/suppliers information, grading and labeling, phyto-sanitary and the certification for sesame seeds and processed products.
6) There is the imperative need to strengthen the cooperative movement in Magwi County by establishing cooperative union and support the cooperatives with logistics and finance in addition to building their human and institutional capacity
7) The government to increase investment in public physical infrastructures and facilities including village market access roads, market centers, off-farm storage and oil seeds processing units.

5. Conclusion

This study set out to analyze women's participation in the sesame value including production, value addition and marketing. It also assessed the extent of assets creation and the types of assets owned by small holder women farmers in the study area as a result of their participation in the sesame value chain. In addition, this study probed into the challenges along the sesame value that limit value creation among women and suggested strategies to alleviate and/or remove the challenges and constraints.

This study revealed that the majority (86.2%) of women are in 25-54 years bracket and this is the group that is most active in sesame production in the study areas. On education, 79.1% of women attained primary to secondary education indicating good literacy level, implying increased ability to read and comprehend print messages on improved agricultural practices. The majority (98.2%) of smallholder women cultivated sesame in 2024 and their average years of experience in sesame growing was 5.9 years. About 83.9% of women indicated that their main reasons for engaging in sesame farming was to provide food for household consumption, while 75.0% cited the crop as being the main sources of household income. There was no problem for women accessing farming land across the study areas as 93.5% indicated owning arable land. Regarding the methods of land preparation, 36.3% of women used oxen/animal draught. On the types of seeds used the majority 91.6% of women planted own recycled sesame. The average areas planted in 2024 were 5.49 Feddans (2.3 Hectares) for women. From the mean areas planted with sesame in 2024 the estimated average yield was 200.3 kg/Feddan

(477 kg/hectare)

Women undertook value addition to the raw sesame seeds including drying, winnowing and cleaning of seeds, post-harvest handling and storage, sorting and grading of sesame seeds and the processing of sesame seeds into paste/butter and unrefined oil. About 41.9% of women carried out the processing of sesame seeds into paste/butter while only 6.6% extracted unrefined oil from the raw sesame seeds. In relation to marketing, the majority 98.8% of households across the study areas sold their sesame seeds individually, while only 1.2% sold their sesame through farmers' groups or cooperative. The average income obtained from the sales of sesame seeds by women within the three months of November 2024 to January 2025 was SSP 974,700 SSP. The findings of this study therefore pointed out that through their participation in the sesame value chain women sold their sesame and obtained incomes which enable them to accumulate physical assets at the household levels including productive assets, livestock, means of transport and protective/household assets. In addition, with the incomes they obtained from the sales of sesame, women made structural improvements to the roof, wall and floor of their main house.

The main livestock asset acquired and owned by women farmers were chickens (78.0%); goats (61.1%); cattle (33.5%); ducks (30.1%); sheep (28.7%); oxen for ploughing (27.7%); and pigs (21.0%. The three main source of income used for livestock purchases were from the sales of sesame (60.5%), the sales of other crops (49.1%) and the sales of livestock (52.1%). Conversely, the physical productive assets owned by women were hoes, axe, Panga, slashers, rakes and sickles, spades/shovels, wheelbarrows, ox-ploughs and pickaxes. Whereas, the means of transport acquired by women included bicycles (46.7%), motorcycles (42.4%), tri-cycle and car at 1.2% each and lorry at 0.6%. The three main sources of income used by women to purchase means of transport during the period December 2022-November 2024 were from sales of sesame (64.7%), livestock sales (69.8%%) and sales of other crops (60.4%). The major household/protective assets owned by women were plastic chairs (91.5%), sponge mattress (81.6%), mobile phone (81.5%), table-small (75.9%), bed-wooden/metallic (71.9%), radio (63.2%), chairs-wooden (48.8%), stove-charcoal/traditional (46.2%), solar panel (36.9%) and Table-dinning/large (15.5%). The three main sources of money used by women to purchase the protective/household assets were from sales of sesame (67.9%), sales of other crops (64.9%) and sales of livestock (64.3%)

Concerning the improvements women made to their main house, only 4.8% of women had metal/iron sheet roofs and only 4.8% had concrete/stone/cement flour, while 29.2% had the walls of the main house made of burnt bricks. The main sources of money used by women to make improvements in the structures of their main houses were from livestock sales (54.2%), the sales of sesame (53. 0%) and the sales of other crops (46.4%). Thus the income from the sales of sesame seeds was the second most important source of income used by women to make improvements in the conditions of their main houses.

Nonetheless, despite the benefits to women from the income they obtained from sales of sesame and its use in acquiring productive, livestock and household assets and means of transport as well as making improvements to the structures of their main houses they encountered challenges in sesame production, value chain addition/simple processing and marketing of the sesame crops. The major production challenges of women farmers included the lack of lack of ox-plough/ ox-ploughing services, pests and crop diseases, poor soil fertility, shortage of labor, lack of/ or poor road infrastructure and variable rain/drought/dry spells, heavy weed infestation, erratic rainfall, lack of access to high quality sesame seeds, lack of knowledge on good agricultural practices, excessive rains/flooding and shortage of storage facilities and the absence of extension service/technical support. The major challenges in value addition/simple processing of sesame experienced by women included the lack of access to simple processing equipment, limited access to semi-industrial processing machines and poor knowledge on postharvest handling and value addition, the lack of postharvest handling equipment such solar driers and tarpaulins. Conversely, the marketing challenges for women include the lack of or/poor road infrastructure, low price of sesame and the lack of and/or low demand for sesame, the high cost of transport, no reliable information about the market for sesame, taxes too high, price fluctuations, high losses of sesame seeds during storage and transport, long distances to markets and the lack of properly constructed market center/structure. Other constraints included the lack of access to loans/credits and the lack of own capital/finance.

Overall, this study provides evidence that the participation of smallholders' women farmers in the sesame value chain enabled them to produce sesame the incomes from which they used to acquire productive assets, livestock, means of transport and protective/household assets. The incomes were also used by women to make improvement in the conditions of their main houses. Based on the challenges faced by women at the level of production, value addition and marketing across the study areas, there is the imperative need for the government and development partners to formulate and implement appropriate polices and strategies designed to strengthen

the capacity of smallholder women farmers and relevant institutions to support the sesame value chain at the production, value addition/processing and marketing levels to maximise opportunities for sustainable assets creation at household levels among smallholder women farmers in Magwi County.

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