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Economic Value of Farming Productions in Mwekera Farming Block: Case Study

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About Article

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ABSTRACT

This study evaluates the economic value of smallholder agricultural production in the Mwekera Farming Block, Copperbelt Province, Zambia, focusing on its influence on household consumption and savings behavior. Despite growing recognition of smallholder agriculture's role in rural welfare, there is limited empirical evidence quantifying how productivity variations translate into measurable household-level economic outcomes in Zambia. This study fills that gap by analyzing data from 100 households using descriptive and inferential statistics, including ANOVA, Fisher's Exact Test, and Chi-square tests. These results showed that 76% of the households had increased their production, with most consuming farm produce for more than eight months of the year, thus confirming the centrality of agriculture to food security. However, ANOVA results showed no significant differences in household consumption across yield categories, as shown by $F = 0.92$ and $p = 0.4001$, implying relatively uniform household sustenance irrespective of yield. Similarly, saving analyses revealed no statistical difference between yield groups, as supported by $F = 2.01$ and $p = 0.1402$, and thus agricultural income contributes equally in all households toward raising their savings capacity. Employment analysis, $F = 0.39$ and $p = 0.6805$, also revealed no significant difference and, again, stresses the seasonality of rural work. These findings verify the hypotheses that agricultural production improves household consumption and saving potential, but the insignificance across categories may also represent small-sample limitations and homogeneity of operations among smallholders. The overall conclusion of this study is that agricultural production remains key in rural welfare, but increased financial inclusion, access to extension services, and use of agricultural technologies are required to ensure production growth translates into sustainable livelihoods.

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1. INTRODUCTION

This section presents the study, highlighting agriculture's international and local significance and challenges in Zambia. It targets Mwekera Farming Block, where land-use transformation has boosted farming activity, but the economic significance of production is uncertain. The section describes the objectives, relevance, and theoretical foundation connecting agricultural production with household welfare outcomes.

1.1. Background

Agriculture remains the global socioeconomic development driver, providing jobs, livelihoods, and industrial raw materials and sustaining rural livelihoods (Norton *et al*., 2021). In Sub-Saharan Africa, over 60% of the employment is based on smallholder agriculture, which contributes about 23% of the region's gross domestic product (Giller *et al*., 2021; Nyambo *et al*., 2022). While it constitutes the pillar of agrarian economies, the sector remains vulnerable to traditional constraints such as poor access to productive inputs, inefficient farm management, and uncertain policy support. These restrictions constrain crop production and decelerate agriculture in promoting household welfare, particularly in food consumption and saving capacity (van Ittersum *et al*., 2016; Rege & Sones, 2022; Agostoni *et al*., 2023).

Agriculture in Zambia contributes to over 9% of the country's GDP and is a fundamental element of rural households' livelihoods in food security, job creation, and income (Kanyanga *et al*., 2013; Kapotwe & Tembo, 2021). Small-scale farmers characterize the sector, yet it is highly vulnerable to drought and erratic rainfall distribution. Cereals such as maize that provide around 90% of national cereal consumption demonstrate the close link between farm production and local subsistence (European Commission, 2020; Wood, 2024). The recent events, including the drought caused by the 2023–2024 El Niño, have highlighted smallholder farmers' exposure to climatic shocks and the suggested impact on consumption, income stability, and ability for savings (Mwaba *et al*., 2024).

The Copperbelt Province Mwekera Farming Block is a case in point. It is endowed with good soils and diversified cropping systems that possess significant potential for enhancing household food security and income. Local agricultural production's economic contribution to its effect on household consumption and savings behavior, among other things is nevertheless still inadequately documented (Manyana & Chibomba, n.d.; Mulenga *et al*., 2025). While agricultural production is obviously tasked with the responsibility of sustaining household nutrition, its contribution to savings and financial stability in the long term is not so obvious.

This study therefore seeks to estimate the economic value addition of smallholder farming in Mwekera Farming Block by establishing how agricultural production influences household consumption levels and savings patterns. This nexus is crucial to learn for policy impact on financial inclusion, reinforcement of reinvestment, and resilience building of rural livelihoods through increased agricultural productivity.

1.2. Problem statement

Mwekera Farming Block, Copperbelt Province, is smallholder/medium-scale diversified farming soils that are productive, but the economic contribution achieved by the local farm production (employment, savings, consumption, reinvestment) has been poorly recorded (Manyana & Chibomba, n.d.; Mulenga *et al*., 2025). Remote sensing and GIS data analysis confirmed widespread land-use change in the Mwekera Forest Reserve: 30% agricultural land, 48% forest and 22% settlements/naked land in 1998, and trends (1998–2018) indicating continued deforestation with the expansion of agriculture and settlement (Kanja *et al*., 2017). Local trends are a copy of large SSA land-use trends (Brink & Eva, 2009) and raise issues regarding the effects of forests to agriculture transition on local employment, saving, food security, and local incomes.

1.3. General objective

The general aim of this study is to quantify the economic value addition of agricultural production among the smallholder households of Mwekera Farming Block through savings and consumption by the household.

1.3.1. Specific objectives

i. To examine the impact of agriculture production on consumption.

ii. To examine the impact of agriculture production on savings.

1.4. Significance and scope

The study contributes by providing empirical evidence on how smallholder farm production enhances household welfare through its effects on food consumption and savings patterns. In exploring the relationship between farm production, household nutrition, and financial conduct, the study provides critical insight for policymakers, development agencies, and agricultural institutions concerned with triggering inclusive rural development and financial resilience.

About smallholder farmers in the Mwekera Farming Block, production and economic activities are considered from the recent farming season to capture the direct link between farm productivity, domestic consumption, and saving capacity. Expected outcomes are to inform specialized interventions in rural finance, extension services, and adoption of farm technology to improve household consumption stability and long-term economic security (Sánchez *et al*., 2022; Kristkova *et al*., 2017).

1.5. Theoretical/conceptual framework

This study is grounded on the Sustainable Livelihoods Framework (SLF) and Agricultural Household Theory (AHT), which collectively constitute a holistic approach for the analysis of economic value of farm output among smallholder farmers in Mwekera Farming Block.

The Sustainable Livelihoods Framework (SLF) contends that households use a combination of natural, social, physical, and financial capital to access sustainable livelihood outcomes such as income, food security, and savings (Opiyo *et al*., 2024; Su *et al*., 2025). SLF emphasizes the interaction between resources, external shocks, and institutions in the determination of well-being among rural households.

The Agricultural Household Theory (AHT) builds upon this by describing the way in which farm households make consumption and production decisions simultaneously, observing agricultural output as a marketable commodity as well as a means of direct consumption and earnings. This duality is particularly relevant to smallholder situations in which agricultural choice influences everyday consumption and saving activities.

Through combining these two models, the study establishes a conceptual framework for estimating how variations in agricultural productivity affect household consumption levels and saving capacity and therefore estimates the broader economic value of Mwekera smallholder farming.

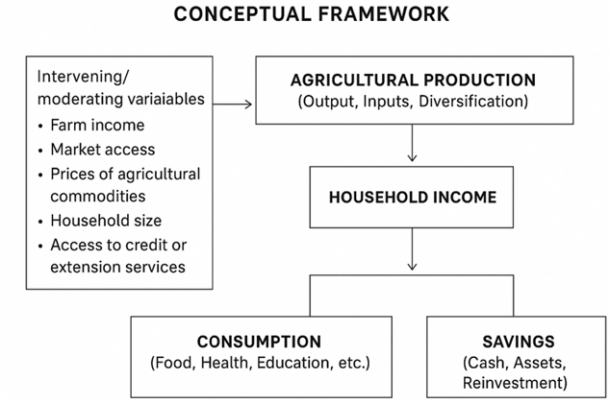

Figure 1. Conceptual framework

2. LITERATURE REVIEW

This chapter presents a summary of the effects of agricultural production on food security, savings for households, and employment. It addresses the role of production towards food security, examines farm revenues and savings, and develops the conceptual framework and hypotheses relating production to investment and employment.

2.1. Agricultural production and food security

Agriculture is central to the attainment of food security, reduction in poverty, and rural development. However, literature on how gains in agricultural production translate into improved welfare for the household is divided. While early conceptions of food security emphasized availability and access to food, contemporary frameworks incorporate utilization, stability, and equity (Clapp *et al.*, 2022). Barrett (2021) extends it by mentioning systemic inequalities and ecological limits which restrain the traditional "*production-equals-security*" narrative. That denotes a very important issue in SSA, where agriculture is both livelihood and vulnerability.

A comparison of global evidence shows distinct regional dynamics. In developed economies, the works of Calloway *et al.* (2023) and García-Díez *et al.* (2021) point to nutritional insecurity in the face of surpluses resulting from unequal access and poor dietary quality. Meanwhile, Van Ittersum *et al.* (2016), Heffer *et al.* (2017), and Vanlauwe & Dobermann (2020) have highlighted low productivity and resultant soil infertility and lack of mechanization as major reasons for food insecurity in SSA. The underlying fact, however, is that while high-income countries are fighting the quality of diets, developing economies are still struggling with quantity and stability. However, convergence does appear in the recognition that nutrition-sensitive agriculture - through improved seed varieties, biofortification, and dietary diversification-is required for sustainable food and health outcomes in both contexts (Muscaritoli, 2021; Chowdhury & Ray, 2024).

The broader debate, however, emphasizes that global food security challenges are structural. According to Sekaran *et al.* (2021), one in nine people globally suffers from persistent undernutrition; smallholders living in degraded environments comprise a considerable bulk of this. Growing populations and changing diets, especially those toward more protein-intensive foods, further increase the pressure on agricultural systems (Bruinsma, 2009; Weindl *et al.*, 2020). This supports Popkin *et al.*'s (2012) view wherein, although demand-side pressures are increasing, supply-side capacity is still constrained by environmental degradation and technological gaps.

Empirical findings in SSA support these views. Smallholder farmers obtain yields below half of those obtained in experimental plots, which usually receive adequate fertilizer, irrigation, and proper agronomic management that can lead to yields above 6 Mg ha−1 (Bationo *et al.*, 2007; Dossou-Yovo *et al.*, 2020). Yield gaps reflect lost opportunities, therefore, to enhance household food availability and cushion against price volatility. Evidence also shows that higher smallholder productivity enhances household food variety and makes households more resilient to seasonal food shortages (Ogunniyi *et al.*, 2021; Lowder *et al.*, 2016; Taherzadeh & Mogollón, 2024).

The general trend observed in SSA is no different in Zambia. In fact, fragmented landholdings, declining soil fertility, and climate variability-particularly recurring droughts and floods-have remained significant risks to yield and incomes. Petros *et al.*, 2025. Staple crops such as maize, sorghum, and wheat are thus vulnerable to such climatic changes in household food and nutrition security. An emerging consensus in literature is thus that although increased production is critical for improving food security, quality, stability, and sustainability of agricultural output are equally important to household welfare.

2.2. Farm income and household savings

Generally, households in rural economies display heterogeneity in incomes, which are combined from agricultural production, off-farm employment, remittances, and social transfers. The mix of incomes determines welfare levels and the capacity of households to reinvest in agriculture and diversify livelihoods. Agriculture remains the most important income source in most rural economies, especially for smallholders and subsistence farmers. However, the income level derived from farming varies greatly depending on farm size, market access, and productivity. This variability exposes smallholders to income shocks that undermine savings capacity and long-term investment.

However, literature varies regarding the sustainability of farm incomes. Reardon *et al.* (1998) and Davis *et al.* (2010) argue that farm revenues alone cannot sustain household welfare in conditions of fragmented land ownership and market inefficiency. Off-farm income is therefore both a risk management tool and crucial for livelihood diversification. In

developing economies, non-farm income contributes 30% to 50% of total household earnings, smoothing volatility and allowing saving over some periods. On the other hand, Chamberlin and Jayne (2020) stress that institutional policy interventions could, theoretically, serve as a stabilizer by smoothing farm incomes, as happens with the EU's Common Agricultural Policy (Volkov *et al.*, 2019). Such policies reduce exposure to market and environmental shocks but risk creating dependency or unequal access to benefits between commercial and subsistence producers. This scholarly tension illustrates a rather broader question: whether rural livelihood sustainability should depend on diversification or institutional protection mechanisms.

In addition, the structure of rural income is further complicated by remittances and social transfers. For example, Lucas (2007) shows that households receiving remittances show greater resilience when faced with agricultural shocks. Transfers compensate for consumption and finance farm investment. Similarly, Mishra *et al.* (2012) show that social transfers, such as pensions, child benefits, and targeted welfare programs, reduce vulnerability and indirectly enhance savings because household resources are freed for productive use. Finally, Igwe (2013) explains that rural household income is dynamic and multidimensional; it is built from agricultural and non-agricultural sources in order to raise stability and reinvestment capacity. These contributions show that what matters in determining the resilience of rural income systems is not any one stream of income, but how multiple streams of income interact within the household economy.

Even with such diverse sources of income, smallholder farmers are still confronted with constraints that affect productivity and savings behavior. According to Townsend (1994) and Dercon (2008, 2009), liquidity constraints lie at the core of constraints on productivity growth and welfare. Financial management then becomes key in balancing household expenditure, sustaining production, and securing long-term viability. As such, smallholders more often rely on a mix of internal and external resources-saving, informal networks, and formal credit-to finance consumption and investment (Omobitan & Khanal, 2022; Banerjee & Duflo, 2007). However, formal credit is in most situations not widely accessible within rural economies. Khanal and Omobitan (2020) note that a shortage of credit suppresses consumption smoothly and restricts investment in modern technologies, while Guirkinger and Boucher (2008) suggest that these binding constraints shape current and future investment decisions.

Off-farm income, therefore, has become an essential part of planning household finances even in rural settings. Briggeman *et al.* (2009) and Brown & Weber (2013) find that off-farm work contributes up to 80% of additional household earnings, hence helping to meet the families' expenditure needs and accumulate precautionary savings. Adhikari and Khanal (2021); Omobitan & Khanal (2022) further note that diversified sources of income build resilience against shocks such as floods, droughts, and price fluctuations. This, however, is often the case when households have limited financial access or are exposed to greater risk. Their priorities lie with short-term consumption rather than long-term savings, weakening their economic stability.

The contribution of productivity to farm income and savings has also been considered in depth empirically. Lu and Hu (2015) show that agricultural productivity, itself a function of land use efficiency, input intensity, and government support, remains one of the primary determinants of rural welfare. Fragmented landholdings and small farm sizes negatively affect profitability, while land consolidation and an improved transfer mechanism led to increased incomes (Xu *et al.*, 2020; Peng *et al.*, 2022). On the contrary, Cai *et al.* (2015) suggest that land transfer cost being excessively high could offset these benefits. Input utilization is equally important: fertilizers, pesticides, labor, and infrastructure contribute to cost efficiency and improvement in yield (Li *et al.*, 2016; Ragasa & Chapoto, 2017). Mechanization is steadily associated with higher productivity and reduced labor cost (Peng *et al.*, 2022; Hu & Zhang, 2018), besides improving crop quality and protecting against weather shocks (Berdnikova, 2018). At the macro level, She *et al.* (2013) and Zhou *et al.* (2017) noted that institutional support determines resource efficiency and the determination of revenue through, especially, inputs and land policies. Technologies, information access, and human capital development further reinforce productivity outcomes (Chen, 2019; Lei *et al.*, 2021).

Empirical results from Hubei Province, China, proved that mechanization enhances agricultural output and household income for reinvestment (Peng *et al.*, 2022). These findings collectively prove that productivity is a driver and reflection of effective farm management systems. However, increasing productivity is only part of the equation, while the capacity to transform higher income into savings is tied to demographic, institutional, and behavioral factors. Feyissa & Gebbisa (2021) and Sisay (2023) point out that the pattern of saving among small-scale farmers depends on socioeconomic characteristics such as age, education, household size, farm size, and availability of credit. Moges *et al.* (2021) similarly note that longer travel time to markets or financial institutions lowers the propensity to save, especially for households in liquidity constraint situations. Education and financial literacy, on one hand, reinforce savings discipline through the promotion of formal saving practices (Addis *et al.*, 2019; Bollinger *et al.*, 2022). On the other hand, access to credit increases the possibility of flexibility and, subsequently, risk management (Asfaw *et al.*, 2023; Mazengiya *et al.*, 2022).

Using data from rural Tanzania, Strzelecka & Zawadzka (2023) find that a larger farm size and higher income increase the probability of saving, while having a large family or a higher dependency ratio diminishes the capacity to save (Lugauer *et al.*, 2019; Sibuea & Sibuea, 2020). Empirical studies have established a consensus that diversification, technological advancement, and financial inclusion all jointly account for household saving performance. Households that combine sources of income and adopt improved farming methods like improved seeds and fertilizers increase productivity and hence their capacity to save (Sisay 2023; Asfaw *et al.* 2023). On the other hand, long-term accumulation is constrained by structural binding constraints such as credit, infrastructure, and climate risk. Kambali & Panakaje (2022) observe that agricultural finance remains one of the critical determinants of sustainable income generation because farming activity is capital intensive with a seasonal nature.

For instance, in India, where agriculture is the occupation of 70% of the population but the contribution to GDP is no more than 14%, the productivity and savings tendency are locked between structural bottlenecks such as fragmented ownership and a weak irrigation system (Singariya & Sinha, 2015; Kambali & Panakaje, 2022). Targeted financial inclusions like the Pradhan Mantri Jan Dhan Yojana have bridged such gaps by facilitating mechanization and expanding credit opportunities to households (Kelly *et al*., 2003; Kambali & Panakaje, 2022). Savings behavior among smallholder farmers thus remains a function of various demographic, economic, institutional, and behavioral factors. Credit accessibility, financial literacy, market infrastructure, and education affect the capacity to save and invest. However, the reviewed literature also shows that despite great progress in understanding these determinants, gaps remain on how agricultural investments translate into welfare outcomes such as consumption, savings, and employment generation across different contexts.

2.3. Conceptual implications and hypothesis development

The reviewed literature establishes a consistent yet nuanced relationship between agricultural production and household welfare: while productivity enhances food availability and income potential, its ultimate impact is based on institutional, demographic, and behavioral factors that mediate how households allocate and use resources. Studies from SSA and Asia confirm that improved agricultural output leads to better food consumption patterns, income diversification, and eventual savings accumulation. However, the strength of these linkages remains context-specific, being influenced by access to markets, credit, and adaptive capacity to shocks.

This work is based on the Sustainable Livelihood Framework and Agricultural Household Theory, both of which assume that agricultural capital and productivity are crucial in determining household welfare outcomes. Thus, this study hypothesizes that:

H1: Higher agricultural production enhances household food consumption by improving the availability and quality of food.

H2: Improved agricultural production enhances household savings through increased disposable incomes and reduced vulnerability to income shocks.

The empirical testing of these hypotheses allows this study to contribute to the growing debate on how agricultural intensification is translated into improved welfare outcomes in resource-constrained settings such as Zambia, thereby bridging the gap between production-oriented and livelihood-oriented approaches in rural development.

3. METHODOLOGY

This chapter will explore and establish the criteria to be used for investigating the research topic. This will outline the theoretical information approach to the production of data that is primarily concerned with how this study is going to be undertaken. This chapter will outline the research design, target population, target population, the sampling design, how the sample size will be determined, the data collection techniques, the data analysis, triangulation, the limitations of the study and the ethical issues that will be put into consideration when conducting this research paper.

3.1. Research design

The study employed a descriptive and analytical research design to assess the economic value of farming production among smallholder farmers in Mwekera Farming Block, Copperbelt Province, Zambia. The use of this design is since it supports qualitative and quantitative analysis, which enables the description of socioeconomic characteristics of farming households and examination of correlation between agricultural production and economic variables such as consumption, savings, investment, and employment.

3.2. Study area

The study was conducted in Mwekera Farming Block, some 15 kilometers east of Kitwe in Copperbelt Province. The block covers a total area of approximately 2,843 hectares and consists of a mix of smallholder and medium-scale farms. The most common crops produced are maize, cassava, and vegetables. The area has a humid subtropical climate with mean annual rainfall of approximately 1,200 mm and temperatures ranging from 17°C to 28°C. Mwekera was selected as the study area due to its agricultural potential and ongoing deforestation for cultivation.

3.3. Population and sampling

The study involved all smallholder farmers in the Mwekera Farming Block, according to Ministry of Agriculture records, the total population of smallholder farmers in the area is approximately 600. Stratified random sampling was employed to select a sample of 100 farming households with a goal of representation of farm sizes and gender of household heads. The sampling frame was obtained from the local Ministry of Agriculture extension office. With Yamane's (1967) formula for finite populations, a 95% confidence level, and a 5% margin of error, the sample size was determined. This assisted in taking an adequate and representative sample of the farming populace.

$$n = \frac{N}{1+N(e^2)}$$

Where,

n = Required sample size

N = Total population size

e = Margin of error (set at 5% or 95% confidence level)

While the formula suggests a sample size of 240 respondents for maximum statistical precision, the study administered 100 questionnaires due to practical considerations including time, resource availability, and logistical constraints. Despite being smaller than the calculated sample, this number was sufficient to capture the diversity of smallholder farming practices and economic outcomes within the population.

3.4. Data type and sources

Primary as well as secondary data were used in the study. Primary data were collected with the help of structured questionnaires filled by head of the household on demographic profile, level of production, household consumption, income, savings behavior, investment, and employment generated due to farming. Secondary data was collected from government documents, the publications of the Ministry of Agriculture, and

allied scholarly studies for comparative perspective.

3.4.1. Operationalization of key variables

The following study focuses on two major variables: household consumption and household savings. Their measurement follows below:

3.4.1.1. Household consumption

Measured as the total monthly household expenditure in Zambian Kwacha, including expenditure on food and non-food items.

i. Continuous variable, suitable for statistical analysis by ANOVA.

ii. Consumption levels were categorized as follows for descriptive purposes:

- Less than 1,000 ZMW
- 1,000–3,000 ZMW
- 3,001–5,000 ZMW
- Above 5,000 ZMW

3.4.1.2. Savings of households

Measured as the actual amount of money saved per month in ZMW after meeting household expenditure.

i. Continuous variable used inferential statistics.

ii. Other categorical indicators are:

- *Ability to Save:* Household perception (Increased, No Change, Reduced)
- *Place saved:* Where savings are stored (Bank, Mobile Money, Cash, Savings Group)

These definitions indicate the scale and type of each variable, thus responding to concerns about appropriateness for ANOVA.

3.5. Data collection procedure

Questionnaires were pilot tested with 10 farmers from beyond the major sample to test clarity and reliability of questions. Data collection was accomplished through direct interviews by trained enumerators who spoke the local languages. Ethical procedures were ensured by obtaining verbal consent from all respondents and ensuring confidentiality of response. Questionnaire approach was supplemented by field observation for cross-checking response on farm activities and production levels.

3.6. Data analysis

Data was entered, cleaned, and analyzed using Stata version 17. Descriptive statistics (means, frequencies, and percentages) summarized household consumption and savings. The inferential statistics included ANOVA, comparing average consumption and average savings across groups based on categorical variables like:

- Age group
- Gender
- Education level
- Household size
- Farming type

ANOVA was appropriate because the dependent variables of consumption and savings in ZMW are continuous while independent variables are categorical. This allows the testing of whether mean consumption or mean savings differ significantly between household categories. For non-parametric comparisons, Chi-square tests were used for categorical aspects such as savings place or perceived ability to save.

3.7. Analytical framework

The study was guided by the Agricultural Household Model (AHM) and the Sustainable Livelihoods Framework (SLF). The SLF articulates household welfare in human, physical, natural, financial, and social capital terms, and the AHM puts household consumption and production decisions under one roof (Ellis, 2000). These two frameworks provided theoretical guidance in establishing the ways in which agricultural production influences household consumption, savings, reinvestment, and employment generation.

3.8. Limitations of the study

The main study limitations were recalling bias in domestic saving and consumption reports, and limited access to some remote farms. However, these limitations were overcome through effective questionnaire design, data triangulation, and field validation.

4. RESULTS AND DISCUSSION

The study's conclusions provide insight into several areas related to the economic value of agriculture production and agricultural methods used by the farmers in the research area. This chapter will discuss the key findings depending on the objectives in chapter one. On month consumption, Savings, income generation as stated in the objectives. Key metrics from savings behavior, savings, consumption and investment behavior were discovered by combing quantitative and qualitative insights. The primary conclusions and their ramifications are summarized in the following overview

4.1. Overview of respondent characteristics

The survey involved 100 smallholder households of the Mwekera Farming Block. The gender constitution of the sample has been reported as 57% male-headed and 43% female-headed households as shown in table 1.

Table 1. Sample proportion of Gender

proportion Gender				
Proportion estimation			Number of obs = 100	
Proportion		Logit Std. err.	[95% conf. interval]	
Gender				
Male	.57	.0495076	.4703001	.664328
Female	.43	.0495076	.335672	.5296999

Age is presented as a distribution with the largest share in the 35–44 years cohort (40%), followed by ≤24 years (28%), 25–34 years (13%), 55+ (14%) and 45–54 years (5%), and the study presents these cohort shares rather than a single mean age as presented by figure 1 and table 2 below.

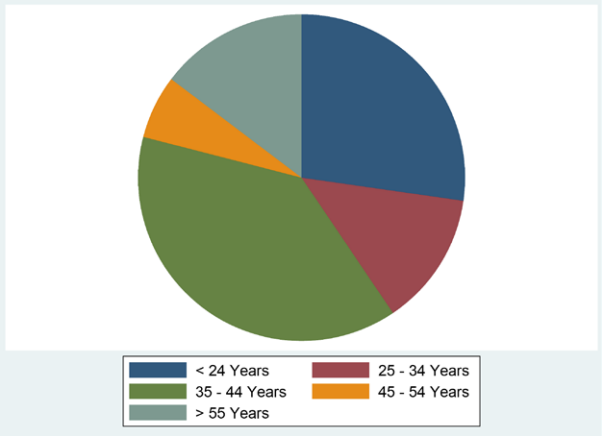

Figure 2. Sample age distribution

There are comparatively fewer mature-aged participants between 45 to 54 years, at 5%, and older than 55 years at 14%. This means that the dataset includes comparatively fewer mature-aged participants, an issue that could impact mature-aged-related information.

Table 2. Sample proportion of Age

Proportion Age				
Proportion estimation			Number of obs = 100	
Proportion		Std. err.	[95% conf. interval]	
Age				
24 Years	.28	.0448999	.199986	.3769436
25 - 34 Years	.13	.0336303	.0764939	.2123278
35 - 44 Years	.4	.0489898	.3077857	.4998904
45 - 54 Years	.05	.0217945	.0207374	.1156773
> 55 Years	.14	.0346987	.0841592	.2238364

The report does not provide an exact mean household size or mean holding in hectares in sections of the report open to examination; the study does provide similar socioeconomic and farming-experience measures, set out in table 3 (e.g., 98% of respondents cite over 10 years' experience of farming).

Table 3. Sample proportion of experience

Proportion Experience				
Proportion estimation			Number of obs = 100	
Proportion		Std. err.	Logit [95% conf. interval]	
Experience				
> 1 < 5	.02	.014	.0049219	.0776637
> 10	.98	.14	.9223363	.9950781

The proportion estimation indicates soybean cultivation as the leading among farmers under study with 48 percent of the respondents, and a 95 percent confidence interval ranging from 38.3 percent to 57.9 percent as indicated in table 4. Maize is the second crop harvested at 32 percent, followed by ground nuts at 16 percent. The least harvested among all crops is sunflower at 4 percent of farmers. These observations indicate that most of the crop production activity in the region focuses on soybeans and maize, as they represent the farmers' selection of crops with greater market demand or more environmental adaptability within the region.

Table 4. Sample proportion of cultivated crops

Proportion Crops Cultivated				
Proportion estimation			Number of obs = 100	
Proportion		Std. err.	Logit [95% conf. interval]	
Crops Cultivated				
Maize	.32	.0466476	.2352078	.4186278
Groundnuts	.16	.0366606	.0997983	.2465703
Soyabeans	.48	.04996	.3829126	.5786219
Sunflower	.04	.0195959	.0149112	.1028928

The cross-tabulations between average yield and crop produced in table 5 indicate stark differences in the average sizes of yields among the four crops. Soyabeans maintained the highest mean yields among the 100 farmers, with all 48 averaging above 5 tons. Maize was also doing well, with 31 of the 32 farmers averaging above 5 tons. On the other hand, sunflower and groundnut had more variation for groundnuts, whereas most of the farmers (8 out of 16) got between 0.5 to 1.5 tons, some farmers were distributed among all the yield classes in the instance of sunflowers.

Table 5. Cross tabulation of crop-cultivated to average yield

Tabulate Crops Cultivated Average Yield, exact				
Enumerating sample-space combinations:				
stage 4: enumerations = 1				
stage 3: enumerations = 14				
stage 2: enumerations = 7				
stage 1: enumerations = 0				
Crops	Average Yield			
Cultivates	> 0.5 ton	> 1.5 ton	> 5.0 ton	Total
Maize	0	1	31	32
Groundnuts	2	8	6	16
Soyabeans	0	0	48	48
Sunflower	1	1	2	4
Total	3	10	87	100
Fisher's exact =			0.000	

Fisher's Exact Test gave a p-value of 0.000 that showed there was a highly significant association between the crop type grown and the amount of yield attained. This means that the

results of the yields do not occur randomly but are influenced by the type of crop which has been cultivated. That is, maize and soyabeans will yield very much compared to ground nuts and sunflowers in the context of the study at hand.

4.2. Agricultural production and household consumption

The study found that 76% of households reported increased meal production, with all households depending on farm produce for at least eight months annually. This indicates a strong link between agricultural production and household food security as shown in table 6.

Table 6. Tabulation of average yield against household consumption

Tabulate Average Yield Production on Meals, chi2			
Production on Meals			
Average Yield	**Increased Quality**	**Increased Variety**	**Total**
> 0.5 tones < 1.5 ton	3	0	3
> 1.5 tones < 5.0 ton	8	2	10
> 5.0 tones < 12.0 to	65	22	87
Total	76	24	100
Pearson chi2(2) = 1.1141		Pr = 0.57	

However, households also indicated that agriculture contributed to more than 8 months of their consumption in a year, this clearly shows that there is dependence on agriculture for sustenance as indicated in table 7 below.

Table 7. Sample proportion on average months sustenance

Proportion Sustenance on Farm			
Proportion estimation		Number of obs = 100	
Sustenance on Farm	**Proportion**	**Std. err.**	**Logit [95% conf. interval]**
> 8 Months	1	0	- -

The ANOVA results in table 8 did not indicate a statistically significant difference, at p > 0.054, between yield categories and levels of household food consumption. Although this may suggest, at face value, that agricultural output contributes uniformly to food availability across households, the lack of significance could also be a result of small sample size, n = 100, or imprecision in measuring household consumption. These results should therefore be treated with caution; the apparent uniform benefits of agricultural production on consumption could be because of low statistical power or measurement constraints rather than true equivalence in consumption levels.

Table 8. Anova analysis of consumption on average yield

oneway Monthly Consumption AverageYield, bonferroni					
Analysisof variance					
Source	**SS**	**df**	**MS**	**F**	**Prob > F**
Between groups	.612873563	2	.306436782	0.92	0.4001
Within groups	32.1471264	97	.331413675		
Total	32.76	99	.330909091		

Bartlett's equal-variances test: chi2(1) = 3.7100 Prob>chi2 = 0.054
Note: Bartlett's test performed on cells with positive variance: 1 multiple-observation cells not used

Similar results were reported by Ngoma *et al.* (2021), who noted that smallholder farmers' production increases food access but not necessarily dietary diversity. The findings confirm that Mwekera's farming households are food secure but nutritionally limited, implying the need to diversify production toward high-value crops and livestock.

4.3. Savings behavior among farming households

Most households as indicated in table 9 showed that (94%) reported saving part of their farming income in cash and (6%) indicated using mobile money, but the savings amounts were smaller than ZMW 1,000 per season.

Table 9. Sample proportion of saving method

Proportion Place Saved				
Proportion estimation		Number of obs = 100		
Place Saved	**Proportion**	**Std. err**	**Logit[95% conf. interval]**	
Mobile Money	.06	.0237487	0269346	.128305
Cash (home)	.94	.0237487	.871695	.9730654

These findings indicate that most households rely on keeping cash at home as their primary savings method. Only a small minority utilize formal or semi-formal financial channels like mobile money. Combined with the previous analysis showing that mobile money users experienced an increase in their ability to save, this suggests a strong opportunity for promoting financial inclusion and encouraging adoption of mobile or formal savings platforms to improve household savings outcomes.

The ANOVA results in table 10 indicate that differences in mean ability to save across yield groups are not statistically significant. Between-group variance was 0.224, compared to a within-group variance of 5.416, yielding an F-statistic of 2.01

with a p-value of 0.1402. This suggests that while there are small differences in reported ability to save by yield category, these differences are not significant at conventional levels. This aligns with the previous findings, as most farmers consume their farm produce for up to 8 months continuously.

Table 10. Anova analysis of average yield on savings

Oneway Ability to Save Average Yield, bonferroni					
Analysis of variance					
Source	**SS**	**df**	**MS**	**F**	**Prob > F**
Between groups	.223908046	2	.111954023	2.01	0.1402
Within groups	5.41609195	97	.055836		
Total	5.64	99	.056969697		

Bartlett's equal-variances test: chi2(1) = 10.9096 Prob>chi2 = 0.001
note: Bartlett's test performed on cells with positive variance:1 multiple-observation cells not used

The results align with findings by Pradhan (2021) and Lim and Spalding (2025), who observed that smallholders tend to rely on informal savings mechanisms due to limited access to financial institutions. The low savings levels in Mwekera limit reinvestment potential and expose households to income shocks. However, the positive culture of saving, even at low levels, indicates a foundation that financial institutions could build on through tailored rural banking products.

4.4. Integrative discussion and implications

Implications of the study findings provide vivid insights into the economic value of smallholder household agricultural production in the Mwekera Farming Block, relating crop yield to consumption and savings. Respondent profile description indicates a near equal distribution of gender composition among 57% male-headed and 43% female-headed households. Age composition signifies most farmers as 35–44 years (40%), with a smaller proportion of older-aged persons over 45 years (19%). This demographic map is consistent with literature emphasizing household structure, age, and experience influencing production outcomes and financial behavior (Sisay, 2023; Moges *et al.*, 2021). The sample population also reflects very experienced farmers, as 98% have over ten years of experience in agriculture, which is likely to be the reason for high levels of soybean and maize production.

Quantitative results show that soybean cultivation leads to 48% of the homes, followed by maize (32%), groundnuts (16%), and sunflowers (4%). Cross-tabulations show that maize and soybeans produce the highest yields, with over 5 tons per farmer, while groundnuts and sunflower produce more variable low yields (p = 0.000). This is consistent with Van Ittersum *et al.* (2016) and Ahmed *et al.* (2025), who emphasize smallholder farmers' contribution to increasing household and national food security. Consumption practices at the household level indicate that 76% of the respondents had prepared more meals and utilized farm products for a period of eight months annually. ANOVA results show no statistically significant difference in yield categories and consumption by households (p = 0.054), meaning production by agriculture ensures sustenance equitably among households. The evidence supports Ngoma *et al.* (2021), who noted that increased smallholder production ensures improved access to food but not necessarily to dietary variety. Reliance on grains such as maize and soybeans supports the necessity of diversifying production to nutrition-bulk crops to overturn dietary limitations, echo Clapp *et al.* (2022) and Chowdhury & Ray (2024).

Household saving habits indicate that 94% saved with cash and 6% with mobile money. Saving amounts were relatively low (<ZMW 1,000 per season), and ANOVA results show no significant differences in saving behavior according to yield classes (p = 0.1402). These findings support previous studies that indicate smallholder farmers will resort to informal saving mechanisms due to limited access to formal financial institutions (Pradhan, 2021; Lim & Spalding, 2025). While low savings limit the scope of reinvesting and shock absorption, the saving culture reveals a foundation that already exists and can be established upon with financial inclusion interventions, in consistent alignment with Sisay (2023) and Kambali & Panakaje (2022).

Agricultural production in Mwekera contributes significantly to rural employment, where 86% of the population provides seasonal jobs and 14% permanent jobs. Cross-tabulation of employment and crops indicates that soybean and maize cultivation provide more seasonal jobs, while groundnuts and sunflowers provide fewer jobs (p = 0.011). ANOVA results indicate that no significant differences in mean employment by yield groups exist (p = 0.6805), suggesting that farm work demand is more dependent on crops and farm work than on yield itself. The findings provide evidence for literature highlighting smallholder agriculture as the source of informal temporary work and rural livelihood diversification (Ogbari *et al.*, 2024; Lowder *et al.*, 2016).

The study has several policies and practical implications. While farm production guarantees household survival, food diversity is constrained, reflecting the necessity of policies promoting the growth of nutrient-rich crops and intercropping with livestock to increase the quality of food. Low levels of savings imply the necessity for easy financial services, mobile banking, and credit services adapted to small-scale farmers for encouraging reinvestment opportunities and economic stability. Families appreciate land enlargement and schooling for productive farms, indicating that policy efforts encouraging mechanization, high-tech inputs, and financial education would enhance long-run productivity and socio-economic advancement. Finally, crop selection greatly affects seasonal employment, with effects that diversified high-value crops and agro-processing can maximize employment opportunities while steadying household income.

In general, these combined results affirm that food crop production is still the backbone of Mwekera rural livelihood with implications for food security, household income, savings, and employment. Strategic measures in access to credit, input availability, and crop diversification would enhance productivity, household well-being, and climatic and economic shock resilience.

5. CONCLUSION

This study assessed the economic significance of smallholder farm production in Mwekera Farming Block, Copperbelt Province, Zambia, for household consumption, savings, reinvestment, and employment. The findings were that production on the farm was a vital source of household food security, since most households depended on the farms for survival for most of the year. As production rose, meal availability was enhanced, but farm income savings remained low and primarily informal, reflecting the partial depth of financial inclusion in rural areas. All farm income was repatriated, with the majority being utilized to increase arable land and buy inputs, whereas employment generated was significant but predominantly temporary. Statistical tests identified no statistically significant differences across yield groups, suggesting that the differences in productivity did not lead to meaningful economic gaps between households.

The study underscores the central position of agriculture to sustain rural livelihoods, improve household welfare, and ensure income-generating activities. However, it also shows inherent pitfalls such as low savings, poor credit access, poor market linkages, and dependence on conventional farming practices. These limitations mean that productivity growth may not be sufficient to transform household well-being unless complemented by institutional and financial interventions. Improving agricultural extension services, improving access to low-cost finance, and improving participation in value chains are essential for leveraging the economic contribution of smallholder farming to its fullest potential.

The paper offers empirical evidence on how smallholder production supports rural economies at the micro level and provides policy implications for policymakers and development practitioners seeking to improve agricultural productivity and household resilience through program design. Future research could build on these results by exploring longitudinal impacts of productivity growth, access to digital finance tools, and adaptation strategies on well-being among smallholders.

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