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# **Gender Analysis of Maize Post-Harvest Management in Zambia: A Case Study of Chipata and Katete Districts**

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## **Executive Summary**

The International Maize and Wheat Improvement Center (CIMMYT) is a non-profit research and training institution dedicated to both the development of improved varieties of maize and wheat and the introduction of improved agricultural practices to farmers, thereby improving their livelihoods. This is a study on gender analysis for maize post-harvest management in Zambia. CIMMYT started a pilot post-harvest management project called Effective Grain Storage Project phase 1 (EGSP-I) in Kenya and Malawi. The second phase (EGSP-II) was initiated in 2012 to 2015, in two other countries Zambia and Zimbabwe to consolidate efforts from the phase one countries (Kenya and Malawi). The EGSP-I and EGSP-II projects for both pre- and post-harvest activities aimed at reducing post-harvest losses (PHL), increased incomes, and enhanced food security with the funding from Swiss Agency for Development and Cooperation (SDC).

The purpose of the study was to investigate on the dynamic nature of gender relations by understanding the cultural and symbolic dimensions of gender and how they are invoked in specific post-harvest actions, rights and responsibilities and power. In addition, the study identified knowledge gaps in the existing literature. The study gathered data from both secondary and primary sources. In the former data was generated from program documents including annual and quarterly reports, policy and activity reports. Primary data was generated using the following tools: (i) Interview guide for community focus group and key informants interview, (ii) Gender audit and in-depth interview guide for implementing partners, (iii) Case study profiling for households and, (iv) Artisans' interview guide. In addition, information was collected on knowledge gaps on gender analysis for maize post-harvest management.

Information from Focus group discussions (FGDs) was collected from the following areas: Chipata and Katete districts of Zambia. In Chipata specifically the study was in Kamlaza area and respondents were drawn from Kuzani village. In Katete as well the study was in Chimutende area and respondents came from the following surrounding villages Chikwanda, Chipapika and Sambila. The two districts were purposively sampled with the assistance of Chipata's and Katete's District Agricultural Extension Officers who was familiar with these agricultural camps.

A total of 18 FGDs were carried out, 8 in Chipata and 10 in Katete. The male FGDs were classified as follows: male FGDs divided as: single male-headed households and married male-headed households. The same categories were applicable for female FGDs as: single female headed households and married women. For youths the FGDs were divided as follows: single youth male-headed households and married youth male-headed households. The same categories were applicable for the youth females as: single youth female-headed households and married youth women.

Key informant interviews (KII) sample was also purposely sampled from the following groups: agricultural extension officers at camp level, traditional leadership (one from each area) and polygamous marriages. Three individuals were interviewed in any polygamous marriage, the husband, and the wives. In Kamlaza area in Chipata district there was no polygamous household, while in Katete district several households were polygamous. Four households were interviewed, three male-heads of households with their two wives and in one household the male-head of household was not available, resulting in the two wives being interviewed without their husband.

Gender audits were carried out in three partner institutions that collaborated with CIMMYT to undertake the EGSP activities in Zambia. The key partners are, the Ministry of Agriculture and Livestock (MAL) with the Department of Mechanization, Katopola Farmer Training Institute and Zambia Agriculture Research Institute (ZARI). At the MAL headquarters, the coordinator of the metal silo activities was interviewed. At the provincial offices in Chipata one officer who directly deals with the EGSP activities was interviewed. At each district two officers who directly work with the EGSP were interviewed. At the camp level data was collected from camp agricultural extension officers. Under MAL a total of eight officers were interviewed. Key documents were also collected and gender analysis was done. Two officers were interviewed at ZARI. At Katopola Farmer Training Institute one officer involved in training the Artisans in fabricating metal silos was interviewed. Key documents were collected and a gender analysis was conducted. A total of eleven officers and three institutions were audited.

The artisan's guide was used to gather information from eleven artisans. Five were based in Chipata while six were operating from Katete. Information was also obtained from households that had already adopted the metal silos.

The key findings from the gender analysis study in Chipata and Katete districts were:

- Ethnic groups in Chipata and Katete are Ngoni's, Nsenga's and Chewa's. Intermarriages have diluted ethnicity, resulting in no major differences in findings from the two areas except for polygamous marriages that were found in Katete. Women from polygamous marriages had more decision making power compared to women from monogamous marriages. Single women whether young or old were independent in their decision making process,
- Cultural inhibitions and gender roles hindered female youths from accessing information on PHM. Knowledge on PHM was high in older women, men and male youths,
- Traditionally granary (*nkhokwe*) belonged to women because of their gender roles of preparing food for the family. Men were responsible for the construction of the granary but women controlled the maize stored,
- The introduction of metal silos has brought different dimensions in the ownership and control of maize stored in households in Zambia. For instance men are taking over from women's traditional role of controlling maize and in some cases conflicts within households. While in other households metal silo adoption has led to improved food security and acquiring assets for households,
- There was no difference in regards to cash crops grown by women and men farmers. In addition women and girls contributed positively to food security in households by growing crops that provided nutrition for the family,
- In both districts, hybrid maize is grown at large scale compared to local maize. The art of preserving local maize for seed was slowly being abandoned. Poor households mostly female-headed and the single women commonly called *Mbeta's* still grew local maize,
- Metal silo adopters have abandoned the use of *nkhokwes* and if well-coordinated metal silo adoption can result into reduced post-harvest losses for many households in Zambia,
- Budgets allocated to PHM activities were generally low in all the implementing partners. Gender mainstreaming activities were not budgeted for and institutionalised gender policy and strategies were non-existence,
- Metal silo fabrication is a male dominated trade and their training did not include any gender-specific targeting to ensure women were included to train as metal silo

artisans. Therefore, no special attention and deliberate effort was made to target women during the selection and delivery of demonstration and research metal silos,

- CIMMYT and implementing partners are willing to mainstreaming gender in their programs and the personnel involved in EGSP-II were willing to be trained in gender and,
- There was dearth information on gender and PHM, gender and technology, gender issues and gender relations in agriculture in Zambia.

Gender was not mainstreamed in the EGSP-II project and the implementing partners resulting in gender blind interventions. To remedy the situation a gender strategy is therefore recommended to guide the current project and future programs. The suggestions for the gender strategy for PHM include:

**(i) Technology Development – Artisans**

The study observed that the project artisans were selected on the premise that they were already practicing tinsmith as a trade which is male dominated in Zambia. Major needs for the artisans are financial loans (these could be provided in form of materials needed for manufacturing metal silos) to kick start production and further training on gender in PHM. CIMMYT and the key implementing partners could utilize the existing human resources, financial and other resources available. Training workshop to include the following topics: a focus on gender and metal silo fabrication; gender issues in agriculture in general; gender relations in PHM; benefits of adoption of metal silo for women and men farmers, entrepreneurship opportunities for metal silo fabrication; effective marketing of metal silos; business development and planning of metal silos and; effective book keeping records. Both female and male participants should be trained as artisans. To achieve gender equity the next training should be targeted exclusively for females. Ideally the next recruitment exercise should be undertaken from vocational colleges in the Eastern Province of Zambia.

**(ii) Technology Delivery – Implementation Partners**

Study results revealed that gender was not mainstreamed in the institutions where gender audits were conducted. Individual role in gender mainstreaming was not clear and staff gender capacity was low. Institutional budgets allocated to PHM activities were generally low. Specific budgets for gender mainstreaming were not available. In addition, institutionalized gender policy and strategies were not available. Individual role in gender

mainstreaming was not clear and staff gender capacity was low. This resulted in the institutions being gender neutral in their technology delivery. All the staff members working on EGSP activities are willing to be trained in gender and the following topics were suggested: gender analysis and planning; gender mainstreaming skills to engender other programs; gender sensitive monitoring and evaluation skills; gender training of trainers; analyzing policies with a gender perspective and; gender responsive budgeting.

### **(iii) Research**

There was dearth of information on gender and PHM, gender and technology adoption, gender issues and gender relations in agriculture in Zambia. More qualitative research needs to be undertaken to narrow the knowledge gap that exists. Socio-economic research using qualitative methods should be undertaken to provide more insights in gender and PHM.

### **(iv) Government Policy**

Research has revealed that all implementing partners had not institutionalized gender policy but relied on the National Gender Policy (NGP) that was implemented in Zambia. Officers had no knowledge on what is contained in the NGP. MAL and ZARI to appoint Gender Focal Point Person to coordinate, monitor and evaluate gender mainstreaming efforts. CIMMYT together with the implementing partners should commission the development of institutionalized gender policies.

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### **List of abbreviations and acronyms**

AIDS	-	Acquired Immune Deficiency Syndrome
CIMMYT	-	International Maize & Wheat Improvement Center
CPB	-	Cement Plastered Basket
CSO	-	Central Statistics Office
EGSP-I	-	Effective Grain Storage Project Phase 1
EGSP-II	-	Effective Grain Storage Project Phase 2
FAO	-	Food and Agriculture Organization
FCSU	-	Food Conservation and Storage Unit
FGD	-	Focus Group Discussion
HIV	-	Human Immunodeficiency Virus
IFAD	-	International Fund for Agricultural Development
KARI	-	Kenya Agricultural Research Institute
KARLO	-	Kenya Agricultural and Livestock Research Organization
KG	-	Kilogram
KII	-	Key Informant Interview
LGB	-	Large Grain Borer
MACO	-	Ministry of Agriculture and Cooperatives
MAL	-	Ministry of Agriculture and Livestock
NGO	-	Non-Governmental Organization
NGP		National Gender Policy
NLCCP	-	National Large Grain Borer Control and Containment Programme
PHM	-	Post-Harvest Management
SFSDP	-	Smallholder Farm System Diversification Programme
SHAPES	-	Smallholder Access to Processing Extension and Seeds
SPHFSP	-	Southern Province Household Food Security Programme
UNDP	-	United Nations Development Programme
USD	-	United States Dollars
WLSA	-	Women and Law in Southern Africa

- ZARI - Zambia Agriculture Research Institute
- ZMK - Zambian Kwacha

### **List of local names and terms**

Kafubwefubwe	-	Large grain borer
Lichelo	-	Winnower made from bamboo
Mbeta	-	Derogatory term referring to single ladies
nkhokwe		Traditional granary
Nkhokweyachizungu	-	Granary introduced by foreigners
Nkhokweyamakolwe	-	Granary used by our ancestors
Nkhokweyasopana	-	Granary recently developed
Viluluvantele	-	Bamboo granary

## **1.0 Background**

The gender analysis for post-harvest management (PHM) of maize in Zambia was conducted to inform the Effective Grain Storage for Sustainable Livelihoods of African Farmers Project phase-II (EGSP-II) implemented by the International Maize and Wheat Improvement Center (CIMMYT) in Kenya, Malawi, Zimbabwe and Zambia with funding from the Swiss Agency for Development and Cooperation (SDC). The EGSP-II seeks to provide equal opportunity to both men and women to participate in the intervention, provide clarity on how men and women are involved in controlling and accessing stored grain and to identify arenas of gender conflict and cooperation in post-harvest management of grain within households. The CIMMYT office in Zambia introduced the second phase of the Effective Grain Support Project (EGSP) in 2012. The projects for both pre- and post-harvest activities aimed at reduced post-harvest losses, increased incomes, and enhanced food security. The first phase (2008-2010) of EGSP was in Kenya and Malawi. In 2012-2015, the second phase of the project tried to consolidate the efforts in Kenya and Malawi as well as initiate activities in Zambia and Zimbabwe.

The EGSP I project focused on three areas: (i) technology development, testing, and awareness promotion; (ii) value chain and; (iii) policy. The project primarily promoted post-harvest technologies such as metal silos and hermetic (super) bags. Through the EGSP I project, CIMMYT coordinated the activities of all partners, trained artisans, carried out research and facilitated policy dialogues. The partners working towards the implementation of the activities included the Kenya Agricultural and Livestock Research Organization (KARLO) formerly known as Kenya Agricultural Research Institute (KARI) who tested the effectiveness of alternative storage technologies in Kenya. In Malawi, the Ministry of Agriculture and Food Security, with the Department of Agricultural Research, and the Department of Crop Improvement, trained the artisans, who manufactured their own metal silos. In Zimbabwe, the project works in partnership with the following: the Department of Mechanization in the Ministry of Agriculture, Mechanization and Irrigation Development and the University of Zimbabwe's Faculty of Agriculture. The latter's role in the project is on-station and on-farm testing of metal silos and hermetic bags while the role of the former is mainly to train artisans. In Zambia, CIMMYT worked with the Zambia Agriculture Research

Institute (ZARI), the Ministry of Agriculture and Livestock (MAL) with the Department of Mechanization identified the training needs of target groups and also prepared and disseminated the relevant training materials and information.

The partners in Zambia made achievements in fostering improved technology adoption. Specifically, they trained 80 metal silo artisans (79 male and one female). The artisans through the Department of Mechanization facilitated the distribution of about 357 metal silos for demonstration purposes. In Malawi, 20 artisans have been trained and they have manufactured and sold 91 metal silos. Furthermore, the project distributed about 187 metal silos for demonstration and awareness creation purposes. Furthermore, in Kenya, 58 artisans were trained and artisans manufactured and sold about 206 metal silos. Also about 273 metal silos were distributed for demonstration purposes. The purpose of this study was to investigate on the dynamic nature of gender relations by understanding the cultural and symbolic dimensions of gender and how they are invoked in specific post-harvest actions, rights and responsibilities and power.

## **2.0 Literature Review**

This was a gender analysis study of post-harvest management of grain. Gender analysis examines the differences in women's and men's lives, including those which lead to social and economic inequity for women, and applies this understanding to policy development and service delivery. It is concerned with the underlying causes of these inequities and aims to achieve positive change for women. Gender analysis provides a basis for robust analysis of the differences between women's and men's lives, and this removes the possibility of analysis being based on incorrect assumptions and stereotypes.

### **2.1. Gender and Agriculture**

Meinzen-Dick *et al.*, (2012) stated that paying attention to gender is not a matter of ideology but rather a matter of development effectiveness. Therefore, incorporating gender issues more widely and systematically in agricultural research, development and extension systems contributes significantly to meeting the food needs of the future population or ensuring that productivity translate into the improved welfare of the poor. Gender differences matter in agricultural production in various farming systems all over the world, where the ownership and management of farms and natural resources by men and women are defined by cultural

specific gender roles. The roles and involvement of males and females in food and agricultural systems must be taken into consideration because this relates to agricultural productivity, food security, nutrition, poverty reduction and empowerment.

Considerable evidence shows that households do not act in a unitary manner when making decisions or allocating resources. This means that men and women within households do not always have the same preferences or pool their resources. Empirical evidence studies have found that redistributing inputs between men and women in the household has the potential for increasing productivity (Meinzen-Dick *et al.*, 2012).

Both men and women need to play an important role in agriculture, that is, in planting, weeding, post-harvest processing and food preparation. Involving both sexes in agriculture can result in greater sustainability of the environment. Furthermore, men and women also hold local knowledge of low impact, low-cost methods and coping strategies in response to climate change. According to Doss (1999), gender affects farmers' access to labor, land and other agricultural inputs. The adoption of maize technologies in Zambia has affected gender labor patterns. In households that adopt new technologies, men work more on crops and animals and less on non-farm tasks, while women spend less time on crops and more time on post-harvest activities. Children shift from tending crops to tending animals. The adoption of technology increases the use of both household and hired labor in all months (Doss, 1999).

## **2.2 Gender and Agriculture in Zambia**

The ideology of patriarchy in Zambia has played a role in agriculture, guiding the roles and work patterns of men and women. According to a report by FAO (2011) the female share of those economically active in agriculture in Zambia was 46.5 percent in 2010. Women perform 65-70 percent of all agricultural tasks in Zambia, and produce 80 percent of the nation's food stock (GIDD, 2007). In households that are agricultural oriented women are involved in weeding, harvesting, stocking, marketing and processing while men are largely involved in soil preparation and ridging. There are different gender roles that men and women perform in agriculture. Grain processing of maize, sorghum, millet, groundnuts is predominantly an activity involving women. Furthermore, women head-load the grain and transport to various places within and outside the districts and provinces in Zambia. Men, however, tend to get involved in transporting grain to hammer mill facilities when improved technology (e.g. bicycle or ox-carts) become available and are adopted. The transportation of harvested crops to homesteads and storing the grain involves both women and men.

However, shelling for marketing purposes is also predominantly a female activity, while transportation to markets tends to be mainly a male activity arising from the fact that grain marketing is generally done through male-heads of households.

Due and Mudenda (1983), in their study of labor inputs by men and women during the farming season in Mazabuka District (Southern Province), Mumbwa District (Central Province) and Mpika District (Northern Province) found that there were gender differentials in terms of participation rates by men in household chores and farming activities. It was revealed that women worked substantially longer hours than men, once agricultural and non-agricultural tasks are added up. Moreover data from the Northern Province also show variations in terms of labor inputs according to the type of agricultural activity and crop. Men tend to allocate more time than women to soil preparation for all crops and ridging for maize. For example, soil preparation and ridging to which men allocate more time than women are undertaken in the early season. However, weeding and harvesting to which women allocate more time than men tend to be done both during the early season and at the end of the growing season, showing that women experience time constraint twice, while men experience labor time constraint once during the farming season cassava. Men generally allocate less time than women to activities relating to planting/sowing, weeding and harvesting (Due and Mudenda, 1983).

According to the Agricultural Analytical Report of the Central Statistical Office, there are a total of 1, 084,673 agricultural households in rural Zambia. Out of these 250,279 or 19.2 percent are female-headed households (CSO, 2003). Provincial proportions of female-headed households participating in agriculture are shown to be 19.8 percent for Eastern at 17.7 percent for Lusaka and 16.7 percent for Southern province. On the other hand, male-headed households engaged in agriculture are shown to have the largest proportions of 83.3 percent for Southern province; 82.3 percent for Lusaka province and 80.2 percent for Eastern province. On average the national household size consists of approximately 6 persons while the national average size of agricultural households was shown to be 5.5 persons (CSO, 2003). In Zambia most cultural norms and practices are based on either patrilineal or matrilineal systems. A patrilineal system entails inheriting land or property through a male figurehead and the matrilineal system confers land or property through the female line of descent. Among some matrilineal communities such as the Chewa women are assured of tenure security based on the prevailing that they were born and have lived in that community all their lives, and inherited land from the *makoloor* parents. Ng'andwe (1976) mentions also

that present attitudes tend to favor the inheritance of land by children rather than by brother and nephews, who are the rightful heirs under the traditional matrilineal kinship system.

According to the patrilineal system especially among the Tonga of Southern Province and the Ngoni of Eastern Province, land belong to the men, and women's tenure security is thus dependent upon their marital status. Women's tenure security ends upon divorce, separation and the death of the spouse. In the patrilineal communities eligibility is limited to those related to the deceased through a common male ancestor (WILSA, 1999). Without access to, ownership and control of land, women's social, economic, political and tenure security is compromised, resulting in, for example, lack of access to reliable source of credit, extension, livelihood, food security as well as on being excluded from decision making processes at household, community and national levels. Ownership of land in this context refers to a situation where women effectively participate in decision making pertaining to land use and marketing while control of land basically means that a woman is able to decide on how the proceeds from the sale of agricultural produce would be used. It is argued that in sub-Saharan Africa, while women, men and children play complimentary roles in agriculture, traditional ideology has established hierarchical relationship in which men are the heads of families or households and consequently, they have more opportunities than women, to take individual decisions and have access to and control of resources.

### **2.3 Gender and post-harvest loss of maize**

In regards to post-harvest losses of maize, it is important to understand the gender relations that vary over time, in different situations, and in different locations and appreciate the nuance and complexity that underpins the relations of the women and men living and working in dynamic situations (Okali, 2011). A large proportion of economic activity takes place in the households where productive resources, including land and labor are allocated. Women and men both work in various capacities, e.g. as independent operators (possibly as household heads or as household members working on their own account), producing for consumption and/ or for sale and workers on the farms or in the enterprise of another (as labor remunerated in kind or cash for a spouse and/or others, or as 'unremunerated' labor) (Okali, 2011).

There are cultural constructions of gender roles and actual roles. The ‘domestic’ realm is portrayed in contemporary theory as a ‘reproductive’ sphere where women, as principal agents and managers, carry out unpaid, home-based activities that ensure the maintenance and functioning of people within households. The household in turn, is characterized as the site of principal collective consumption. The reproductive domestic archetype is embedded within the ‘cult of domesticity’ that prevailed in Europe and its colonies from the 18th-20th centuries (Howard, 2003). These are features of powerful systems of ideas that serve to obscure rather than to illuminate those fundamental aspects of contemporary human-nature relations that are the source of social and environmental instability and crisis. What is characterized as the ‘reproductive’ domestic sphere, is in reality tremendously productive, albeit largely invisible realm. It contributes the majority of subsistence resources in many rural areas. It involves a highly demanding and holistic level of technical and environmental knowledge and skills related to plants that can require at least a third of a lifetime to accrue, as well as frequent innovation.

The gender relations that exist in many households affect the activities in grain storage management. Even if maize could be considered to be mainly a male crop since it is produced by men, men’s decision about which cultivars to grow might be influenced by women considering their knowledge and roles in post-harvest management and final consumption. According to Rugumamu (nd) men, women, boys and girls divide the tasks in the maize production and post-harvest storage and management. In de-husking maize cobs, knives of various sizes and sharpened wooden tools were used by 25 percent women and 11 percent men while 100 percent women and 98 percent men reported the use of bare hands. Cobs were packed in baskets and/or in gunny/polythene bags. According to 71 percent respondents reported that men, women and children played the role of ensuring that all harvested cobs are transported while 29 percent indicated that only women carried out these processes. Further, some women had formed an association to enhance rapidity and efficiency in this crucial activity aiming at minimizing losses (Rugamamu, nd).

The adoption of maize technologies in Zambia has affected gender labor patterns. In households that adopt new technologies, men work more on crops and animals and less on nonfarm tasks, while women spend less time on crops and more time on post-harvest activities. Children shift from tending crops to tending animals. The adoption of technology increases the use of both household and hired labor in all months (Doss, 1999).

### **3.0 Study Objectives**

The objective of this study is to gain a deeper understanding than hitherto available of gender relations and roles in post-harvest management of grain, with particular reference to metal silos. Specifically, the study seeks to:

- (a) Provide a deeper understanding of how gender norms shape men and women's post-harvest practices and experiences across diverse maize farming contexts,
- (b) Investigate how effective current technology development, promotion and dissemination approaches are in ensuring gender equality in adoption and impact,
- (c) Identify knowledge gaps in the area of gender and post-harvest management,
- (d) Inform the development of a gender equality strategy that guides the implementation of the post-harvest management strategies that ensure equitable processes and outcomes for men and women farmers.

### **4.0 Research Questions**

The above objectives lead to a set of research questions about gender relations and roles in post-harvest grain management, which this study seeks to tackle in pursuit of its overall objective. These research questions are as follows:

1. (i) What roles do men, women, and youth play in grain post-harvest management?
  - (ii) In what ways do men, women, and youth as household members have both separate and joint activities, interests, rights, responsibilities and decision making power?
  - (iii) In what ways do social and cultural norms determine individual's roles, rights, responsibilities and claims over other members of the household?
  - (iv) What strategies do men, women, and youth use within households for grain and store management?

(v) What bargaining goes on between men and women in the area of stored grain management, marketing and control over resources?

vi) What socio-cultural constraints do women and men in different household circumstances encounter in post-harvest management?

(vii) How does an improved storage technology such as metal silos alienate or empower men, women and youth who have either individual or pooled storage facilities within a household?

(viii) In what ways do improved storage technologies such as metal silos meet men's, women's and youth's design needs and preferences?

2. What are the current approaches used by partners in technology design, development, and dissemination? How effective are these approaches in promoting gender equality? In what ways might these approaches be improved to promote gender equality at household level?

3. What gender knowledge gaps exist in the context/country of study?

4. What lessons can be drawn from this study to inform the development of a gender equality strategy for the implementation of post-harvest management strategies for equitable processes and outcomes for men and women farmers.

## **5.0 Rationale for Gender Analysis Study**

There is a dearth of information in Zambia concerning gender issues in post-harvest management of grains. In view of the above Zambia then presents an appropriate case study country. Maize is the staple food for most of the rural poor in Zambia and provides about 90 percent of the food consumed. Maize is important crop in Zambia because it is used for food in many households; as feed for animals and; as a source of industrial raw materials. Maize is mostly grown by small-scale farmers in Sub-Saharan Africa under rain fed conditions and is mainly for human consumption. There is a major shift in global cereal demand and as Pingali (2001) observes, estimations reveal that by 2020 the demand for maize will increase and surpass the demand for wheat and rice. The shift to maize has also been as a result of the growth and demand for livestock feed. Apart from this, there is pressure for maize food in the least developed countries due to the population growth and the persistence of poverty.

Declining productivity levels coupled with post-harvest losses contribute to food insecurity. A significant amount of the food is lost through pre- and post-harvest losses. The tropical climate makes foods produced in these regions prone to pests and diseases. Poor handling and storage further increase the post-harvest losses. Maize grains constitute the primary sources of food for mankind and a considerable waste of these valuable foods during pre- and post-harvest constitute such a major agricultural bottleneck that the reduction of pre- and post-harvest losses is now a common food strategy throughout the world. Post-harvest handling is an important stage of crop production after harvest as it includes cooling, cleaning, sorting and packing. It is important in keeping the product cool, to avoid moisture loss and slow down undesirable chemical changes, and avoiding physical damage such as bruising, to delay spoilage.

The post-harvest storage conditions are critical to maintaining quality because each crop has an optimum range for storage temperature and humidity. Regardless of the scale of harvest, domestic garden and industrialized farm crops must be handled with care. The technology in post-harvest helps in the stabilization and storage of unprocessed or minimally processed foods from the time of harvest until final preparation for human consumption. The technology which includes selection, preservation, packaging and processing has contributed to the promotion of agricultural production through the improvement of farmers' income by raising the value of agricultural produce.

Yet, there is limited knowledge about post-harvest losses and much less about gender issues in post-harvest management. The earliest interventions into crop storage in Zambia, then Northern Rhodesia is backdated to 1954 and the focus was on maize depots, farms and mills in Central and Southern Provinces. In the sixties a series of studies were conducted on infestation of export groundnuts and grain storage problems funded by Overseas Development Agency and Freedom from Hunger campaign respectively. To our knowledge only about eight initiatives attempted to provide solutions for post-harvest losses since the early 1980s (Table 1). For instance, in 1983 Food and Agriculture Organization (FAO) supported a program that introduced cement and mud plastered storage structures. Subsequent FAO programs as well as others supported by United Nations Development Programme (UNDP) and Non-government Organizations (NGOs) such as World Vision, appear to have largely technology driven. Available information is unable to shed light on gender issues in post-harvest management technologies. Therefore, Zambia presents an

appropriate context to investigate gender in post-harvest management. Several programmes on the post-harvest management and promotion of On-farm storage have been conducted in Zambia since 1970 and some of these programmes are presented in table 1:

**Table 1: Previous Efforts on Post-Harvest Management and On-farm storage in Zambia**

<b>Year</b>	<b>Organization</b>	<b>Project Title/Code</b>	<b>Geographical Focus</b>	<b>Program Focus and Accomplishments</b>	<b>Gender Aspects</b>
1983	FAO	Improved Storage Pilot project PFL/ZAM/001 and PFL/ZAM/002	Eastern and Southern Provinces	Introduced solid walled grain storage bins in 80 agricultural camps. Structures included ferrumbu, cement plastered baskets and mud plastered baskets	Unknown
1986-1992	UNDP and FAO	Post Harvest Loss Control Pilot Project GRZ/UNDP/FAO ZAM086/004 and ZAM/94/008	Choma and Monze districts in Southern Province	Introduced storage structures	Unknown
1995-2000	IFAD	On-farm Storage component of Southern Province Household Food Security Programme (SPHFSP), (SPHFSP: ZAM- 368)	Southern Provinces	Improved household security of smallholder farmers through construction demonstrations of improved storage structures viz. Ferrumbu, CPB, Brick-bin.	Unknown
1997	UNDP	Smallholder Farm System Diversification Programme (SFSDP)		Improved incomes and food security of smallholder farmers and vulnerable groups, including women and youth who constituted the majority of the rural population as the ultimate beneficiaries through capacity building at the farm level	Built capacity of women farmers to improve their incomes and food security
		National Larger Grain borer Control and		Created public awareness campaigns, trained MAFF staff and other stakeholder.	

		Containment Programme (NLCCP)		Introduced insecticides suitable for control of LGB as well as promoted of improved storage structures	
	FAO FCSU MAFF	Small- Scale Farmer Maize Marketing and Storage (TCP/ZAM/4555)	Eastern, Northern and Southern provinces	Addressed and marketed improved storage at small scale farmer level	Unknown
2000-2007		Small-holder Access to Processing Extension and Seeds (SHAPES) project (NB: On-farm storage programme)	Sinazongwe, Siavonga districts	Groups were trained in improved storage management. The groups were also taught about the benefits of shelling maize and groundnuts as opposed to the traditional ways of storing harvested farm produce.	The SHAPES project aimed at promoting equal benefits for both women and men. Women seemed to be more receptive to different ideas. Traditionally women took the sole responsibility of food preservation and storage at household level.
	World Vision International	(NB: On-farm storage programme)	Sinazogwe and Kalomo districts	Promoted improved storage systems. The farmers were expected to bear the full cost of constructing the storage structures especially the brick bin. World Vision International provided assistance by making cement available on barter basis; one bag of cement was exchanged for a 90 kg bag of maize. The farmers who wanted to build mud-plastered baskets had courses	Unknown

				organized for them with technical input from FCSU	
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## 6.0 Methodology

### 6.1 Conceptual Issues in Gender Analysis

According to Srinivas (n,d) gender analysis examines the differences in women's and men's lives including those which lead to social and economic inequity for women and applies this understanding to policy development and service delivery is concerned with the underlying causes of these inequalities aims to achieve positive change for women. A gender analysis should recognize the following:

- Women and men have different needs, interests priorities, experiences and issues in their day to day life and are different for different ethnic groups, different groups of women (e.g. dependent income levels, on age, marital status , employment status etc)
- Different strategies may be necessary to achieve gender equitable outcomes for both men and women,
- Analyses aim to achieve equity rather than equality.

There are several different Gender Analysis Frameworks exist today: the Harvard Analytical Framework, Women's Empowerment Framework, Moser Framework, Kabeer's Social Relations Approach and Okali's Social Relations Framework. Frameworks often follow step-by-step tools for carrying out gender analysis, which help to raise questions, analyze information, and develop strategies to increase women's and men's participation in and benefits from development programmes. Gender Analysis Frameworks are concerned with:

1. The development context or patters in an area, answering the questions: *What is getting better? What is getting worse?*
2. Women's and men's activities and roles in post-harvest grain management, answering the questions: *Who does what?*
3. Women's and men's access to and control over resources, answering the questions. *Who has what? Who needs what?*
4. The actions needed, answering the questions: *What should be done to close the gaps between what women, and men need? What does development deliver?*

In order to obtain information on gender inequalities in the distribution of resources, power, roles and responsibilities between women, men, girls and boys and the youths this study used Kabeer's Social Relations Approach. The approach was selected because of the several

concepts it uses for analysis. The approach also examines the drivers of inequality when distributing resources, assigning responsibilities and power. Further, institutions like the state, market, the community and family are also examined. These institutions enhance the production, reinforcement and reproduction of social relations perpetuating social difference and inequality. The social relations approach identifies five aspects which institutions are examined and these are rules, activities, resources, people and power. These concepts are defined as follows: rules refer to how things get done; activities refers to what is done; resources refers to what is used and what is produced; people refers to who is in, who is out, and who does what and; power refers to who decides, and whose interests are served.

## **6.2 The Study Context**

### **6.2.1 Demographic characteristics in households in Zambia and the gender implications**

Zambia's total population in 2010 was estimated at 13.1 million, with a sex distribution of 50 percent female and 49 percent male (CSO, 2012). Of the 13.1 million Zambians, 60 percent live in rural areas and depend on small-scale farming for their livelihood. Nearly half of Zambia's population (45 percent) is below age 15 years who still are under parental care and support (CSO, 2012). Agriculture plays an important role in many households in Zambia owing to its contribution to food security, income generation and improved livelihoods. According to the Agricultural Analytical Report of the Central Statistical Office, there are a total of 1, 084,673 agricultural households in rural Zambia. Out of these 250, 279 or 19 percent are female-headed households (CSO, 2003). Provincial proportions of female-headed agricultural households are shown to be 19 percent for Eastern; 17 percent for Lusaka and 16 percent for Southern province. On the other hand, male-headed agricultural households are shown to have the largest proportions of 83 percent for Southern province; 82 percent; 3 percent for Lusaka province and 80 percent for Eastern province. On average the national household size consists of approximately 6 persons while the national average size of agricultural households was shown to be 5.5 persons (CSO, 2003).

Although men are traditionally heads of households, the number of female-headed households is growing although the pattern is not consistent from the 1980s to 21<sup>st</sup> century. It was, 28 percent in 1980; 17 percent in 1985; 17 percent in 1990; 24 percent in 1996; 22 percent in 1998; 19 percent in 2000; 23 percent in 2002; 24 percent in 2007 and 23 percent

in 2010 (CSO, 2012b; 2003; 1997). The head of household usually is the link between the household and the national economy because of the influence the head has on other household members. Such influence may enable or constrain participation of others.

The sex of the head of the household has implications on the social economic status of the household and its members particularly access to and control over resources. In Zambia men tend to have more access and control over resources than women especially in a marriage. Unmarried women heading households tend to compare favorably with men than when married. As mentioned earlier, the female share of those economically active in agriculture was 46 percent in 2010 (FAO 2011a). Women perform 65-70 percent of all agricultural tasks in Zambia, and produce 80 percent of the nation's food stock (SIDA 2008). As stated earlier in agricultural households in Zambia, women are generally responsible for more chores including weeding, harvesting, stocking, marketing and processing than men who are largely involved in soil preparation and ridging.

The headship status should be understood in the context of Bryne's (1994) of the two types of households in Zambia namely *de facto* and *de jure* female-headed households. According to Bryne, a *de facto* female-headed household is one where a husband is away from the household for various reasons e.g. wage labour, deserted due to family dispute or failure to support or divorce their wives. The *de jure* female headed household on the other hand refers to those households where a woman has no husband because she was never married, has been divorced or is widowed and makes her own decisions. Although some *de facto* heads may receive support in form of remittances from husband, they have difficulties in making decisions on their own. In contrast, *de jure* heads make independent decisions (Geisler, 1993; 1972, Due and White, 1986: 96 in Bryne, 1994: 17).

In Zambia, people usually migrate from rural to urban areas for economic reasons. Rural-urban migration has a gender dimension which disadvantage women. While men have, since colonial days, migrated to urban centers in line with the Colonial Migrant Labor Policy for wage employment, women migrated to towns for social reasons, for instance, to join husbands already working in town, or to flee abusive marriages (Schyster, 1988). Overall, women's mobility is constrained by the gender division of labour because in addition to their daily housework they perform over 80 percent of all agricultural tasks that is weeding, harvesting, transportation and ensuring household food security (MACO,

2005). Clearly increased workload limits women's ability to engage in activities that involve traveling far away from home.

### **6.2.2 Legal Issues: Constitution and Intestate Succession Act Cap 59 of 1989**

The Zambian Constitution defines a power relationship between men and women limits women's access to and control over resources (JUDAI, 2008). On the one hand, Article 11 of the Constitution protects both sexes against discrimination based on sex, race, ethnicity etc. On the other hand Article 23 (4) allows use of customary law (unwritten and varied across 73 tribes) in marriage, divorce, and disposal of property. Customary law treats women as minors– codifying female subordination and reproducing historical gender based inequalities. This explains the existing gender gaps in education and training, employment, land ownership, agricultural extension services, and decision-making. Furthermore, the Intestate Succession Act (1989) which aims to ensure fair distribution of property among widowed individuals where the deceased has not left a Will apportions property as: 50 percent to children; 20 percent to the surviving spouse; 20 percent to parents; and 10 percent to dependents. Widows in polygamous marriage are disadvantaged as they are expected to share the 20 percent.

### **6.2.3 Livelihoods Sources and Gender Roles in agriculture**

Agriculture is the main source of livelihood for the majority of women in rural areas. Over time, agricultural production has declined with negative impacts on the household's livelihood, especially women farmers. Women in Zambia provide over 80 percent and 70 percent of labor in subsistence and cash crop production respectively. The proportion of females engaged in agriculture in rural areas has increased from 71percent in 1990 to 91percent in 2000, and 93 percent in 2008 compared to men from 70 percent to 87 percent in 2000 and 88 percent in 2008 (CSO, 2000; 2012b). This trend is associated with the negative implications of the Structural Adjustment Programs (SAPS) implemented in the 1990s which resulted in many women losing formal employment.

Owing to women's triple roles, women bear the time and income poverty brunt more than men. For example, women's participation in lucrative farming opportunities and their limited participation in membership organization are intrinsically linked to the poor time-share in productive and reproductive roles. Poverty levels in Zambia are gendered. A report

by CSO (2004) indicates that female-headed households are more likely to be extremely poor than their male counterparts. Food scarcity in female and male-headed households was at 61 and 52 percent respectively (CSO, 2004). The FNDP 2006-2010 showed that 68 percent of the country's population fell below national poverty line in spite of the implementation of the PRSP. Those most affected by poverty were: small-scale farming households (84 percent) of whom 72 percent were below extreme poverty line; and female-headed households (60 percent) compared to those headed by males (51 percent). Clearly this shows that gender explains the patterns of poverty. Of great concern with poverty is that women farmers have fewer coping strategies during lean periods. They usually adopt strategies that are unsustainable and make it very difficult to escape poverty. Their common strategies are working in other people's fields for food or cash (piecework) at expense of own field, renting out their fields to the rich (Concern Worldwide Zambia, 2010) and reducing meals among others.

#### **6.2.4 Human Development Indicators**

Human development is 'the process of enlarging people's choices and the essential elements include people's ability to lead a long and healthy life, to acquire knowledge and have access to resources for a decent standard of living' (UNDP, 1990). Critical human development indicators necessary for sustained economic growth and poverty reduction are education, health care, decision-making, and HIV and AIDS. Education, according to the UN Convention of the Rights of the Child and Universal Declaration of Human Rights is a human right for all citizens and a basic need for the fulfilment of an individual's aspirations (CSO, 2012) yet access to education by females and males is varied. Women lag behind men in Zambia's education system. The ZDHS 2007 literacy data shows male and female at 81 percent and 63 percent respectively. Clearly men are more likely than women to enjoy benefits associated with formal education especially in increased participation in decision making, increased livelihood options, improved nutrition and health, and access to information, skills and knowledge. Women are disadvantaged by male dominance in decision-making in both public and private spheres. At household level, men decide the type of crop to plant, quantity and time to plant and sale and use of proceeds.

Although national HIV prevalence rate has now reduced to 14 percent, the share of women living with HIV is higher at 16 percent compared to 12 percent for men (CSO, 2009). Gender differentiated impacts of HIV and AIDS can be assessed in terms of proportion of

the individuals living with the disease, work productivity and burden of care. At household level, health care giving is primarily a responsibility of women. HIV and AIDS have increased the workload of women and girls at the expense of economic activities such as formal employment, farming and education. This partly explains women's absence from economic activities and social groups such as farmer associations.

### **6.2.5 Situational Analysis of Youths in Zambia and youth in agriculture**

The definition of youth varies from one country to another. The United Nations, for statistical purposes, defines 'youth', as those persons between the ages of 15 and 24 years while the Commonwealth Youth program the youth are between 15 –29 years. In Zambia, the youth are between the ages of 18 to 35 years. The population has over the years remained youthful in Zambia with 29 percent of the population being in the age range 15 - 30 years (CSO, 2000). It has been acknowledged that the major threats facing youths in the world are HIV/AIDS, unemployment and poverty (NYP, 2006). The levels of poverty in Zambia have had a severe effect on the livelihood of youths. Extreme poverty in rural areas declined from 81 percent in 1991 to 67 percent in 2006. This is still especially high given the fact that economic growth is driven by capital- intensive sectors, and has limited impact on community welfare. This has resulted in the majority of the Zambian youths living in absolute poverty both in rural and urban areas.

In Zambia the youths are affected by a number of challenges. These include: inadequate proper guidance, counseling and recreational facilities resulting in their engagement in substance abuse, crime, prostitution and thus increasing teenage pregnancies and early parenthood especially among female youths. It was also observed that there was inadequate life skills training amongst most youth to enable them engage in gainful activity. The policy further elaborates that the youths are socially, economically and politically alienated from the mainstream of national development. The existing education systems also do not guarantee continued education for youth. Government does not have adequate and reliable data to gauge with precision and certainty the nature, extent and magnitude of youth problems. Youth in many African countries including Zambia, find little to attract them into an economic activity based on back-breaking labour, little infused with modern technologies that can interest and challenge them, subjected to high risks of climate and of unstable markets and often only poorly profitable. In addition there are no incentives that would attract women and men into agriculture. The lack of knowledge on viable agriculture

business, agricultural management and marketing skills is another issue faced by young women and men (SACAU, 2013).

The National Youth Policy 2006 overall objective on agriculture is to promote youth participation in agriculture and use agriculture as a major source of livelihood and poverty reduction among youths. It further acknowledges that youths due to their energetic and creative nature are a valuable economic resource for sustainability of agriculture and rural development. Youths can contribute to national development by engaging in agricultural production and consequently in the economic development of the country. The following strategies are outlined in the youth policy: simplify land acquisition requirements, provide agriculture implements and inputs for the youth in resettlement areas, acquire additional land for youth resettlement for agricultural purposes, create conditions that promote access to micro financing, provide grants to innovative, viable youth agricultural projects, provide adequate extension and technical services, engage youths on the land so that youth unemployment can be reduced, set up Agro-based processing businesses, provide market information systems for agricultural products and re-introduce young farmers clubs in schools.

Gender inequalities in agriculture continue to be perpetuated amongst young men and women. For instance, sons may inherit in many societies and women lose their land rights upon marriage (reverse in matrilineal societies). In most African countries, young women are marginalized traditionally where cultures dictate that women cannot inherit nor own land. The young women can't develop infrastructure and the technology needed to run the farm. This has implications on young men and women access to credit, extension services, technology adoption and access and control of farm produce and returns from produce. There are very few institutions offering affordable micro financing not demanding collateral to young women and men (SACAU, 2013).

## **6.3 Selection of the Study Sites**

### **6.3.1 Chipata**

Chipata, is the capital of the Eastern Province of Zambia and has a population of 455,783, of these 49 percent males and 51 percent females according to statistics between 2002 - 2010 (ZamStats, 2010). It has a population density of 38 persons per square kilometer. The predominant tribes are Chewa in the north and Ngoni in the south of the district. It is one of the most important small holder agricultural regions. It is the business and administrative hub that serves the region. It stands at an altitude of 960 –1,669 meters above sea level. The district is approximately 11,986 square kilometer size with total hectares of 1,198,600, 10 to 12 percent of which is hilly. The arable land is approximately 11, 320 square kilometer which is 1,132,000 hectare. The forest reserve area is about 5.76 square kilometer. Out of a total area of 611,174.784 hectare (6111.75 square kilometer) of arable land, 173,037 hectare is cultivated and 438,137.78 hectare is not cultivated.

Land is divided into two distinct tenure classes that is, Traditional and State land. This land maybe used or occupied according to customary law without law without leasing it or having any formal right assigned and it is controlled by Chiefs with their headmen in-charge of villages. Utilization depends on both right and ownership of the community. An individual can, however, acquire a certificate of title depending on how the Chief perceived the request, though normally chiefs do not accept such requests because they fear it might lead to loss in popularity among their subjects. Generally, the climatic condition in the district is favorable to most crops under rain-fed conditions, with a rainfall of 800-1000 millimeters and a growing period of 125 to 140 days. The district lies in the central plateau zone of the agro-ecological zones of Eastern Province. Soil types vary from area to area: clay loam, clay sandy loam and sandy with a pH range of between 5.0 and 6.5 and rich in phosphorus. The most predominant soils in the district are the clay and sandy loam.

Most of the inhabitants practice Conventional and Conservation and mixed farming, combining both pastoral and arable activities. Pastoral farmers concentrate on keeping cattle and other small livestock e.g. goats, sheep and poultry. The major crops grown are maize, groundnuts, soybeans, sunflower, tobacco, cassava, cowpeas. The major vegetables grown are tomatoes, cabbages, onion, Irish potatoes, among them. For agricultural extension

provision purposes, the district is divided into 8 Agricultural Blocks which are further sub-divided into 58 Agricultural camps. Out of these, 44 are manned while 14 are not (DACO, 2014). Farmers in Chipata are classified into three categories as follows: the commercial farmers, the emergent farmers and the subsistence farmers. The emergent farmers are defined as farmers selling more than 50 percent of their crops whereas the subsistence farmers sell less than 50 percent. In Zambia the emergent farmers are geographically concentrated along the line-of-rail and in the Eastern Province. In Eastern Province most of them live along a fairly narrow band following the Great East and Lundazi-Chipata roads.

Eastern Province has the highest incidence of female-headed rural households in the country and there are three types of female-headed households: de facto, created through male migration; legal, created through death, divorce, or never having been married; autonomous polygamous, or co-wives living separately and having major responsibility for day-to-day activities. In Chipata 39 percent of the households are female-headed in Eastern Province. Depending on how the female-headed household was defined in the 1980 population census, if the polygamous wives were classified under this group or not, the percentage of the de facto female headed households varies from 49 percent (or 19 percent of all the households) to 23 percent (9 percent of all the households). The size of a female-headed household is generally smaller (average of 3.5 members in Eastern Province Rural) than that of a male-headed household (average of 4.6 members). This also indicates the labour shortage of the female-headed households in comparison with the male-headed households

### **6.3.2 Katete**

Katete is a small town and it is one of the eight districts of the Eastern Province of Zambia with a total area of 3989 square kilometers. Katete has a population of about 243,849, of these 48 percent males and 51 percent females according to statistics of 2002-2010 (ZamStats, 2010). In Katete district agricultural farming is divided into five blocks namely; Northern, Southern, Western, Eastern and Central. The district has 20 agricultural camps. The rural part of Katete district is sparsely populated, with clusters of family-run farms clustered in small villages. With an average farm size of approximately 4 hectares (10 acres), the typical farm is small, and most planting and harvesting done without machinery. Farm land is generally owned by communities, who allocate the land to families via local headmen and chiefs. Families are allowed to sub-divide their land and share it with their children or grand children, and land usage rights are often passed from parents to children or other relative. The

amount of farming land families can get access to is, at least theoretically, not limited; any individual can claim additional land from the chief as long as they can show they have the manpower and skill to use the land.

With a large number of crops growing well in the area, most farmers diversify their crops and grow maize and cotton. On average, farmers allocate 48 percent of their land to maize and 36 percent of their land to cotton. The remaining 16 percent are allocated to a mix of other crops consisting of sunflowers, groundnuts, beans and sweet potatoes. The overall degree of diversification is quite remarkable, 67 percent of farmers grow at least three crops, while 11 percent of farmers grow 5 crops or more.

#### **6.4 Data Collection Tools and Respondents Selection**

Peoples' perceptions and attitudes are very critical in the investigation and analysis of social phenomena more so with gender issues. It was essential therefore to employ suitable approaches and modes of inquiry that facilitated the assessment of how men, women, boys and girls who are the project beneficiaries and other stakeholders perceived themselves and their roles in addressing the gender disparities in maize postharvest storage and management. Four tools were used to collect data: (i) Interview guide for community focus group and key informants' interview; (ii) Gender audit and in-depth interview guide for implementing partners; (iii) Case study profiling for households and; (iv) Artisans interview guide. In addition, information was collected on knowledge gaps on gender analysis for maize post-harvest management. The decision to administer the artisan interview guide and case study profiling households that adopted improved post-harvest technologies was influenced by the fact that though the implementation period was short the artisans and households were exposed to the metal silos technology and it was felt information collected will serve as base line data that can be used later to compare if there has been any improvement or not in terms of gender considerations.

##### **6.4.1 Interview guide for community focus group and key informants' interview**

The interview guide for community focus group information was collected from the following areas in Chipata-Kamlaza and respondents were drawn from Kuzani village. In Katete-Chimutende area and respondents came from the following surrounding villages Chikwanda, Chipapika and Sambila. These areas were purposively sampled with the help of

Chipata and Katete District Agricultural Extension Officers who were familiar with these agricultural camps. The areas were selected for the following reasons: the EGSP project was already known in these areas as metal silos were distributed; majority of the farmers grow maize and utilization of metal silos in the areas by a considerable number of farmers; proximity of the study areas to each other; district and local agricultural extension camp officers were constantly in touch with these areas; metal silo dissemination field days were held in these two areas Kamlaza in Chipata and Chimutende in Katete and; the availability of farmers to provide insights on gender and PHM.

#### **6.4.2 Focus Group Discussions (FGDs)**

Focus Group Discussions (FGDs) respondents were selected with the help of local lead farmers and agricultural extension camp officers. Specific instructions were given to the agricultural extension officer on the day and time when a specific cadre of farmers was required. In this study the focus groups comprised of 6 to 8 individual farmers who were purposively sampled from the communities with assistance from agricultural extension officers at the camp level. A total of 18 FGDs were carried out 8 in Chipata and 10 in Katete. The FGD for adults and youths were classified as follows: male FGDs divided as: single male-headed households and married male-headed households. The same categories were applicable for females as: single female-headed households and married women. For youths the FGD were divided as follows: single youth male-headed households and married youth male-headed households. The same categories were applicable for females as: single youth female headed households and married youth women.

#### **6.4.3 Key informant interviews**

Key informant interviews are qualitative in-depth interviews with people who know what is going on in the community on a particular issue or project. The purpose of key informant interviews (KII) was to collect information from a wide range of people, including community leaders, professionals, or residents who have firsthand knowledge on a particular topic. These experts, at community level with their particular knowledge and understanding, can provide insight on the nature of problems and give recommendations for solutions on the project. KII sample was also purposely sampled from the following groups: agricultural extension officers at camp level and traditional leadership. In addition, information was also collected through KII from polygamous marriages. Data collection from polygamous marriages was normally shrouded with secrecy, lack of trust and transparency. To overcome

these challenges this study used KII as a tool compared to FGD. Three individuals were interviewed in any polygamous marriage, the husband, first and the wives. In Kamlaza - Chipata we did not find any area polygamous household, while in Katete several households were polygamous. Four households were interviewed, three male heads of households with their two wives and one household the male head of household was not available so the two wives were interviewed.

#### **6.4.4. Gender Audit and in-depth interview guide for implementing partners**

Gender audits were carried out in three institutions that have been involved in the EGSP since its inception in 2012. These are, the Ministry of Agriculture and Livestock (MAL) with the Department of Mechanization, Katopola Farmer Training Institute and Zambia Agriculture Research Institute (ZARI). Ministry of Agriculture and Livestock has been involved in identifying the training needs of target groups, preparation and dissemination of relevant training materials and information. Their core activity was to provide extension services by way of transferring new technology in this case metal silos to farmers. At the MAL headquarters one person who coordinates the metal silo activities was interviewed. The Katopola Farmer Training Institute under the Ministry of Agriculture was involved in training the artisans in manufacturing the metal silos. One officer involved in training the Artisans in fabricating metal silos was interviewed. ZARI was involved in on-going research to determine the stability of metal silo in Zambian conditions and to provide overall supervision to the project. Two officers were interviewed at ZARI. Key documents were collected and gender analysis was also carried out. A total of eleven officers and three institutions were audited. At the provincial offices in Chipata one officer was interviewed. At each district two officers who directly work with the EGSP were interviewed and at camp level where data was collected camp agricultural extension officers were interviewed. Under MAL a total of eight people were interviewed. Key documents were also collected and gender analysis was also carried out. A gender audit of the three institutions has provided valuable information that will be used to promote gender mainstreaming at all levels.

#### **6.4.5 Artisan Interview guide**

The Artisan guide was used to solicit for information from the Artisan's who were trained for the project to fabricate metal silos. A total of eleven artisans were interviewed, five in

Chipata and six in Katete. The Artisans were purposively sampled with the help of the Agricultural Extension Officers.

#### **6.4.6 Household Profiling**

Case studies were generated from information obtained from households that had adopted metal silos and had stored maize for a season. A total of twelve households were profiled. The households were purposively sampled with assistance from the local Lead Farmers and Agricultural Extension Officers who are familiar with the households.

#### **6.4.7 Knowledge gaps**

The study identified knowledge gaps in the existing literature at theoretical, methodological, conceptual and empirical levels by employing the following approaches: review the existing literature including unpublished grey literature within Zambia and carry out content analysis of several documents including data collection tools that have been used within the project including training manuals. This approach has helped identify not only what is not known (the substance), but how evidence can be generated in the future on gender and maize post-harvest storage and management. The scope and depth of previous work was also acknowledged.

#### **6.4.8 Organizing and implementation of field work**

The study was conducted by a team comprised of two senior gender experts, as well as one male, and one female research assistant. The research assistants assisted with the sex disaggregated data interviews with FGD and HH profiling. Chipata and Katete districts are overseen by the Provincial Agricultural Coordinating Officer based in Chipata. The team first reported to the officials and got permission to collect information from the two districts. Officers who were responsible for the two districts were assigned to assist the team prepare for field work. Lead farmers in both districts identified all the categories of respondents that facilitated the categories of respondents. Field itinerary was discussed with lead farmers each day until all the different groups were interviewed.

#### **6.4.9 Data Analysis and Interpretation**

This study used qualitative method for data collection. Qualitative data was sorted, organized, coded and interpreted. The information obtained from the key informants and FGDs was transcribed and studied to identify the categories of themes. The qualitative data was analysed

inductively and larger volumes of narrative information coded and analysed. Data collected was recorded in electronic recorders direct from interviewee in their local languages. Data was translated into English then generated from the demographic and socio-economic information was quantitatively analyzed using descriptive statistics. Data was further grouped into tables, interpreted in percentages and presented in graphs and pie charts for easy reading and interpretation. The information derived from this analysis was used in the presentation and discussions of the findings.

### **6.5.0 Ethical Considerations**

The nature and purpose of the study, the methods of data collection and the ethical considerations were addressed in detail to all the respondents. The study followed an informed consent protocol. All the participants verbally agreed to the terms of the study before data collection was undertaken. The respondents were given the choice to discontinue the process if they felt uncomfortable during the interview. Permission was obtained for all the photographs taken and to electronically record all the interviews. All the interviews were conducted in a place and time suitable and convenient to the respondents. The moral, ethical and cultural norms of the respondents were respected. In addition the Consultant handled all information collected with confidentiality. No name appeared in the final report and measures were taken to avoid information being referred back to any of the respondents.

## **7.0 Findings**

### **7.1 Introduction**

In this section the research findings were presented in three sub-sections. In the first section, the cultural and gender practices in Chipata and Katete were outlined. In the second section, agricultural and farming systems and post-harvest losses were presented. Finally, the gender roles in post-harvest management of maize discussed.

### **7.2 Cultural and Gender Practices in the Community**

The major ethnic groups found in both Katete and Chipata districts are, Ngoni, Nsenga and Chewa. It was indicated that intermarriages are diluting the major ethnic groups. The communities are dominated with male-headed households. Female headed and child headed households are found in both areas but the percentages are very small. Chipata district is a

patriarchal society where the males, husbands and sons are decision makers. Katete district is predominantly matrilineal; nephews (husband's sister's children) are decision makers. Biological children whether males or females are not decision makers in their own homes. In male-headed households women are not decision makers except those in polygamous marriages. It was indicated that women have some degree of decision making especially during the period when the husband is away with the other wife. Single women are independent in their decisions making.

In Katete one female respondent in a polygamous marriage remarked:

*“Ndine wachinayi ndi wotsiriza mkazi m'banja. Poyamba ndinali kukhala okwiya ndi wansanje pamene mwamuna wanga anandisiya kwa nthawi yaitali, ndipo ine kudabwa chifukwa akazi ena sizinali bvuto ngakhale overstayed ndi ine. Ndinazindikira kuti pamene ali kutali inu onse zochita; Mwachitsanzo kugulitsa chimanga popanda kupempha chilolezo ndi inu ntchito ndalama monga mufuna inu sakulamulidwa kudziwitsa iye akadzabwera. Tsopano ndikuona kuti ndi mwayi”* (“I’m the fourth and last wife in my marriage. At first I used to be annoyed and jealous when my husband left me for a long time, and I would be surprised why the other women never bothered even if he overstayed with me. I discovered that when he is away you take all the decisions; for example selling the maize without asking for permission and you use the money as you wish and you are not obliged to inform him when he comes. Now I see that it is an advantage”) (Female respondent)

Information obtained from sex disaggregated focus group discussions composed of heads of households either single or married. These heads of households were both women and men. Youths and adults were also considered. Local traditional leaders (head woman and man), local head teachers were interviewed as key informants in Chipata and Katete districts. In Katete, where polygamous marriages existed, key informants were sampled from a number of households. However, in Chipata there were no polygamous marriages in the area that was sampled. One community leader explained the non-existence of polygamous marriages as follows:

*“Akhala timphunzisa ammudzi motsutsana mitala. Mu lero, ndiye kuti sichidaliranso yapamwamba ndi akazi oposa mmodzi kapena angapo zibwenzi. Pali zambiri matenda ndi inu kufa oyambirira kusiya ana anu akuvutika. Choncho malo aya m'dera inu*

*sadzapeza mitala. Ife anaonanso banjali kuchepetsa cha kumwa moŵa. Incidences mabanja kugulitsa awo onse chimanga ndi kuona njala lotsatira lisanafike zokolola komanso yafupika*” (“We have been sensitizing the community against polygamous marriages. In this present day, it is no longer fashionable to have more than one wife or several girlfriends. There are too many diseases and you die early leaving your children suffering. So in this catchment area you will not find polygamous marriages. We have also noticed a drastic reduction of excessive beer drinking. Incidences of families selling all their maize and experiencing hunger before the next harvests have also reduced.”) (Male leader, respondent)

Assigning roles and responsibilities, division of labor, access and control of resources and benefits was generally the same in all the study areas. The men assign roles and responsibilities. However, it was noted that there are roles that are already traditionally assigned. For example, roles such as construction works are traditionally for men. Kitchen chores and general care of children in a household are roles for women. Control of resources in the household was done by the male head of household. In some households this was done in consultation with the wife if the husband wished. One village headman remarked:

*“Masiku ano zinthu zasintha, zokambiranazo tifunikila nyumba. Takhala sensitizing anthu athu kuphunzira kufunsa mzake makamaka pa nkhani zikuluzikulu za pakhomo. Ife monga anthu am'deralo tikhoza kudziwa yemwe kunyumba ali payekha kusankha wopanga ndi zina pamene onse okhudzidwa 'ngakhale ana anafunsira. Chitsanzo chabwino ndi pamene nthawi mbewu malonda ena mwamuna chipululu kwawo pambuyo kugulitsa mbewu ndi iwo okha reappear pamene ndalama zonse Kwatha”* (“These days things have changed, consultations are important in a home. We have been sensitizing our people to learn to consult each other especially on major decisions in the home. As locals we can tell which home has individual decision maker and the other where all stakeholders' even children are consulted. A good example is when it's time for crop marketing some husband's desert their home after selling crops and they only reappear when all the money is finished”) (Village headman, respondent)

Single women on the other hand seem to be content in their status when it came to decision making. The following sentiments were expressed by FGD comprising old and youths single women:

*“Monga akazi osakwatiwa tilibe mavuto ndi kusankha zochita, timapanga zochita zonse popanda kusokonezedwa ngakhale ana athu ndi achibale. Tingadziwe zathu mmene chimanga ife adzagulitsa ndi mmene tidzakhala ndi chakudya chitetezo chathu homes”* (As single women we have no problems with decision making, we make all the decisions with no interference even from our children and relatives. We determine on our own how much maize we will sell and how much we will keep for food security in our homes) (Single women respondents).

Married women from male-headed households in Katete expressed different views on decision making. Majority were frustrated when it came to decision making processes in their homes. They commented the following:

*“Zikuluzikulu makamaka chimanga ndi mbewu zina malonda kumachitika ndi amuna athu, ngakhale ndalama anazindikira zina tilibe adziwe za izo. Ngakhale Bajeti kumachitika ndi amuna athu ndi kugula cha chuma”* (“Major decisions especially on maize and other crops marketing is done by our husbands, even the money realized in some cases we do not get to know about it. Even budgeting is done by our husbands and purchasing of assets”) (Married women respondents)

Respondent’s knowledge on PHM was high in older women and men compared to the youths especially girls. Female youths were disadvantaged more than males because of cultural inhibitions. In both areas the study was conducted after field days where information concerning metal silos was disseminated. Female youths both married and single did not attend field days due to their gender roles. While others were attending field days, they remained in their households performing various tasks such as cooking and doing laundry and washing dishes. This had a negative implication on their level of knowledge on PHM and specifically on the metal silo. Some male FGD participants expressed the following sentiments.

*“Atsikana sakuyenera m'zimene pagulu, ichi motsutsa chikhalidwe chathu. Iwo akuyenera kukhala kunyumba kuphika, kuchapa ndi kusamalira ana. Ngakhale iwo anabwera ndi nawo kumunda tsiku zitsulo silo kodi zimenezi opindulitsa kwa iwo.”* (“Young girls are not supposed to be seen in public gatherings, this is against our culture. They are supposed to remain at home cooking, washing and taking care of the children. Even if they come and attend a field day for metal silo how is this beneficial to the young.”) (Male FGD participants)

Another FGD also remarked that:

*“Limodzi atsikana sayenera kuonedwa kusakanikirana ndi amuna amenewa fora, iwo sadzakhala kulemekezedwa ndi anakwatira”* (“Young single girls should not be seen mingling with men in such fora, they will not be respected and married”)  
(FGD participants)

### **7.3 Agricultural and Farming Systems and Post-harvest Losses**

Major crops grown in the study areas included maize, soya beans, cotton, groundnuts, sunflower, beans, sweet potatoes and cowpeas. In addition to the above, in Katete they grew bambara nuts and okra. Respondents indicated that there were no preferences to crops based on sex, both females and male farmers grow the same crops, what differs is the size of the field. Male-headed household tended to have larger fields compared to single youths. Female youths had smaller fields compared to male youths resulting in limited harvests. Feminization of poverty was evidenced among the single youths who also had several children out of wedlock. However, others indicated that generally women prefer crops like beans and groundnuts that contribute to household food security. These crops are grown in addition to the major cash crops. Men, on the other hand, tend to prefer cash crops like maize and cotton. Female FGD participants commented:

*“Akazi athu ali ndi udindo woonetsetsa kuti mabanja chakudya chabwino mwa chaka, pamene chodzala tiyenera komanso mbewu zomwe zithandize kudyetsa mabanja athu”* (“As women our role is to ensure that our families are well fed throughout the year, so when planting we need to also plant crops that will help feed our families”.)  
(Female FGD participants)

It was reported that storage of crops was dependent on the amount of crop that was harvested. When one harvests a bigger amount, it could be stored for one year. Respondents mentioned that usually the crop is kept for more than 6 months. Single female youths do not produce enough to store due to lack of capital to buy inputs. Young women grow local maize as they cannot afford to buy hybrid seeds and fertilizer. Single adult females are self-sufficient compared to single youths. FGD comprising single female youths remarked:

*“Monga limodzi achinyamata ndife osauka tilibe ndalama zogulira wosakanizidwa chimanga mbewu ndi fetereza, ife mapeto chodzala mwambo chimanga kuti safuna feteleza” (“As single youths we are poor we have no money to buy hybrid maize seed and fertilizer, we end up planting traditional maize that do not need fertilizers”)* (Single female youths FGD participants).

The major sources of post-harvest losses in maize emanate from, weevils (large and small grain borer), termites, rats and thieves. Hybrid maize is easily attacked by the pest than local maize. Although maize gets destroyed, the married young men indicated that a reasonable amount of local maize remains intact. Whereas hybrid maize gets highly affected by weevils, local maize is somehow resilient as the extent of destruction is not as much when compared to hybrid maize. To this effect hybrid maize is not kept in the traditional storage system (nkhonkwe yamakolo) for prolonged periods of time. Instead it is kept in the bags where chemicals like chirindamura dust are applied. One man from the FGD stated that:

*“Kukula kwa mavuto Nzodziwikiratu Mwachitsanzo akaika 20bags chimanga, inu kokha kutenga 9 kapena zochepa pambuyo miyezi 6” (“The extent of damage is significant for example if you put 20 bags of maize, you would only get 9 or less after 6 months”)* (Male FGD participant)

One of the female traditional leaders stated the following:

*“Zingapo zapitazi takhala bampala kukolola pano. Panali chimanga ndipo sitinkafuna kugulitsa thangwi zaka ife kugulitsa kwambiri chimanga sanachikonze kuti mwachidule nkhani malonda amuna ndi pasanapite nthawi tiyenera kukhala ndi njala, pambuyo kugulitsa, koma mwatsoka sitinali zokwanira ndalama zogulira mankhwala ngati chirindamura fumbi kuti tipitirize kukhala tirigu. Ena ntchito thonje mankhwala koma sanali kwambiri ndi ife tataya kwambiri chimanga” (“Last few years we have had bumper harvests here. There was so much maize and we did not want to sell because the other years we would sell a lot of maize cheaply to brief case business men and within a short period of time we would be hungry after selling, but unfortunately we did not have enough money to buy chemicals like chirindamura dust to preserve our grain. Others used cotton chemicals but it was not very effective and we lost a lot of maize”)* (Female traditional leader, key informant)

When losses are huge, farmers indicated that they run out of food before the new crop is ready. During the months when they have no grain, hunger becomes prevalent and various coping strategies are applied. The first coping strategy for men is to look for opportunities as labourers in other farms while women ask for help from neighbours and families

The group affected mostly was the single female youths who are betrayed by married men, who assure and promise to marry them. When the female youths announce that they are pregnant, they are abandoned by the married men. It was observed that single female youths had children on their backs dirty, hungry, some sick with no help at all. Single female youths experienced a lot of social problems that in turn affected PHM. Food shortages brought out such vices as early pregnancies and marriages, polygamous marriages, heavy beer drinking, prostitution etc. One single female FGD participant remarked:

*“Ine sanafune kuti ana atatu zapathengo, Ndimasangalala tsiku lina tidzakhale pabanja koma onse ankabwera ine analonjeza kuti ndikwatire koma nthawi akupitiriza inu muipeza munthu ayamba kupewa inu makamaka pamene inu kumuuza kuti inu oyembekezera inu sadzaona iye kachiwiri. Chinthu chotsatira mwamva kuti ndi wokwatira. Tsopano ine kusamalira ana anga limodzi chimanjamanja”* (“I did not intend to have three children out of wedlock, I was hoping to get married one day but all men would approach me promising to marry me but as time goes on you find this man starts avoiding you especially when you tell him that you are pregnant you will never see him again. The next thing you hear is that he is a married man. Now I’m taking care of my children single handed”). (Single female FGD participant)

Respondents reported that searching for part time work affects their long term activities and, to some extent, their agricultural production because they spend time working for other people. This, according to the young married men, leads to prolonged poverty in their households. Another coping strategy that respondents used included gardening and sale livestock. The participants explained that losses do vary across households. Furthermore participants indicated that the households that were resource endowed usually did not suffer much loss as they were able to afford chemicals to preserve the maize. However those without resources were affected greatly and the cycle of poverty perpetuated as the poor spent most of their time working for others as opposed to working for themselves.

To lessen the post-harvest losses, farmers used to different ways to control the losses. Farmers tended not to keep grain for prolonged periods in traditional storage facilities. Instead, they shelled the hybrid maize and kept it packaged in bags where they applied chemicals, for example, *chirindamura*. Local maize was kept with husks to prevent pests attack even though for a short period of time. It was further indicated that they sprayed cotton chemicals while the maize was still in husks. In some cases they used cattle manure which they smeared at the bottom of the granary and poured it at every second ox-cart of maize that was put in the *nkhonkwe*.

#### **7.4 Gender Roles in Maize Post-Harvest Management of Maize**

The major processes involved in maize post-harvest management are the construction of the storage facility, the purchase of sacks and the field work. The men indicated that before harvesting they prepared the storage facility first. This involved the cutting of the construction materials such as poles, bamboo, grass, fibre etc. After all the materials are gathered, the construction is undertaken. These activities are undertaken by the men and the male youths. After the construction of the storage facility, then the harvesting begins. It was reported that harvesting is done by the entire community. This is usually done to expedite the processes of harvesting. Single older women hire men to build the traditional storages. A few commented as follows:

*“Kwa zaka ndaphunzira kuti akhale okwanira, Ndine wokhoza kumanga nkhonkwe. Ine kugula nsungwi mabango kwa anyamata ndi kumanga wanga. Udzu ine kukolola udzu ndekha ndipo mangani icho. Chaka chatha ndinakweza ndalama kugulitsa nkhonkwes”* (“Over the years I have learnt to be self-sufficient, I’m able to build the traditional granaries I buy bamboo reeds from the young men and construct my own. The grass one I harvest the grass myself and build it. Last year I raised some money from selling traditional granaries”) (female FGD participants)

The following stages are undertaken in harvesting of maize:

- Cutting of stalks: it was done by the entire family i.e. the head of household, the spouse and the youth (both male and female);
- Stoking: this was also done by the entire family;

- Removing of cobs from stalks: this was done by the community. There is no gender differentiation in this activity. Men, the women and the youth participated in this activity;
- Transporting: this was done by use of the ox-cart. In this regard men and the male youth usually undertook this activity. However women participated in the loading of the ox-cart in the field. The men drove the ox-cart to the homestead and offloaded it. The women then loaded the maize into the *nkhonkwe*;
- Shelling: the whole family and the community undertook this activity especially bumper harvest of hybrid maize to be sold;
- Winnowing: this activity was primarily women's role, winnowing and cleaning and packaging. If the maize was for selling, chemicals were not applied. For the maize that was to be kept in bags men apply the chemicals as because of their perceptions that they had the knowledge of how it ought to be done;
- Both women and men mentioned that when the maize was to be kept in the *nkhonkwe*, it remained the responsibility of the woman to retrieve some for food and controlled accessibility to the storage facility. Men and women further said that, in the event that the man has no spouse, the daughter or any woman in that household controlled accessibility to the storage facility and has the authority over retrievals. Male FGD participants remarked:

*“Malinga ndi mwambo wa nkhokwe anali chuma cha mkazi, ngati munthu chinaoneka za Iye yekha ndi zochitika za nkhokwe inu mudzakhala chinthu chosekedwa m'mudzi, koma tsopano zinthu zikusintha oyamba a masiku yosungirako zones zofunikira amatithandiza amuna kutenga kulamulira chimanga chifukwa chimanga kale shelled kotero Sindifuna mkazi wanga kuyeretsa (“Traditionally the traditional granary was the property of the woman, if a man was seen concerning himself with affairs of the nkhokwe you would be a laughing stock in the village, but now things are changing, the introduction of modern storage facilities are enabling us men to take*

*control of maize because maize is already shelled so I do not need my wife to clean”)* (Male FGD participants)

The roles in post-harvest have changed over time. In the past women would carry the crop on their heads from the field to the homestead and load the storage facility. Currently men transport the maize using the ox-cart. The respondents confirmed that nowadays people are collectively working together to take care of the crop. This is the same even when the crop is at home. In the past it was different. In some households decision making with regard to what should be sold or kept and how resources should be used is done by women and to some extent the youth.

The men indicated that the main challenge they faced was currently the construction of the storage facility as well as finding means of keeping at bay the pests that destroyed the grain. Whereas they could use sacks, it was mentioned that the sacks and chemicals were expensive and they could not afford to be bought all the time. As a result it was stated that they still used the *nkhonkwe*. In addition the bamboo material for constructing the facilities were no longer available and were getting expensive if they were to be bought from those who endure the long distances to fetch them for sale.

## **8.0 Gender and Traditional and Improved Storage Technologies**

### **8.1 Introduction**

Findings in this section will be discussed under four sub themes as follows: traditional post-harvest storage technologies and practices, improved post-harvest technologies awareness, access and preferences, improved post harvest technology management at household level and improved post-harvest management technology management at community level.

### **8.2 Traditional Post-Harvest Storage Technologies and Practices**

At national level the following post-harvest technologies were as observed open slabs where maize bags are covered with plastic sheets and tents, sheds and big warehouses. For demonstration purposes the following were used solid wall farm bins, *ferrumbu*, mud plastered baskets, cement plastered baskets and brick bins.

In Chipata and Katete the main storage systems common were the traditional storage (*Nkhokwe*) made out of bamboo reeds, twigs, grass, tree branches and mud plastered and the use of sacks. Some households were also using plastic bins to store seeds. Metal Silos were also used for demonstration and research. Almost every household had more than one *nkhonkwe*; one for storing maize and the other for groundnuts or cowpeas. The *nkhonkwe*'s were traditionally constructed by men even though now they are a few single old women who were able to construct them. Maintenance is at two levels, if it involves major works like replacing poles and thatching, the men cut the poles whereas the women cut the grass. The men then replaced the poles and thatched the roof of the storage facility. However, there were traditional storage facilities which were plastered with mud and usually legumes, particularly groundnuts unshelled were kept there. If the maintenance of the *nkhonkwe* is required e.g. mud plastering, then the women undertook the role. It was stated that the advantage of storing grain in *nkhonkwe* was that the space was usually enough to take in volumes. The disadvantage however was that the storage facility was not secure and so the maize was prone to thefts and pest infestation. Female FGDs stated that:

*“pachikhalidwe nkhonkwewas mkazi wa chuma, molinganiza kulamulira anapatsidwa akazi koma tsopano oyamba zitsulo silos zasintha izi m'chigulugulu”*  
(“Traditionally granary was a woman’s property, access and control were given to women but now the introduction of metal silos has changed this norm”) (Female FGDs participants)

Sacks were also widely used in the community particularly for keeping hybrid maize which was, according to the farmers, highly vulnerable. The advantage of using sacks according to the farmers was that they are kept inside the house and application of chemicals was done. The sacks are usually procured by the men but general maintenance of sacks which involves sewing was done by woman. It was mentioned that the use of sacks was a new phenomenon. Traditionally, maize was stored in *nkhonkwes*.

### **8.3 Improved Post-Harvest Technologies Awareness, Access and Preferences**

The improved post-harvest technologies that farmers were aware of included the metal silo and brick built storage system and cement plastered. The latter was not widely used because of the cost of bricks and cement. With regards to the metal silo women and men farmers were introduced to it through interaction with the agricultural camp extension officer. Women and

men indicated that they also interacted with the households that received the metal silo and learnt from their experiences. Women and men farmers reported that the technology was new and they had only learnt about the selling mechanism that were being proposed where a farmer was required to pay ZMK 400 approximately (USD 67) to acquire it and the Government or project pays the other ZMK 400. Farmers felt that the technology was good and had its benefits. In this regard the farmers desired bigger silo's that could accommodate between 25 to 30 by 50 kg bags of maize grain. In addition, women wanted small silos to store groundnuts and beans for household food security and seeds.

With regard to the mechanisms of dissemination of the improved post-harvest technologies that would be appropriate the farmers indicated that the use of demos would be appropriate. One of the farmers was heard saying:

*“Pakuti ife kuwona nkukhulupirira. Mwachitsanzo posachedwapa pamene ife ku chitsulo silo kumunda tsiku, panali chimanga kuti sanali kusunga zinthu zachitsulo silo ndipo panali chimanga ku zitsulo silo, m'modzi wa ku zitsulo silo zabwino quality, osati wodzala ngati anali nditangokhala kukololewa ndipo winayo kwa makolo yosungirako malo kufuzika”* (“For us seeing is believing. For example recently when we attended the metal silo field day, there was maize that was not keep in the metal silo and there was maize from the metal silo, the one from the metal silo was good quality, not infested as if it had just been harvested and the other one from the traditional storage facility was completely destroyed”) (Male FGD participant)

Farmers indicated that acquiring the technology was good for them and it would help the farmers keep their grain safe. Farmers further suggested that mechanisms should be devised bearing in mind the status of the farmers. They proposed that mechanisms should allow them to pay slowly or barter system exchanging with maize for the metal silo. The farmers indicated that the metal silo was very effective in the storage of maize and no losses were reported. One man stated that:

*“Pamene mumaiika 20 ndi 50 kg matumba mu zitsulo silo, udzapeza yemweyo 20 matumba ndi 50 kg za tirigu. Izo siziri choncho pa miyambo yosungirako malo anali mumaiika 5 zonse ng'ombe-ngolo koma patapita miyezi inu kokha kutenga 3 ng'ombe-ngolo”* (“When you put 20 by 50 kg bags in the metal silo, you will get the same 20 bags by 50 kg of grain. That is not the case for the traditional storage facilities were

*you put 5 full ox-carts but after some months you only get 3 ox-carts”*) (Male FGD participant)

The use of a metal silo would also lessen women’s job in retrieving the maize from the metal silo and shelling it. It was indicated that with the use of the metal silo the whole household would participate in shelling. The woman would only have to winnow and the grain stored in the metal silo. Retrieval of the grain for grinding a meal was made easy as the woman only gets ready for the grinding mill grain. The men indicated that given the trouble they took to go too far places to fetch poles and the bamboo which they used for constructing, storage facilities would be the thing of the past. In essence, the implication of this is that the labour and time needed to do the constructions of the traditional facility would be channelled to other productive activities. Given the benefits that had been observed of the metal silo, a recommendation was made the metal silo fabrication should be brought closer to the farmers.

#### **8.4 Improved Post - Harvest Technology Management at Household Level**

Although the traditional storage facility was built by men for the household it was viewed as a woman’s property because of her gender roles of cooking and taking care of the family. As far as the community is concerned, the woman is the custodian of the food stock in the household. Access to and control over the traditional storage facility or the sacks was vested upon the women. Male FGD participant remarked the following:

*“Malinga ndi chikhalidwe chathu chikhalidwe granary inamangidwa ndi amuna awo, ngati munthu anapezeka kuti analamulira nkhokwe ena asangalala ndi mongomunamiza”* (“According to our culture the traditional granary is constructed by men for their wives, if a man was found to be controlling the nkhokwe others will laugh and mock him”) (Male FGD participant)

The introduction of improved post- harvest technology at household level was beneficial but at the same time introduced new ways of life. Women on the other hand expressed the following sentiments:

*“Chitsulo silo ankayenera kuti atithandize koma ochepa mabanja ife kale kuona kunthawi ya umwini kwa anthu. Udindo wathu ndi ofunika kuwachotsa chifukwa chimanga likhalebe loyera ndi anthu mosavuta akatenge popanda inu kuzindikira.*

*Ndi mwambo umodzi n'kovuta chifukwa pali ntchito yambiri amafunika nthawi zonse akatenge tirigu. Choncho zitsulo silo wabweretsa zabwino ndi zoyipa ife akazi” (“The metal silo is supposed to help us, but evidence from a few households we are already seeing a shift of ownership to men. Our role is no longer needed because the maize is kept clean and men can easily retrieve without you noticing. With the traditional one it is difficult because there is a lot of work required every time you retrieve the grain. So the metal silo has brought both good and bad for us women”)* (Female FGD participants)

In some households members kept their maize crop separately from the main household in *nkhonkwe*. This was usually where the youths (usually the male children) would have cultivated smaller portions for themselves in order to generate some money. In this regard ownership was with the young person who constructed and stored the crop in his own *nkhonkwe*.

**8.5 Improved Post-Harvest Management Technology Management at Community Level**  
Farmers reported that there are no shared community storage facilities. Respondents mentioned that the initiative would not suffice in the community because it would be difficult to follow up the amount of grain they would have kept in a communal facility and that it would just led to conflict amongst the community members.

## **9.0 Improved Post- Harvest Technology Delivery and Promotion**

### **9.1 Introduction**

This section presented findings from two subtopics on: Gender and Improved Technology Delivery – EGSP Approach and Gender and Improved Technology Development and Access – Insights from Artisans

### **9.2 Gender and Improved Technology Development – EGSP Approach**

Artisans in Chipata and Katete did not start the metal silo fabrication on their own; it was through the invitation by the Ministry of Agriculture to attend the training at Katopola Farmer Training Institute in 2013. The Ministry selected the artisans by identifying those who were already engaged in metal fabrication at their local markets. The initial groups of artisans trained were all males. The Principal at the Farmer Training Institute has since received a lot of application letters from women who are willing to be trained in metal silo fabrication. Gender audit for both Katopola Farmer Institute and the Ministry of Agriculture revealed that there is limited gender capacity of staff members and also the gender responsive budgeting was not implemented. According to the artisans, they operated from the market and do not own workshops. According to one of the artisan he informed the researcher that he paid rent for the stall at fee of ZMK 85 (USD 13.82) per month.

### **9.3 Gender and Improved Technology Development and Access – Insights from Artisans**

Artisans interviewed had attained formal education ranging from grade 7 to grade 12. Some had formal training in metal fabrication, others reported that they did not have formal training but acquired the skill from their parents or friends who were already doing the work. All the respondents were married and had families, with family size ranging from 3 to 8 members. Experience in metal fabrication ranged from 2 years to over 26 years. However, the artisans only indicated that they just had over 1 year of experience in metal silo fabrication. The age range of the artisans that were interviewed was from 21 to 44 years. Their metal fabrication businesses they engaged in, was informal, operating in an open space at the council market with no defined structure as a workshop. Artisans operated individually although not every individual had all the tools needed to do the work. Working in an open space in one place

made it easier for them to use tools that they do not have, but are needed, by borrowing from their colleagues. Most of the artisans drew the motivation to engage in the metal fabrication business from their parents who had actually passed on the skill to them in order to make a living. According to one artisan:

*“Pamene ine ndinasiya sukulu, makolo anga anaganiza mundiphunzitse zitsulo yonama kuti ndikhoza kupeza ndalama powona kuti ndi pang'ono maphunziro ine, kungakhale kovuta kupeza ntchito”* (“When I stopped school, my parents decided to teach me metal fabrication so that I could earn some money seeing that with the little education I had, it would be difficult to get a job”) (Male Artisan)

Another artisan explained the following:

*“Pamene Ine anabwera Katete m'mudzimo ndinkafuna ntchito, ndinasamukira ku chinthu mpaka ine anataya chiyembekezo. Ndinali paliponse kukhala Ine ndinagona pa sitieshoni kapena pamodzi shopu makonde. Tsiku lina ine ndinali basi akupita kuzungulira msika ndinapeza anthu ochepa ntchito pansu pa mtengo Ine ndinayima ndipo anati kwa nthawi zimene anali kuchita. Kuyambira pamenepo Ine adzakhala ndi kusunga zimene anali kuchita mpaka ine ndinali waukali lingaliro. Ndinadzipereka misonkhano yanga kwaulere ndipo anavomera ndipo umo ndi momwe ine ndinayamba. Tsopano ine anakwatiwa ndi ana, kudyetsa ndi kuwaphunzitsa pa malonda”* (When I came to Katete from the village I was looking for employment, I moved from one place to another until I lost hope. I had nowhere to stay I slept at the station or along shop corridors. One day I was just going round the market and I found a few men working under a tree I stood and observed for sometime what they were doing. From then on I would sit and observe what they were doing until I had a rough idea. I volunteered my services for free and they accepted and that is how I started. Now I'm married with children, feeding and educating them from this business) (Male Artisan)

Metal fabrication businesses in both areas were not registered. The level of the businesses was at small-scale level and all the artisans interviewed reported that they were not able to employ extra help. Whereas a few artisans indicated that metal fabrication is the only business they engage in. Most of them were having other businesses (albeit at small-scale level) as a way of diversifying the sources of income. Some indicated that away from metal

fabrication, they are farmers, whereas as others indicated that they engaged in such businesses as selling second hand clothes and conducting poultry businesses.

Based on their knowledge the artisans indicated that the potential for the metal silo to sell was very high amongst farmers because it reduces costs for buying chemicals that are currently applied to the grain which was usually stored in the bags. When artisans were asked to rate their knowledge of the technology vis-à-vis technology preferences for the farmers, most indicated that the technology of the metal silo was excellent. This could have been rated this way as only a week before this research was undertaken, a field day showcasing the benefit of the technology had been held in the two districts' understudy. Artisans were appreciating the benefits of the technology as most of the farmers who were piloting the technology indicated not having lost any grain to pest attack and that the grain quality was good.

Most of the artisans indicated that they manufactured the metal silos only on order basis. This was because the technology was still new and not many people had come to know and appreciate its benefits. Most of the artisans indicated that they only get about three to eight orders in a year. Artisans indicated that since people have to see the kind of silo and the quality workmanship that go into fabrication of the silo, they usually make one for display for the general public and farmers. The prices of the metal silos vary based on quality and size. For example, the biggest metal silo, that has a capacity of 1000 kg of grain (20 by 50 Kg bags of grain) costs between ZMK 800 (USD 133) and ZMK 900 (USD 150) whereas the smaller metal silos that can has the capacity between 250 kg and 400 kg of grain (5-8 by 50 Kg bags of grain costs between ZMK 250 (USD 42) to ZMK 400 (USD 67).

The main buyers of the silos included farmers and institutions. Artisans indicated that their main orders came from the district agricultural office and individual farmers who visited their stands and appreciated the metal silos. Artisans mentioned that as the metal silo was a new technology, they were not able to tell who preferred the technology most between the different sexes as they had sold to both women and men. In order to ensure that the target customers (who are usually farmers and the general public including institution that need the metal silo technology) are aware and know where they can get the silos; the artisans indicated that they usually advertise on the community radio stations in the two districts, notably radio breeze in Chipata and radio Mpangwe in Katete. Artisans also reported that they ensure that they stick their information (information about where they are found including their phone

numbers) on the metal silos they fabricate to enable other people that see its benefits know where they can find them and perhaps contact them through the phone.

The artisans also said that they have produced fliers and leaflets with information about their products that they distributed to the institutions and individuals. They also deliberately visited the farmers to market the metal silo. They participated in the field-days during which time they distributed the fliers, brochures and participated in demonstrating the benefits of using the metal silo to farmers. The artisans mentioned that although their businesses had potential to grow, they lacked marketing skills and have no clear strategy to reach out to farmers. The other challenge is that the artisans are generally poor marketers with little capital. What they do is a hand-to-mouth kind of business. As one of artisans indicated:

*"Ife tiribe mokwanira likulu kuti aganyali mu kupanga silos monga zipangizo kukankha kuyamba bizinesi ndi okwera mtengo"* ("We do not have enough capital to invest in making of silos as the materials to kick start the business are expensive")  
(Male Artisan)

Furthermore, the artisans indicated that they lack established workshop infrastructure. Artisans operate in make-shift structures in an open space, one of them remarked:

*"Sanali wokongola winawake m'gulu la makasitomala. Makasitomalawo Choncho alibe chidaliro mu utumiki timathandiza"* (This place is not attractive to a certain category of customers. The customers therefore do not have confidence in the services we provide") (Male Artisan)

Additional challenges artisans face are; long distances between surrounding villages and artisans lack the capacity to hire transport to transport the metal silo villages and; limited or the lack of availability of materials locally hence resulting in an expensive product. The artisans perceive that women prefer metal silos more than men because women are the custodians of food and have the responsibility to control and ensure that food stocks are kept properly in the household. It was further argued that apart from the silo being effective in storage of grain as it does not get infested with pests, the labor involved in the day to day preparation of the grain for the hammer mill is lessened as the maize grain kept in the silo is shelled and ready for use. The artisans indicated that while there some men who might not like the new technology as it requires a relatively big amount of money to acquire it most men also like it because it has reduced labor that is needed in constructing the traditional

storage facility, particularly in the current days were the materials for making traditional storage facilities are scarce. Therefore both men and women wanted to adopt this new technology. The artisans indicated that the metal silo business was still in its infancy but similar strategies or key things that have made them continue in the business of metal fabrication applied. The key factors that have greatly contributed to the success of the artisans business included:

- Good business management: Artisans indicated that there are key considerations in the input and the expected output of the product. Based on this, they determine the prices of the product so that the business remains profitable;
- Ensuring that the products of high quality that meets the need of the customer;
- Marketing of the products and services: This is what leads to them getting orders from the customers and;
- Conducting promotions whereby the customers that buy a lot of products are given some free services.

Key things that have made business not be successful included:

- Non-availability of financial institutions that can give loans to artisans so that the working capital can increase. Mostly, they are not able to meet the requirements for acquiring loans,
- Not meeting customers' needs in terms of quality of products produced. Sometimes artisans lack certain types of tools that are needed to do good finishing's on the products and,
- Sometimes the family demands are overwhelming to the extent that they are not able to save funds for reinvestment into the business,
- The artisans mentioned that knowledge in the use and general keeping of the metal silo is low amongst farmers, hence farmers should be trained on effective use and handling of metal silos via face to face talks and demonstrations to the farmers. It was also suggested that, to ensure farmers acquire the metal silo, it would be good if the services of metal fabrication were taken closer to the farmer. In other words, artisans suggested that if farmers in a village want the metal silos, they could organize themselves and make an order. The artisan then could make arrangements to go and manufacture the metal silos within the villages. This would take the ease burden of transporting the metal silo for famers,

- Generally artisans had not received formal training on gender under the auspices of EGSP. Others had the opportunity to attend some short courses where gender was a general component that was mentioned during the trainings. Those that had the opportunity mentioned that the knowledge they had acquired on gender had helped them in their business as they treated women as equal partners. One artisan remarked:

*“Women understand and go through a lot of problems in their homes. They therefore understand better their needs and so as artisans we should listen to them and fulfil their needs through products that satisfy them”* (Male Artisan)

Another artisan commented as follows:

*“Women can perform any job just like men, so they should be given every opportunity to participate even in strenuous jobs such as tinsmith”* (Male artisan)

#### **9.4 Analysis of institutional policies, strategies on gender**

In Zambia the main implementing partners were the Ministry of Agriculture and Livestock (MAL) and two other institutions under its jurisdiction namely Zambia Agriculture Research Institute (ZARI) in Lusaka and Katopola Farmer Training Institute in Chipata. Post-harvest management technologies are coordinated by officers operating in the department of Farm Power and Mechanization. Officers interviewed were drawn from the headquarters, provincial, district and camp level in Lusaka, Chipata and Katete. The positions of respondents varied as follows: Principal Agricultural Engineer, District Agricultural Coordinator, Agricultural Assistants, Farm Power and Mechanization Officer, Senior Regional Research Officer and Senior Agricultural Officer.

The role of respondents in the EGSP partners was to: coordinate activities; follow up and to ensure that silo's were utilized accordingly; coordinator and focal point person in Zambia took the supervisory role on trainings given to the farmers at camp level and; to conduct on station research on the effectiveness of metal silo's and super grain bags. In post-harvest management the respondent's roles were: to train agricultural extension officers in management of crops, to supervise crop storage after harvesting and trainings. Almost all the respondents did not have any role to play in gender mainstreaming. Some staff members expressed the following views on their roles in gender mainstreaming.

*“I do not consider gender issues in this program; gender is not related with machinery or with technology. Here I deal with serious issues of draft power, mechanization and introduction of new farm technologies like metal silos, gender has nothing to do with such”* (Male Program Staff)

Another staff member remarked:

*“Personally or let me say in this section we do not think of gender at all. Recently I heard that there is a new person in the district who has been employed to deal with such issues, otherwise I have never thought of it”* (Male Program Staff)

In addition, another staff member stated the following:

*“As an entomologist my involvement with EGSP was to test the efficacy of the metal silo in our environment and the super grain bag, I do not think gender is connected to such. In short I do not think gender should be mainstreamed in laboratories”* (Male Program Staff 2014)

Annual budgets for 2013 of the organizations varied from ZMK 15,000 (USD 2,500) to ZMK100, 000 (USD 16,667), in some cases these were budgeted figures, actual disbursed figures were less than the stated amounts. Budget allocated to post-harvest management was included in the figures above, others said 50 percent of the budgeted amount was set aside for post-harvest management. Promotional and dissemination activities for post-harvest technologies figures ranged from ZMK10, 000 (USD 1,666) to ZMK30, 000 (USD 5,000). Most of the respondents were not aware of the budgeted figures for gender mainstreaming activities.

A gender analysis of the policy and program documents was conducted focusing on seven areas namely: situation analysis, target group analysis, institutional context, problem identification, goals and objectives. The gender analysis measured the extent to which gender is mainstreamed or addressed in each of the themes above. The seven areas of analysis were compressed to show two aspects of the strength and weakness in terms of identifying, analyzing and addressing gender issues. The measures stipulated in the document analyzed to promote gender equality were also recognized.

Overall the document analysis showed lack of gender analysis. Most of the documents were silent on gender issues. The challenge that program staff had is to analyze the gender issues and proceed to develop interventions that can correct the situation. All the staff interviewed expressed ignorance and they felt that as long as data is disaggregated by sex then gender issues are addressed.

**Table 2: Gender analysis of policy and program documents**

Document	Strength	Weakness
Preliminary crop forecast for 2010/2011 and 2012/2013.	<ul style="list-style-type: none"> <li>Presents sex disaggregated data</li> </ul>	<ul style="list-style-type: none"> <li>No gender analysis of the target group</li> <li>Does not show specific gender issues plan will address</li> </ul>
Farm families Chipata district	<ul style="list-style-type: none"> <li>Presents sex disaggregated data</li> </ul>	<ul style="list-style-type: none"> <li>No gender analysis of the target group</li> </ul>
EGSP quarterly reports		<ul style="list-style-type: none"> <li>Does not identify gender gaps and issues</li> <li>No gender analysis of the target group</li> <li>Written in a gender irresponsible language</li> </ul>
EGSP annual reports		<ul style="list-style-type: none"> <li>No gender analysis of the target group</li> <li>Data presented not disaggregated by sex</li> <li>Language used not gender responsive</li> </ul>

In all the institutions undertaking EGSP work in Zambia a total of 31 employees are involved. Of these, 25 are males and 6 are females. This clearly shows that EGSP is spearheaded by men. Further all the senior positions are all occupied by males, females are in lower ranks. The table below shows the details per each institution.

**Table 3: Staffing in EGSP work in Zambia**

INSTITUTIONS	STAFF CATEGORY	MALES	FEMALES
ZARI	Senior management	1	0
	Technical staff	3	0
	Support staff	2	0
MAL – HQ	Senior management	1	0
MAL – Provincial	Senior management	1	0
MAL – District – Chipata	Senior management	3	0

	Technical staff	5	4
	Support staff	2	0
MAL – District – Katete	Senior management	2	0
	Technical staff	2	1
	Support staff	1	1
Katopola Farm Training Inst.	Senior management	2	0
	TOTALS	25	6

**Source: Field work 2014**

The implementing partner's involvement with the EGSP varied from one institution to the other. ZARI was involved in on-station testing of the efficacy of the metal silo and the super grain bag. Katopola Farmer Training Institute was involved in training local artisans in fabricating metal silos. MAL was involved in on- farm testing, promotion and information dissemination. The provincial office was involved in the project from its inception. The following were the activities undertaken:

- Generated the concept note for funding,
- Budgeted for various activities,
- Supervised other related activities including the fabrication of metal silos,
- Trained field level extension staff,
- Engaged stakeholders i.e. the institutions and people involved in agricultural production including those that finance maize production, agro dealers and credit financing institutions,
- Monitored the training of farmers, by the camp extension officers and district officers,
- Distributed metal silos to trained farmers,
- Identified awareness creation opportunities within the province and,
- Organised the human resource at district as well as at camp level.

The involvement of women was done at demonstration level. Although the project used random sampling, the women were not deliberately picked as beneficiaries of the metal silos. This resulted in more men benefitting yet several women in both areas qualified. All the implementing partners had no gender policies. The reason was that it could be because there is a ministry in charge of gender. It was however noted that although the Ministry of

Agriculture does not have such a clear gender policy, gender is usually included in most of the training as a cross cutting issue as the case is with environment and HIV. Some program staff members expressed the following views on how issues of gender are coordinated and managed:

*(“The Government recently created a standalone Ministry of Gender and Child Development, I think they are the ones who were given the mandate to make sure that gender is mainstreamed in all Government activities”)* (Male program staff)

*(“Now that you are probing on such questions, you are right we should be considering gender because post harvest management involves both women and men. So for our programs to be effective we need to consider how women and men are affected by any intervention. We need to be trained how to deal with such”)* (Male program staff)

It was observed however that there has been a paradigm shift in the way jobs were allocated. It was noted for example there were more women being allocated as camp extension officers than it was in the past. It was mentioned further that whereas gender is talked about at several forum, it would be more effectively applied if it were made part of the curriculum. Gender in the project was not articulated. However for purposes of understanding the dynamics of who was participating in the project, data is disaggregated by gender. It was further indicated that there are no deliberate training of the officers on gender; however gender would just be talked about in passing. All the respondents indicated that there were not directly involved in gender mainstreaming and they have never attended any gender training and they were interested in gender training. Staff were asked to identify training needs that if met would enable them effectively address gender in their programs. The following were training needs identified:

- Gender analysis and planning;
- Gender mainstreaming skills to engender other programs;
- Gender sensitive monitoring and evaluation skills;
- Gender training of trainers;
- Policy analysis (analyzing policies from a gender perspective);
- Gender responsive budgeting;
- Gender advocacy training;

- Training of women in metal silo and;
- Dissemination of technical messages on metal silo technology to women farmers.

It was indicated that there were no main achievement towards gender mainstreaming and the following were the challenges:

- Inadequate resources for constant follow –ups;
- Resources for gender issues are limited;
- Training for officers in gender related issues not done;
- Facilities to enhance gender mainstreaming not available;
- Budget line for mainstreaming amd;
- Training workshop to be adapted to cater for both females and males

## **10. Discussion of Major Findings**

The study revealed that the traditional granary (*nkhonkwe yamakolo*) was constructed by men and handed over to be used by women. Crops stored in the granary belonged to the woman because of her gender role of processing and preparing meals for the family. Maize stored in the *nkhonkwe* still required a lot of work to be done like dehusking, shelling, winnowing and bagging. Traditionally all these roles were done by women. Local maize was widely used and it stored well in the *nkhonkwe* with minimum post-harvest losses. Quantities harvested were less due to non-use of fertilizers. During this period women knew exactly how much they had harvested and they would plan accordingly to ensure food security in their households.

However, the situation changed with the introduction of hybrid maize and use of fertilizers resulting in household experiencing bumper harvests. Hybrid maize is not preserved well in *nkhonkwe* resulting in high post-harvest losses. Bumper harvests also saw community members working together to move maize from the field to homestead and involvement of men in arranging transportation of maize using scotch carts. Community members could be invited to participate in de-husking, shelling, winnowing and bagging. Introduction of metal silos (*nkhonkwe yasopano*) has minimized post-harvest losses as maize can be stored longer. Farmers were also able to sell excess maize at a later time when the selling price was more profitable enabling some farmers to acquire household assets. Food security at household level was assured. In the midst of all the merits of the metal silo women's control over PHM

has reduced. This is because of the following factors: nkhonkwe yamakolo and its contents belonged to the woman and she had the right to plan and make all the decisions. Now nkhonkwe yasopano and its contents belonged to the man and he makes all the decisions of how much to sell, give away, keep etc. Metal silo requires some level of literacy reading and writing which is a preserve for men in Zambia as illiteracy rates for women is high compared to men. Institution involved in the metal silo technology development, promotion, dissemination and adoption used gender blind approaches that missed the opportunity to take women's needs and aspirations into account. The few women who were randomly selected their involvement was minimum as their husbands immediately took over learning about the metal silo excluding their wives, even the signing acknowledging receipt of the metal silo was done by their husbands as they could not write. This has resulted in the subsequent visits and names of the metal silo shifting to be owned by the husband yet originally it was assigned to the wife.

These findings support the arguments provided by the Kabeer Social Relations Approach that can be used to assess how gender discrimination and inequalities are created, maintained, and reproduced in institutions like household, community, market and states. The approach assesses the immediate, underlying, and structural factors that maintain and reproduce inequality. The social relations are shaped by rules, resources, people, activities and power. Institutions operate in different ways and reflect the undergirding gender policies that are gender blind, neutral, aware, specific, or redistributive. The social relations approach identifies five aspects which institutions are examined and these are rules, activities, resources, people and power. These concepts are defined as follows: Rules refer to how things get done; Activities refers to what is done; Resources refers to what is used and what is produced; People refers to who is in, who is out, and who does what and; Power refers to who decides, and whose interests are served.

For this study these concepts will be used for analysis. CIMMYT and its implementing partners drew rules on how the EGSP II Project would be undertaken. The rules included activities and resources of what was to be used, for what purposes and the expected end results. The project also identified the necessary people to work, who to benefit, who is not included and who decides what at which level, whose interest will be served and the overall objective of the project. All this resulted in a gender neutral project outcome. Fortunately this was realized before the end of the project and a gender strategy was developed to ensure that

gender equality is achieved. According to Kabeer this will eventually result in institutions that have policies that are gender aware and are also redistributive.

Results of the study show that metal silo can have a positive outcome for all the members of the household if gender issues are taken into consideration and both women and men benefit from improved storage technologies.

## **11. Suggestions for the Gender Strategy for PHM**

### **a) Technology Development – Artisans**

The study observed that the project Artisans were selected on the premise that they were already practicing tinsmith as a trade which is male dominated in Zambia. Their level of education was generally low and they lacked business development skills. The ideal or best practice the study suggested was to select both females and males. Students training as artisans are enrolled in Vocational Colleges. Such students are already acquiring a skill and their syllabus included topics such as entrepreneurship, business development and planning, book keeping and marketing. Additional training as artisans would further develop a critical mass of artisans that are able to develop their businesses accordingly.

Major needs for the artisans are financial loans (these could be provided in form of materials needed for manufacturing metal silos) to kick start production and further training on gender in PHM. CIMMYT and the other implementing partners could utilize the existing human resources, financial and other resources available. Training workshop to include the following topics: gender and metal fabrication; gender relations in PHM; benefits of technology for women and men, entrepreneurship, business development and planning, book keeping and marketing.

Training workshops should be tailored to meet the needs of various strata. A training manual should also be developed accordingly. In view of high staff turnover the training manual should be included as part of the key result area for Extension Officers in MAL. Multi layered reporting mechanism should be developed from camp agricultural extension officers to district, provincial and national offices. Section of the report should contain gender mainstreaming in PHM. Gender should be mainstreamed not integrated in the project cycle and the logical framework. Short term consultants could be engaged to undertake the task in conjunction with CIMMYT and other implementing partners.

Both female and male participants should be trained as artisans. To achieve gender equity the next training should be targeted exclusively for females. Ideally the next recruitment exercise should be undertaken from vocational colleges in Eastern Province. Artisan's business development strategies should include the following: camp agricultural extension officers should involve Artisans in all related block, district, provincial and national field days. Artisans mobile contact details should be broadcasted in both print and electronic media.

Each Artisan should be assigned to different villages for effective marketing coverage. Artisans should lobby for free slots (local radio and television stations) to market metal silos. Artisans should manufacture miniature metal silos for displays and marketing purposes. On market segmentation Artisans should focus their marketing strategies to different group's- female, male and youth farmers. For follow-up purposes artisans should develop customer data base for prospecting and those that purchased metal silo. Artisans should conduct after sale regular visits to their customers. Use of mobile phones should also be enhanced especially to target the youth.

Storage technology preferences men preferred big (more than one tonne) metal silos for storing grain for sale. Women opted for both small and big sizes. Big silos for storing grain for household food security while smaller silos for seed storage. For security reasons a locking device was suggested. Youths preferred smaller silos for storing popcorn grain and groundnuts for sale.

#### **b) Technology Delivery – Implementation Partners**

Study results revealed that gender was not mainstreamed in the institutions where gender audits were conducted. More men than women were involved in EGSP work. Institutional budgets allocated to PHM activities were generally low. Specific budgets for gender mainstreaming were not available. In addition, institutionalized gender policy and strategies were not available. Individual role in gender mainstreaming was not clear and staff gender capacity was low. This resulted in the institutions being gender neutral in their technology delivery. All the staff were willing to be trained in gender and the following topics were suggested: gender analysis and planning; gender mainstreaming skills to engender other programs; gender sensitive monitoring and evaluation skills; gender training of trainers; policy analysis (analyzing policies from a gender perspective); gender responsive budgeting; gender advocacy training and; training of women in metal silo fabrication and dissemination of technical messages on metal silo technology to women farmers.

#### **c) Research**

There was dearth of information on gender and PHM, gender and technology, gender issues and gender relations in agriculture. More qualitative research needs to be undertaken. Socio-economic research using qualitative methods should be undertaken to provide more insights in gender and PHM.

#### **d) Government Policy**

Research has revealed that all implementing partners had no institutionalized gender policies but relied on the National Gender Policy (NGP). Officers had no knowledge on what is contained in the NGP. MAL and ZARI to appoint Gender Focal Point Person whose key result area will be to coordinate, monitor and evaluate gender mainstreaming efforts. CIMMYT and its implementing partners should facilitate the development of institutionalized gender policies.

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