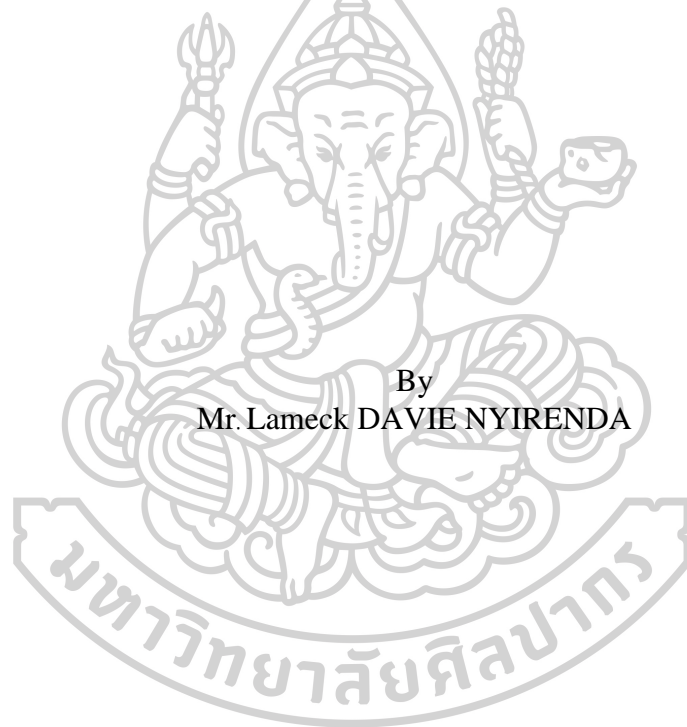




SMALLHOLDER FARMERS' HOUSEHOLD FOOD SECURITY &
PERCEPTIONS ABOUT THE AFFORDABLE INPUTS PROGRAMME (AIP) IN
MALAWI: KASUNGU DISTRICT

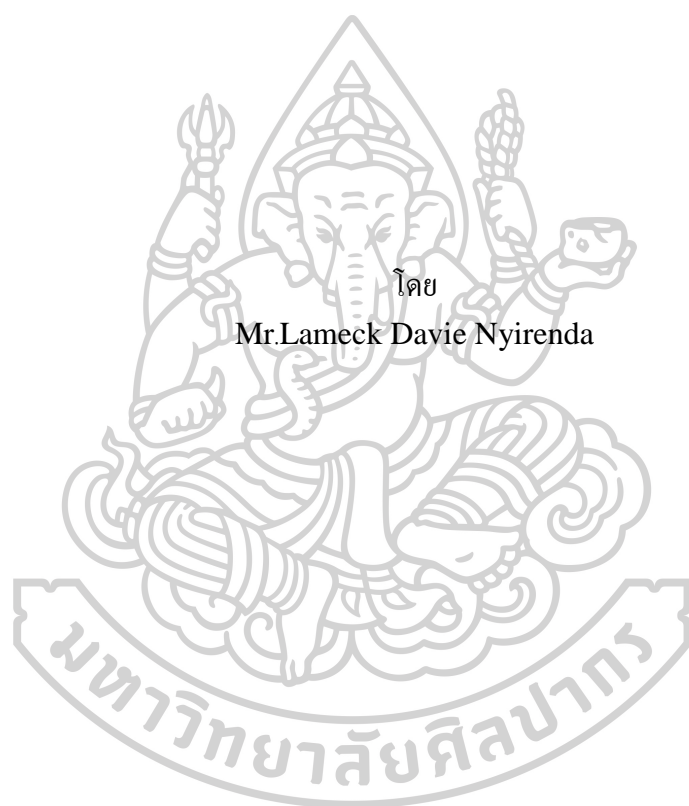


By
Mr. Lameck DAVIE NYIRENDA

A Thesis Submitted in Partial Fulfillment of the Requirements
for Master of Science BIOSCIENCE FOR SUSTAINABLE AGRICULTURE

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โดย
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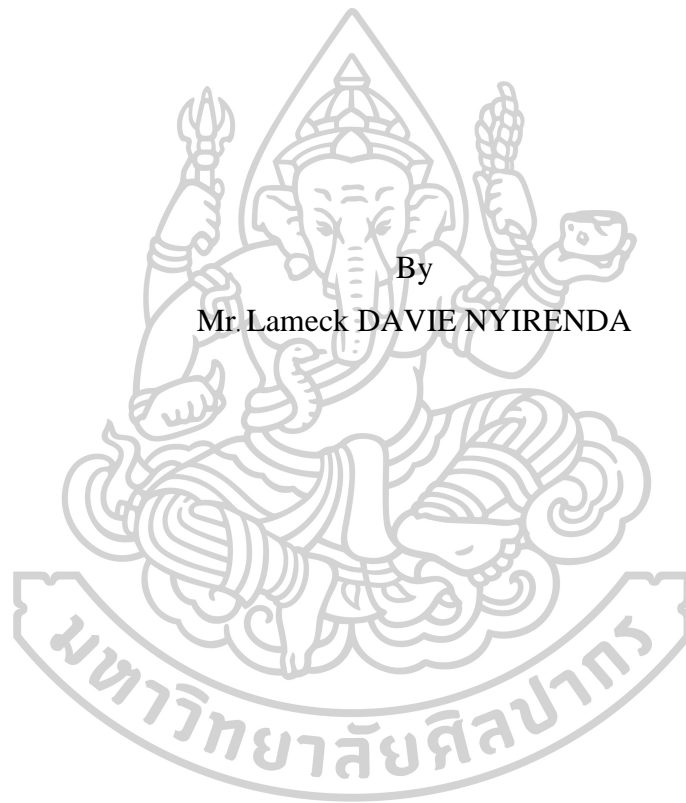
วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรวิทยาศาสตรมหาบัณฑิต
ชีววิทยาศาสตร์เพื่อเกษตรกรรมที่ยั่งยืน แผน ก แบบ ก 2 (หลักสูตรนานาชาติ)

มหาวิทยาลัยศิลปากร

ปีการศึกษา 2567

ลิขสิทธิ์ของมหาวิทยาลัยศิลปากร

SMALLHOLDER FARMERS' HOUSEHOLD FOOD SECURITY &
PERCEPTIONS ABOUT THE AFFORDABLE INPUTS
PROGRAMME (AIP) IN MALAWI: KASUNGU DISTRICT



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Keyword : Affordable input program, Food security, Household, Perception, Subsidy, Smallholder farmers

Mr. Lameck DAVIE NYIRENDA : SMALLHOLDER FARMERS' HOUSEHOLD FOOD SECURITY & PERCEPTIONS ABOUT THE AFFORDABLE INPUTS PROGRAMME (AIP) IN MALAWI. KASUNGU DISTRICT Thesis advisor : Assistant Professor Dr. Chaowanee Laosutthipong

The Affordable Inputs Program (AIP), launched by the Malawian government in the 2020–2021 growing season, sought to make it easier for smallholder farmers to access agricultural inputs and thereby increase the output of these resource-poor farmers. The present study was therefore undertaken to 1) assess the efficiency of AIP project in reducing food insecurity and poverty in Malawi by assessing farmers' perceptions of this introduced AIP and 2) evaluate the impact of AIP on the status of food security at the household level of the poor-resource beneficiary farming households. Data on the social economic characteristics of respondents was collected using a semi-structured questionnaire. Focus group discussions (FGDs) were also used to collect supplementary data for AIP assessment. The food security assessment was based on that developed by the United States Household Food Security Survey Module, United States Department of Agriculture (USDA). Two hundred maize farmers from across five extension program areas (EPAs) in Kasungu district were interviewed. Access to fertilizer, land holding size, household head's literacy level, ownership of an off-farm business, and credit availability were significant factors that affected food security. It was also found that corruption, patchy networks, and late input delivery were prevalent in most input selling points, which jeopardized the effectiveness of the AIP and forced food insecurity and poverty in the area. Most of the whole population (93.5%) was food insecure within the last twelve months. The minority of the food-insecure population (22.5%) was at a low food security level, while the majority (77.5%) was at a very low level. Nevertheless, most of these farmers (80%) viewed AIP as an important program that can mitigate food insecurity with proper management.

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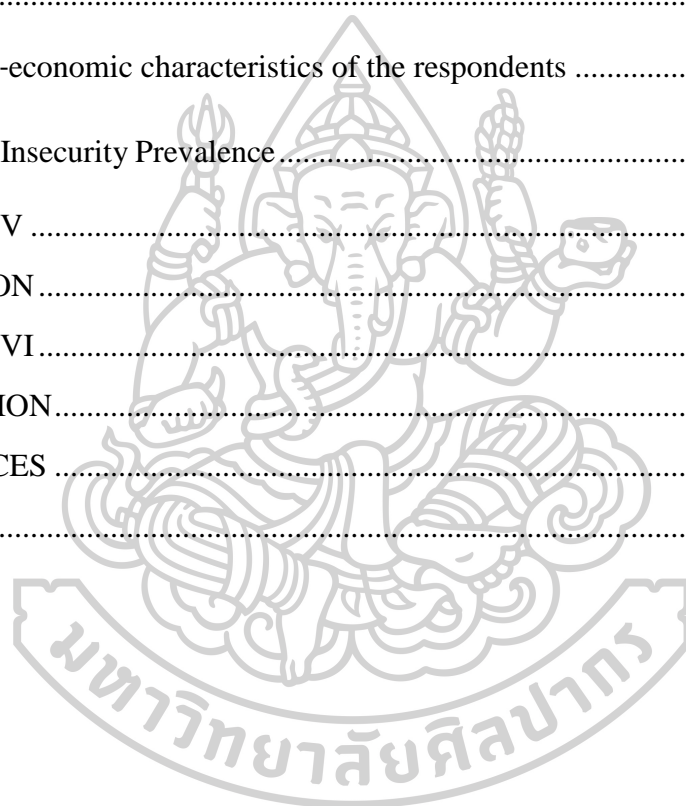
This work is dedicated to my first born child (Sasha Beauty Nyirenda) who was born on the 25th of May, 2023. For every moment she feels challenged in life, let this work remind her that hard work is the only key to success. May this work instil motivation in her as she grows up so that she can work extra harder in class and become a responsible citizen. She should be reminded that Dad's attainment of a master's degree is an assurance that we can achieve greater things that our ancestors failed to accomplish. Certain predicaments may be inevitable in life. However, understanding the gravity of every predicament is the first step towards addressing the same. Dad loves you so much, Sasha Beauty

Lameck DAVIE NYIRENDA

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CHAPTER I

INTRODUCTION

1.1 Rationale of the study

The productivity of maize has been the pillar of food security in Malawi since the 1980s. However, food security has remained a pressing challenge facing the people in Malawi. The situation can be attributed to several factors such as insufficiency of cultivable land, increased population growth, declining soil fertility, frequent floods and drought, and inadequate laws and certain development policies (Bae, 2021; Chibwana & Fisher, 2011; Dorward & Chirwa, 2012; Pankomera et al., 2009).

Food security affects the well-being of the people and can be defined as a condition that exists when all people, always, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Abbasi et al., 2016). Both availability and accessibility to food are significant issues in food security (Abbasi et al., 2016; Dean & Sharkey, 2011; Salarkia et al., 2014; Shaw, 2007). (Abbasi et al., 2016) reported that the most severe form of food security issue occurred when access to enough food was limited and subjected the populace to physical hunger and psychological distress.

In Malawi, access to maize will dictate food security because it has always been a major staple food crop (Makombe et al., 2010). The sufficiency of this staple crop is thus very important because the well-being of each household and the security of the nation are at risk should the production of maize be insufficient. Hunger will have a serious negative impact on economic, political, and social growth, affecting national development in the long run (Abbasi et al., 2016).

To deal with food insecurity, the government introduced, among other food policy interventions, the Affordable Input Program (AIP), a governmental farm input

support program, aimed to enhance smallholder maize production and improve household food security in the country (Bureau, 2021). This was accomplished by providing low-income farmers with fertilizer and seeds at discounted rates.

Smallholder agriculture in Malawi is mostly practiced by low-income subsistence farmers whose meager maize yields fall short of their annual consumption requirements, causing household food reserves to deplete before the next harvest (Musonzo, 2015). Land degradation, which has rendered the majority of smallholder farms unproductive, is one major cause of low output (Njoloma et al., 2016). As a result, subsidy programs have been crucial components of Malawi's food strategy for lowering smallholder farmers' production costs by providing these farmers with heavily subsidized farm inputs.

Since policy changes to combat food insecurity should be supported by reliable evidence, the current study aimed to (1) assess the efficiency of AIP in addressing food insecurity and reducing poverty in Malawi by assessing farmers' perceptions about the newly introduced AIP and (2) evaluate the impact of AIP on the status of food security at household level of the poor-resource beneficiary farming households. The current study will significantly contribute to the growing body of research on the effects of AIP in Malawi by examining how it affects the way of life of low resource smallholder farmers. The anticipated results will aid in creating a standard against which policy makers, may reflect and draw lessons for the AIP's successful implementation in the next farming seasons.

1.2 Problem statement

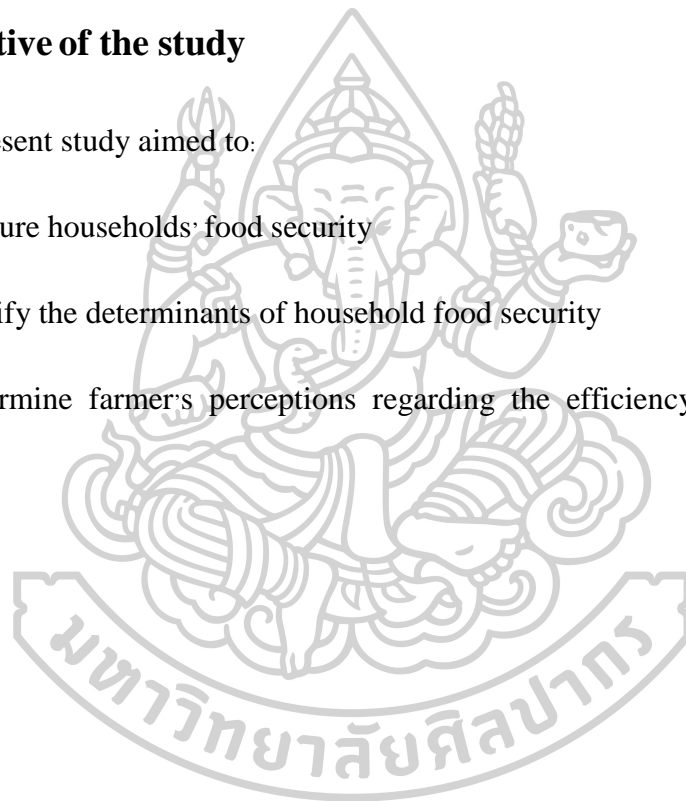
Food security has always been high on the agenda of the Malawi government and the current Malawi's Growth and Development Strategy (MGDS) has been put in place to obtain sustained economic growth and poverty reduction. However, most agricultural-related policy interventions and programs that are meant to benefit

Malawians by boosting crop production do not fully achieve their intended purpose due to various challenges that can, among others, be dealt with if there are checks and balances. The beneficiaries of various programs need to provide feedback regarding the policy interventions and programs so that the government can use such feedback to modify the programs to improve the efficiency of program delivery. The present study aims to evaluate the effectiveness of AIP by assessing the beneficiaries' perceptions of food policy intervention in Malawi.

1.3 Objective of the study

The present study aimed to:

1. Measure households' food security
2. Identify the determinants of household food security
3. Determine farmer's perceptions regarding the efficiency of the AIP at the household level



CHAPTER II

LITERATURE REVIEW

2.1 Agriculture in Malawi

The core of Malawi's economy is its agriculture sector. It generates one-third of the GDP, 90% of foreign exchange revenues, and 85% of the labor force's employment (Msowoya et al., 2016). It also generates over 64% of the country's rural residents' total income. As per Hockett and Richardson (2018), smallholder, being the largest subsector, provides almost 70% of the agricultural output, with the estate subsector producing the remaining portion. Rice, sweet potatoes, cassava, and maize are among the crops that are typically farmed by smallholder farmers for subsistence purposes. While some smallholder farmers in the country also cultivate crops like tobacco, tea, and coffee, these crops are mostly grown by estates for export purposes. Malawi has prioritized the agricultural sector in its development strategies and policies, which include such food policy interventions as subsidy programs, in recognition of the agricultural sector's critical role in the nation's food security and economy (Nyirenda et al., 2021).

2.2 Maize production in Malawi

Malawi is one of the 75 developing nations that cultivate maize as a staple food, with smallholder farmers producing 70% of the crop (Nyirenda et al., 2021). This demonstrates the significance of maize for the majority of low-income countries. In Malawi, access to maize and its availability dictate food security (Makombe et al., 2010). According to Msowoya et al. (2016), about 60% of cultivable land in the smallholder sub-sector is allocated to maize, leaving 40% to other crops. Malawi was able to generate a surplus of maize during the 1970s and 1980s, and overall agricultural productivity increased; nevertheless, this growth was mostly dependent

on input subsidies, which encouraged the use of hybrid maize and fertilizer (Katengeza et al., 2012). However, in response to demands made by the World Bank and IMF's structural adjustment programs (SAP) (Harrigan, 2003), the loan and subsidy programs, on which the nation had been depending, were abandoned in the mid-1990s. Smallholder farmers were hit hard by the development as prices of key farm inputs like fertilizer and maize seeds became so exorbitant (Blackie & Mann, 2005). According to Chinsinga (2010), severe productivity shortfalls were predicted, so government-led interventions were reinstated in spite of donor reluctance to enhance maize productivity for the nation. These interventions were first implemented as the Starter Pack Program from 1998 to 2000, then as the Targeted Input Program from 2000 to 2002, then as the Extended Targeted Input from 2002 to 2004, then as the Farm Input Subsidy Program from 2005 to 2020 and finally as the Affordable Input Program up until this point (Bureau, 2021; Chinsinga, 2010). For subsidy programs in Malawi, A number of food policy interventions to address food insecurity and alleviate poverty in Malawi have been enacted from the 1990s by the Malawi government (Table 1).

Table 1: Various subsidy programs that have been implemented in Malawi since 1998.

Subsidy program	Starter Pack (SP)	Targeted Input Program (TIP)	Extended Targeted Input Program (ETIP)	Farm Input Subsidy Program (FISP)	Affordable Input Program
Duration	1998.09- 1999/2000	2000.01- 2001.02	2002.03- 2003.04	2005.06- 2019/20	2020/21-present

Targeted farmers	Targeted all farming families (2.86 million) & provided inputs to smallholder farmers adequate for 0.1ha.	Initially targeted 1.5 million farmers which was scaled down to 1 million in 2001/02.	Initially targeted 2.8 million farmers which was scaled down to 1.7 million in 2003/04	Targeted 1.5 million maize farmers	Initially targeted 3.8 million which was scaled down to 2.7 million farmers in 2021/22
Inputs provided	2kg of hybrid maize, 2kg of nitrogen legume, 10kg of basal fertilizer and 5kg of top dressing and illustrated instructions	2kg of OPV maize seed, 1kg of legume seed, 5kg of basal fertilizer and 5kg of top dressing fertilizer and illustrated instructions	5kg of OPV maize seed, 12.5kg of both basal and top dressing fertilizer and 1kg of legume seed.	One 50kg bag of basal and another 50kg bag of top dressing fertilizer, 3kg of OPV maize.	One 50kg bag of basal and another 50kg bag of top dressing fertilizers, either 5kg of hybrid seed or 7kg of OPV maize seed or 7kg of rice seed or 7kg of sorghum seed
Farm Inputs redemption method	Inputs handed out by calling out the compiled beneficiary names from the register on scheduled date.	Used a voucher/ coupons system to redeem inputs.	Used a voucher/ coupons system to redeem inputs.	Used a voucher/ coupons system to redeem inputs.	Used electronic devices to redeem inputs
Procurement & supply of farm inputs	Procurement, warehousing, distribution and retailing were sub-contracted to private sector through a system of bids	Procurement, warehousing, distribution and retailing were sub-contracted to private sector through a system of bids	Procurement, warehousing, distribution and retailing were sub-contracted to private sector through a system of bids	Procurement, warehousing, distribution and retailing were largely done by two parastatal bodies (ADMARC and SFFRFM)	Procurement, warehousing, distribution and retailing were largely private sector-led through system of bids.

					ADMARC and SFFRFM were involved
Other innovation systems				Beneficiaries contributed a fixed amount of money to redeem the subsidized inputs	Beneficiaries contributed a fixed amount of money to redeem the subsidized inputs

Note: OPV= Open Pollinated Variety

Sources: (Bureau, 2021; Chinsinga, 2010).

2.3 Impact of Subsidy programs on Food Security

From 1992 to 1994, crop productivity was hampered by severe drought in Malawi and a migration of Mozambican people (refugees) into Malawi created pressure on the already limited resources. The hunger situation was aggravated as a result of a suspension of all foreign aid to Malawi in 1992 and 1993 (Harrigan, 2003). Reduced maize productivity in the 1990s also threatened national food security in Malawi. From 1990 to 1995, the productivity of maize decreased from 1,589,000 to 1,328,000 tons, with a yield reduction of 0.06 mt/ha. This raised the concerns regarding national food production and household food security (Harrigan, 2003).

The Malawi government improved food crop productivity among the resource poor farmers to address food shortage. To achieve this, the government promoted essential inputs such as fertilizer and high yielding maize varieties to these farmers. These poor farmers also received financial subsidies from the government to purchase fertilizer

and other inputs such as seed of a hybrid maize (Dorward & Chirwa, 2012; Harrigan, 2003).

The Malawi government also launched a US\$23.5 million starter pack (SP) programme in 1998 to distribute free seed and fertilizer to the farmers (Blackie & Mann, 2005; Dorward & Chirwa, 2012; Harrigan, 2003). Maize productivity improved significantly as a result of increased inputs and favorable weather conditions. The SP programme also provided grains and legumes (Table 2) to ensure food security among farming households. This measure increased maize production by 27% in 1998 and 1999 compared to that of the previous year (Harrigan, 2003). In the following year, SP was modified in such a way that only the poorest smallholder farmers were targeted. However, the Extended Targeted Input Program (ETIP) was finally introduced as an improved programme to help more beneficiaries among the poor smallholder farmers in the country (Table 1).

Despite all these subsidies, the country still faced severe food security challenges because of the inefficiency in implementing these programmes. In the case of the FISP, the nepotism compromised the efficiency of the programme (Dorward & Chirwa, 2012; Pankomera et al., 2009) as the members of the selection team responsible for screening the farmers were biased by giving families and friends' preference.

The improved FISP introduced both the central management body and the ad-hoc team to select the beneficiaries. This new approach eliminated bias and inefficiency of the programme which occurred as a result of heavy reliance on the judgment of chiefs and the decision of village forums. There was also greater private sector participation in fertilizer distribution & retailing, compared to that of the previous years. This is because, in volume terms, the private sector assisted in filling gaps where the public sector failed to operate (Bureau, 2021; Chinsinga, 2010). In a

transition from SP through TIP and ETIP to FISP (Table 1), AIP was developed based on lessons learned.

2.4 The Affordable Input Program (AIP)

The AIP was introduced in the 2020-2021 growing season based on lessons learned from FISP. Compared to FISP, the AIP was characterized by the following: cereal seed packs were cheaper under AIP (K2,000) than they were under FISP (K6,000); In comparison to the 2021-2022 growing season, when fertilizer prices rose to K15,000 per 50kg bag, fertilizer (NPK/Urea) redemption prices were lower for the first crop season following the adoption of the AIP (2020-2021) (K4,495 per 50kg bag). Contrary to the former FISP system, where public organizations (ADMARC and SFFRFRM) predominated, the purchase, storage, distribution, and retailing of agricultural inputs were predominantly handled by the private sector (contracted enterprises) under AIP. This modification was commended by many stakeholders for it sought to address the key challenge of late delivery of farm inputs that manifested public organizations whose functioning relied on funding from the government which mostly was not timely (Bureau, 2021).

CHAPTER III MATERIALS AND METHODS

3.1 Location and period of study

The study was conducted within various Extension Programme Areas (EPA) of Kasungu district (central region) in March-April, 2023. Kasungu district was chosen because it has been one of the centers for agricultural activities in Malawi (Figure 2).



Figure 1. Map of Malawi showing the study area (in red).

3.2 Sample size

The sample size was calculated using the Cochran Formula (Cochran, 1977) because there was no information available regarding the exact number of farmers in Kasungu District who were intended to benefit from AIP based on Extension Program Areas (EPAs).

$$n = \frac{z^2 (pq)}{e^2} = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2} = 784 \dots\dots\dots (1)$$

Where N= Sample size

z= the selected certified value of deserted confidant level = 1.96

p = the (estimated) proportion of the population that has the attribute in question = 0.5

$q = 1 - p = 0.5$

e = the desired level of precision = 0.07

There were 196, approximately 200 respondents were used. The participants were selected using a simple random sampling technique. Thus, data was collected from 200 farmers using semi-structured questionnaires.

3.3 Sampling techniques

Kasungu district had a total of eight EPAs all of which contained AIP beneficiaries who were the targeted group for this study. As such, a simple random technique was employed to sample the five EPAs that were finally involved in this study.

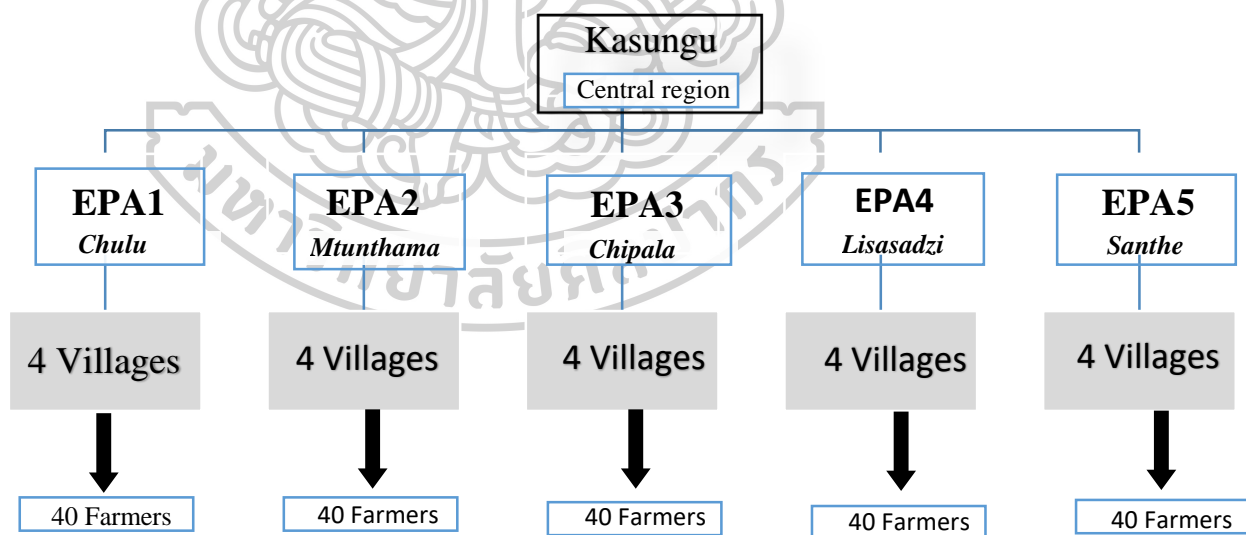


Figure 2 Illustrating the sampling technique

A multi-stage sampling technique was used for this study as follows: The first stage involved a purposive selection of Kasungu district. The second stage involved a random selection of 5 EPAs from a total of 8 EPAs which Kasungu district had. The third stage was random sampling of 4 villages from each of the 5 selected EPAs giving a total of 20 villages. The last stage was random sampling of 10 AIP beneficially farmers from each of the 20 villages which gave a total sample of 200 farmers.

Additionally, five household heads from each EPA were also sampled randomly to form groups which participated in Focus Group Discussion (FGD). Interviews were also conducted among EPA staffs to gather the supplementary data.

3.4 Food security assessment

The food security assessment was done using the US Household Food Security Survey Module (Six-Item), which assessed food security based on the score from 0 to 6 (where the scores 0-1 define high or marginal food security, the scores 2-4 define low food security and the scores 5-6 define very low food security) (Blumberg et al., 1999). Although the most severe range of adult food insecurity, in which a child's food intake is likely to be lowered, is not measured by this module (Britanyak, 2020), this tool was relevant for this investigation since it has a history of reliably and fairly accurately diagnosing food insecurity with little bias (Blumberg et al., 1999; Britanyak, 2020; Hart, 2016). Since the survey module uses adult-referenced questions to assess food security, it was suitable for this study whose respondents were presumably adults (household heads). Lessening the strain of parent engagement in this study was another benefit of using this module.

3.5 Focus Group Discussions (FGDs)

Farmers' opinions of the recently implemented AIP were gauged in order to determine the AIP's effectiveness. Focus group discussions (FGDs) were thus administered to obtain data on farmers' opinions on AIP to mitigate food insecurity and poverty. In addition, the focus group study guide consisted of items that assessed errors of inclusion and exclusion for the analysis of the targeting efficiency of the program.

3.6 Data Analysis

The collected data consisted of the characteristics of a farmer such as gender, age, education, the number of family members, the number of labor, farming experience, membership of the farming organization, cultivated area size, land ownership, financial support, ownership of at least an off-farm enterprise, whether maize was the main crop for the household and household's main source of fertilizer which were analyzed using frequency and percentage. The responses from the food security questionnaire were summed up to obtain final scores which were then dichotomized into food secure and food insecure categories. Chi-square tests were used to study the between-group differences in demographic variables by food security status.

CHAPTER IV

RESULTS

4.1 Socio-economic characteristics of the respondents

Two hundred farmers (100%) responded to the survey. The socio-economic characteristics of the respondents are shown in Table 1. Around half of the respondents (53.5%) were male and the majority (98%) were aged \leq 21. Most of the respondents (83.5%) had a minimum of four members in a family. The majority (65.5%) of the families had 2 to 3 persons for labour. Most of the respondents (94.1%) had an education lower than senior secondary school.

Half of the respondents had $>$ 20 years of farming experience. Most of the households (70.5%) had never belonged to any farming organizations to provide them with the necessary skills for enhancing household crop production and minimizing food insecurity in the long run. Most of the farmers (97.5%) financed themselves for investment in farming, and most of these farmers (74.5%), were not involved in any activities other than farming activities to bring them additional income.

Nearly all respondents (99.5%) reported that maize was both the main cash and food crop for their households, while 61.5% reared different livestock for additional food and income. The commonly reared livestock were chickens (*Gallus gallus domesticus*), goats (*Capra hircus*), and pigs (*Sus domesticus*). Most respondents (64.5%) cultivated the land less than 3 acres, and the minority (26%) had 4 to 6 acres for cultivation. Only a few farmers (9.5%) had \geq 7 acres for cultivation. 97.5% of farmers had ownership of the pieces of land that they cultivated. Moreover, almost all of the farmers (94%) grew additional crops for additional food and income although it was unanimously agreed by most farmers (96%) that earnings from agriculture alone could not sustain the families throughout the year. The commonly cultivated crops were

soybean (*Glycine max*), beans (*Phaseolus vulgaris*), and ground nuts (*Arachis hypogaea*). The farmers mainly used inorganic fertilizer (61.5%), followed by organic fertilizer (38.5%). In the 2021/2022 growing season, about 61.5% of the beneficiaries benefited from AIP.

Table 2. Social-economic characteristics of farmers (n=200)

Attributes	Characteristics	Frequency	Percentage
Gender	Male	107	53.5
	Female	93	46.5
Age	<20	4	2
	21-30	38	19
	31-40	37	18.5
	41-50	41	20.5
	>50	80	40
Family size	1-3	33	16.5
	4-6	104	52
	>6	63	31.5
Family labour	1	34	17
	2	88	44

Attributes	Characteristics	Frequency	Percentage
	3	43	21.5
	>3	35	17.5
	Lower than primary school	33	16.5
	Primary School	132	66
Education level	Junior Secondary school	23	11.5
	Senior Secondary school	10	5
	Bachelor's degree	2	1
	<10	51	25.5
Farm experiences	11-20	49	24.5
	>20	100	50
Farmer organization membership	yes	59	29.5
	No	141	70.5
	Government loans	3	1.5
Type of financial support	Bank loans	2	1
	Own funds	195	97.5
Ownership of an of farm business	yes	51	25.5
	No	149	74.5
Presence of tamed animals at household	yes	123	61.5
	No	77	38.5
Whether maize was the main	yes	199	99.5

Attributes	Characteristics	Frequency	Percentage
crop for the household	No	1	0.5
Presence of tamed animals at household	Yes	123	61.5
	No	77	38.5
Whether maize is the main crop for the household	Yes	199	99.5
	No	1	0.5
Ownership of cultivated land	yes	195	97.5
	No	5	2.5
Size of cultivated land (acres)	0-3	129	64.5
	4-6	52	26
	7-10	7	3.5
	>10	12	6
Additional cultivated crops by households	yes	188	94
	No	12	6
Whether earnings from agriculture alone sustain the families throughout the year	yes	8	4
	No	192	96
Household's main source of fertilizer	Organic	77	38.5
	Inorganic	123	61.5
Access to inorganic fertilizer in 2021/2022 season under AIP	Yes	152	76
	No	48	24

Attributes	Characteristics	Frequency	Percentage
	Very satisfied	78	39
General satisfaction by farmers with AIP towards ending food insecurity in Malawi	Satisfied	78	39
	neutral/not sure	4	2
	Unsatisfied	31	15.5
	Very unsatisfied	9	4.5



4.2 Food Insecurity Prevalence

Table 2 shows the food insecurity prevalence of among the respondents. Most of the respondents (93.5%) were food insecure within the last twelve months. The minority of them (22.5%) were at a low food security level, while most of these farmers (77.5%) were at a very low food security level. Food security level was significantly correlated with membership in farmer organizations, type of financial support, ownership of an off-farm enterprise, landholding size, and access to fertilizer ($P < 0.05$). Food-insecure people shared the following characteristics: they were not a member of any farmer organizations ($P = 0.013$), they financed themselves for investment in farming ($P = 0.000$), they did not own any off-farm business ($P = 0.007$), they cultivated the land less than 3 acres ($P = 0.001$), and they did not access fertilizer ($P = 0.045$).

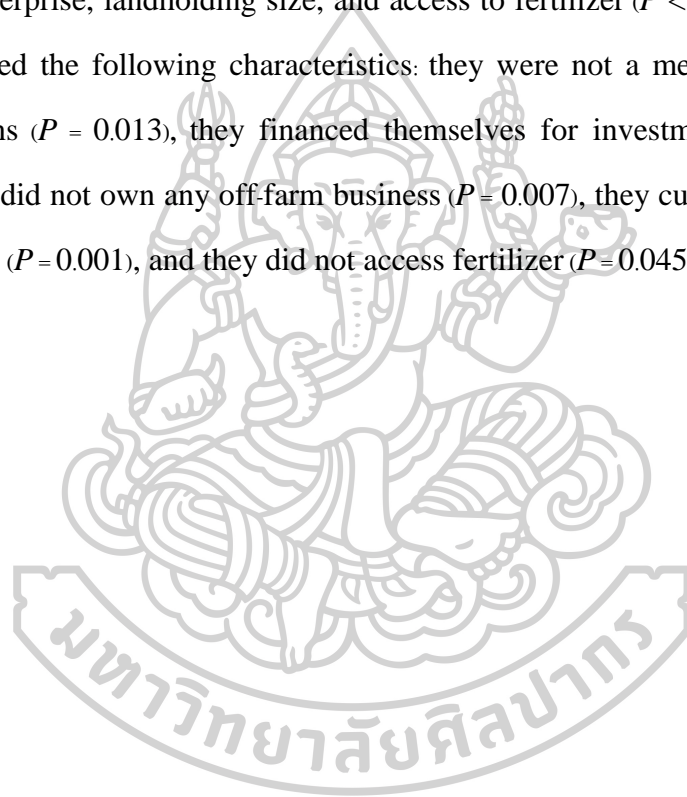


Table 3. Characteristics of the study group and correlations with Food Security Status

Attribute	Score	Food security level								Total	Chi-square	P-value
		High/Marginal		Low		Very low		n	%			
		n	%	n	%	n	%					
Overall		13	6.5	42	21	145	72.5	200				
Gender	Male	8	7.5	27	25.2	72	67.3	107		3.163	0.206	
	Female	5	5.4	15	16.1	73	78.5	93				
Age	<20	0	0	1	25	3	75	4				
	21-30	3	7.9	8	21.1	27	71.1	38		4.221	0.837	
	31-40	1	2.7	8	21.6	28	75.7	37				
	41-50	1	2.4	8	19.5	32	78	41				

Attribute	Score	Food security level						Total n	Chi- square	P- value
		High/Marginal		Low		Very low				
		n	%	n	%	n	%			
	>50	8	10	17	21.3	55	68.8	80		
	01-Mar	5	15.2	5	15.2	23	69.7	33		
Family Size	04-Jun	4	3.8	27	26	73	70.2	104	7.828	0.098
	>6	4	6.3	10	15.9	49	77.8	63		
	1	5	14.7	7	20.6	22	64.7	34		
Family labour	2	5	5.7	20	22.7	63	71.6	88	5.518	0.479
	3	2	4.7	9	21	32	74.4	43		
	>3	1	2.9	6	18.2	28	80	35		
Education level	< primary school	0	0	5	15.2	28	84.8	33	15.392	0.052

Attribute	Score	Food security level						Total	Chi-square	P-value
		High/Marginal		Low		Very low				
		n	%	n	%	n	%			
	Primary school	8	6	33	25	91	68.9	132	1.311	0.86
	Junior secondary	2	8.7	3	13	18	78.3	23		
	Senior Secondary	2	20	1	10	7	70	10		
	Bachelor degree	1	50	0	0	1	50	2		
Farming experience	□10	3	5.9	11	21.6	37	72.5	51	1.311	0.86
	Nov-20	2	4.1	12	24.5	35	71.4	49		
	>20	8	8	19	19	73	73	100		
Membership in farmer organization	Yes	8	13.6	15	25.4	36	61	59	8.718	0.013
	No	5	3.6	27	19.1	109	77.3	141		

Attribute	Score	Food security level						Total	Chi-square	P-value
		High/Marginal		Low		Very low				
		n	%	n	%	n	%			
Type of financial support	Government loans	0	0	2	66.7	1	33.3	3	32.87	0
	Bank loans	2	100	0	0	0	0	2		
	Own funds	11	5.6	40	20.5	144	73.9	195		
Ownership of an off-farm business	Yes	8	15.7	11	21.6	32	62.7	51	9.797	0.007
	No	5	3.4	31	20.8	113	75.8	149		
Presence of tamed animals at household	Yes	11	8.9	29	23.6	83	67.5	123	5.055	0.08
	No	2	2.5	13	16.9	62	80.5	77		
Ownership of cultivated land	Yes	13	6.7	40	20.5	142	72.8	195	1.325	0.515
	No	0	0	2	40	3	60	5		

Attribute	Score	Food security level						Total	Chi-square	P-value
		High/Marginal		Low		Very low				
		n	%	n	%	n	%			
Total cultivated land (acres)	□3	5	3.9	26	20.2	98	75.9	129	21.94	0.001
	04-Jun	3	5.8	9	17.3	40	76.9	52		
	07-Oct	1	14.2	3	42.9	3	42.9	7		
	>10	4	33.3	4	33.3	4	33.3	12		
Additional cultivated crops by households	Yes	13	6.9	41	21.8	134	71.3	188	2.452	0.293
	No	0	0	1	8.3	11	91.7	12		
Household main source of fertilizer	Organic fertilizer	2	2.6	16	20.8	59	76.6	77	3.23	0.199
	Inorganic fertilizer	11	8.9	26	21.1	86	69.9	123		
Access to inorganic fertilizer in	Yes	11	8.9	30	24.4	82	66.7	123	6.182	0.045

Attribute	Score	Food security level						Chi-square	P-value	
		High/Marginal		Low		Very low				Total
		n	%	n	%	n	%			n
2021/2022 season under AIP	No	2	2.6	12	15.6	63	81.8	77		

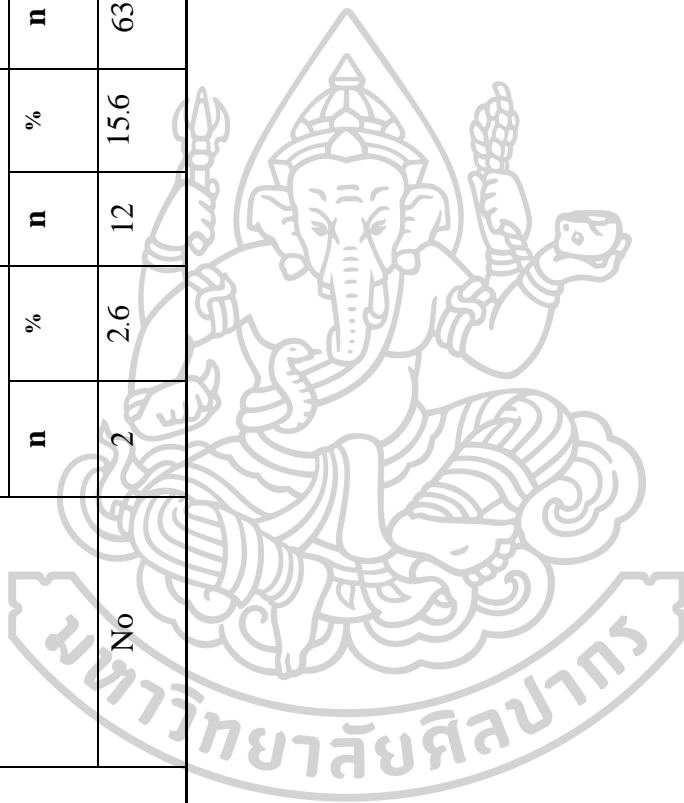


Table 3 displays chi-square and correlation analyses between the social economic factors and items associated with household's food security. The following socioeconomic factors correlated significantly ($P < 0.05$) with at least one of the items associated with household's food security status: gender, family labour, education level of the household's head, membership to farmer organization, type of financial support, ownership of an off-farm business by household's members, presence of livestock at household, size of cultivable land (acres) and access to fertilizers. The households where the food bought just didn't last and they didn't have money to get more, shared the following social economic characteristics: their labour input was low ($P = 0.000$), they did not belong to any farmer organization ($P = 0.026$), they financed themselves for investment in farming ($P = 0.001$), they did not own any off-farm business ($P = 0.000$), they did not keep any livestock ($P = 0.005$), they cultivated land less than 3 acres ($P = 0.031$), and they did not access inorganic fertilizer for their fields ($P = 0.000$). Furthermore, the families that couldn't afford to eat balanced meals shared the following social economic characteristics: their literacy levels were very low ($P = 0.002$), they financed themselves for farming investment ($P = 0.004$), and they did not own any off-farm businesses ($P = 0.005$). Additionally, households whose adults ever cut the size of their meals or skipped meals because there wasn't enough money for food, shared the following characteristics: they were headed by females ($P = 0.046$), they did not belong to any farmer organization ($P = 0.019$), they financed themselves for investment in farming ($P = 0.015$), they did not rear any livestock ($P = 0.02$), they cultivated land less than 3 acres ($P = 0.002$), and they did not access inorganic fertilizer to be applied in their farms ($P = 0.008$). Households whose members consumed less, occasionally, than they felt they should, because there wasn't enough money for food were characterized by following: they financed themselves for farming investment ($P = 0.011$), most of them did not own any off-farm business ($P = 0.028$), and they cultivated land less than 3 acres ($P = 0.001$). Finally, the households whose members felt hungry

on several occasions, but didn't eat because there wasn't enough money for food shared the following characteristics: they financed themselves for investment in farming ($P = 0.002$) as most of them did not own any off-farm businesses ($P = 0.002$). They cultivated land less than 3 acres ($P = 0.000$), and they did not access fertilizers ($P = 0.011$).



Table 4. Chi-square and Correlation analysis between social economic factors and food security items (n=200)

		Food security			
		(Based on the U.S. Household Food Security Survey Module)			
		Six-Item Short Form Economic Research Service, United States, Department of Agriculture (USDA)			
Factor	The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more	(I/we) couldn't afford to eat balanced meals	In the last 12 months, since last August, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?	In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?	In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?
Gender	0.72	0.595	0.046**	0.335	0.836
Age	0.708	0.857	0.66	0.715	0.37

Food security					
(Based on the U.S. Household Food Security Survey Module)					
Six-Item Short Form Economic Research Service, United States, Department of Agriculture (USDA)					
Factor	The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more	(I/we) couldn't afford to eat balanced meals	In the last 12 months, since last August, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?	In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?	In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?
Family size	0.372	0.532	0.192	0.406	0.086
Family labor	0***	0.426	0.367	0.116	0.094
Education level	0.157	0.002***	0.349	0.056	0.203
Farming experience	0.518	0.646	0.807	0.763	0.341

Food security					
(Based on the U.S. Household Food Security Survey Module)					
Six-Item Short Form Economic Research Service, United States, Department of Agriculture (USDA)					
Factor	The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more	(I/we) couldn't afford to eat balanced meals	In the last 12 months, since last August, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?	In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?	In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?
Farmer organization membership	0.026**	0.972	0.019**	0.134	0.129
Type of financial support	0.001***	0.004***	0.015**	0.011**	0.002***
Ownership of off-	0***	0.005***	0.08	0.028**	0.002***

Food security						
(Based on the U.S. Household Food Security Survey Module)						
Six-Item Short Form Economic Research Service, United States, Department of Agriculture (USDA)						
Factor	The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more	(I/we) couldn't afford to eat balanced meals	In the last 12 months, since last August, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?	In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?	In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?	
farm business						
Presence of tamed animals at household	0.005***	0.336	0.02**	0.086	0.086	0.086
Ownership of cultivated land	0.675	0.846	0.47	0.954	0.724	0.724

<p style="text-align: center;">Food security</p> <p style="text-align: center;">(Based on the U.S. Household Food Security Survey Module)</p> <p style="text-align: center;">Six-Item Short Form Economic Research Service, United States, Department of Agriculture (USDA)</p>					
Factor	The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more	(I/we) couldn't afford to eat balanced meals	In the last 12 months, since last August, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?	In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?	In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?
Size of cultivated land (acres)	0.031**	0.162	0.002***	0.001***	0***
Additional cultivated crops by households	0.142	0.643	0.15	0.084	0.141
Household's main	0.24	0.096	0.317	0.546	0.372

<p align="center">Food security</p> <p align="center">(Based on the U.S. Household Food Security Survey Module)</p> <p align="center">Six-Item Short Form Economic Research Service, United States, Department of Agriculture (USDA)</p>						
Factor	The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more	(I/we) couldn't afford to eat balanced meals	In the last 12 months, since last August, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?	In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?	In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?	
source of fertilizer						
Access to inorganic fertilizer in 2021/2022 season under AIP	0***	0.626	0.008***	0.086	0.011**	

*The significant level at 0.05 is represented by two stars (**), while the significant level at 0.01 is represented by three stars (***)*



CHAPTER V

DISCUSSION

In the present study, prevalence estimates of food insecurity, the correlation between food security levels, socioeconomic characteristics, and the correlation between items associated with food security and socioeconomic characteristics in a group of farmers were determined.

Focus group discussions on community factors showed that households located in large trading centers stood a better chance of being food secure. Furthermore, it was shown that households with a higher proximity to medical services had a higher likelihood of experiencing food security. This suggested that household food security may be impacted by the development of basic infrastructure. Pankomera et al. (2009) reported similar results in Malawi.

Table 3 of the current study demonstrated a substantial ($p < 0.05$) association between gender and food security-related items. According to the statistics, household food security was relatively influenced by a person's gender. Compared to households headed by men, those led by women were shown to be relatively food insecure. Similar results were published by Kassie et al. (2012), who linked the incidence to cultural constraints that prevent women from fully engaging in food production activities. Additionally, it is asserted that children from households headed by women have a lower socioeconomic attainment rate (Kassie et al., 2012; Musemwa et al., 2013). It is said that children who attend school and are forced to work to support themselves in houses headed by women will not complete their education to a high enough standard. Therefore, in such households, there is always a greater chance of passing on poverty and food insecurity to the following generation.

In the current study, the elderly made up the majority (60.5%) of households. According to Ngema et al. (2018), there is disagreement among researchers about the

impact of age on food security in households because some researchers think that households headed by younger farmers are more likely to experience food insecurity than those headed by older farmers (Arene & Anyaeji, 2010; Muche et al., 2014; von Fintel & Pienaar, 2016). According to these authors, older farmers have greater farming expertise and know how to handle resources well as opposed to their younger counterparts, which leads to bumper yields. Some academics further assert that older farmers, as opposed to younger ones, have better access to land, which forms a crucial component of agricultural productivity (Musemwa et al., 2013; Ngema et al., 2018). Nevertheless, the current investigation did not find a statistically significant correlation ($p > 0.05$) between age and household food security (Tables 2). Furthermore, there was no significant correlation between age and food security items ($p > 0.05$) (Table 3). According to research by Mango et al. (2014) and Sekhampu (2013), these results are consistent.

In this study, family size was defined as the total number of persons living and eating in the household for at least six months. The demand for consumption increases with family size (Abbasi et al., 2016; Aboaba et al., 2020). However, this study found no evidence of a significant relationship ($p > 0.05$) between the size of the family and the level of food security or any item associated with food security (Tables 2 and 3).

One of the most fundamental components of agricultural output is labor (Salarkia et al., 2014; Sekhampu, 2013). Large family labor sizes are associated with a lower risk of food insecurity because they enable more efficient use of the land for farm diversification (Mango et al., 2014; Pankomera et al., 2009). Given that the majority of the farmers in this study (65.5%) (Table 1) relied on two to three people for labor, it's possible that there wasn't enough labor to support bumper harvests and warn about the evident starvation crisis. However, this study found no significant link ($p > 0.05$) between the size of the labor force and the degree of food security (Table 2).

The high percentage of farmers with an education level lower than senior secondary school entailed high levels of illiteracy among farmers. Illiterate levels of

most farmers could also be a factor contributing to the high levels of food insecurity. The food security level will be high in households that have educated members of a family because education opens for off-farm jobs that in turn provide additional income that can buy farm inputs and food (Pankomera et al., 2009; Tadesse & Belay, 2004). This may help to explain the strong relationship ($p < 0.05$) found in Table 3 between education level and a food insecurity-related factor (not eating a balanced meal). In addition, appropriate resource management will be achieved by the well-educated head of the family (Tadesse & Belay, 2004). This will eventually boost agricultural production and improve food security status for the households.

Compared to less experienced farmers, seasoned farmers have a higher likelihood of using agricultural resources wisely and producing bumper crops (Mango et al., 2014). Ngema et al. (2018) found that agricultural experience is a strong predictor of family food security; however, no significant correlation was found between the two variables in this study ($p > 0.05$). Therefore, this study's clear high frequency of food insecurity among seasoned farmers (>20 years) suggested that farming expertise by itself is insufficient to prevent family food hardship.

Membership in farmer organizations facilitates the creation of beneficial networks that can help farmers realize bumper harvests through experience sharing with fellow farmers (Sadoulet, 2016). Even though there was no statistically significant correlation between membership to farmer organizations and food security level ($p > 0.05$) (Table 2), a statistically significant correlation was established between membership to farmer organizations and food insecurity-related items ($p < 0.05$) (Table 3). One possible explanation for the high levels of food insecurity among farmers in this study could be their lack of membership to farmer organizations, which was reported by 70.5% of the farmers. For example, new agricultural technology can only spread if farmers interact with other farmers who have already adopted it (Devereux,

2001; Sadoulet, 2016). According to Sadoulet (2016), when a particular portion of the population has previously embraced new agricultural methods, non-adopters are influenced to do the same.

The present study showed a significant correlation between farmer's type of financial support and food security ($p < 0.05$) (Table 2). The study revealed that there were no opportunities for the farmers to access loans which might have amplified food insecurity levels (Table 1). Better access to loans for a household increases the likelihood of food security for the household by improving the household's financial resources for food and input procurement (Pankomera et al., 2009). A household with credit access can attain food security by making investments in both farm and non-farm activities, as credit can be used to improve productivity and expand income-generating activities (Devereux, 2001).

In addition, the study revealed a strong correlation between a household's food security and ownership of at least an off-farm enterprise ($p < 0.05$) (Table 2). It was found that nearly all households (96%) could not be food secured based on only earning from farming. This finding suggests that families needed additional sources of money to elevate their food security status. Unfortunately, most of the respondents (74.5%) did not own any additional businesses to top up the income from farming activities. This might, in part, explain the high prevalence rate of food insecurity among the population (Table 2). Because farming does not always guarantee regular and reasonable income, the presence of an off-farm enterprise safeguards the household against food insecurity. Furthermore, the money earned from off-farm ventures can be invested personally to buy agricultural inputs, increasing output. Dorward and Chirwa (2012) reported similar outcomes in Malawi.

According to Pankomera et al. (2009), households may sell some of their livestock to cover production shortfalls and buy food or inputs like pesticides and fertilizers. This suggests that the livestock raised by the majority of farmers (61.5%),

which included chickens (*Gallus gallus domesticus*), goats (*Capra hircus*), and pigs (*Sus domesticus*), may have prevented the effects of household food insecurity. Yet, focus group discussions showed that most farmers were unable to keep their animals free of pests and illnesses, which led to their continual deaths. This affected farmers' ability to generate additional revenue and increased the amount of food insecurity in households.

The total hectares of land a household cultivates for food and income crops defines "farm size" (Muche et al., 2014). Therefore, it is expected that, in comparison to households with smaller farm sizes, those with bigger farm sizes will display greater food security. This is consistent with the results of the current study, which showed a strong ($p < 0.05$) link between landholding size and household food security (Table 2). In the present study, the population's ability to secure food may have been impacted by landholding size, as the majority of farmers (64.5%) farmed less than 3 acres. Other investigations also revealed similar outcomes (Abbasi et al., 2016; Jayne et al., 2005; Makombe et al., 2010).

Most of the farmers (99.5%) confirmed that maize has played a significant role in the food security issue in Malawi (Table 1). Access to inorganic fertilizer and its application by most smallholder farmers (61.5%) (Table 1) are the factors contributing to the increased yield of maize and would eventually influence food security for the household.

Furthermore, the present study revealed a significant correlation between farmers' ability to access fertilizer and household food security level ($p < 0.05$) (Table 2). AIP is, therefore, a program that impacts the food security of the poor-resourced beneficiaries. Most focus group participants (80%) expressed satisfaction with AIP. However, they thought that the efficiency of the program could be improved. For instance, it was reported that beneficiaries' selection processes for the 2020/21 and 2021/22 growing seasons were not effective. FGDs revealed that the list of beneficiaries was imposed on community members and the criteria for selecting the

candidate were not made available to the community members. It was reported that such a practice led to errors of inclusion and exclusion, which resulted in the inefficiency of implementation.

Both difficulties in accessing and the high price of fertilizers impeded farmers from using appropriate technology to increase yield. Technically, the coupon holders may not be able to buy farm inputs as promised. This might have explained the reasons for farmers (24% and 38%) who did not access both fertilizers and other farm inputs such as maize seeds and legume seeds in the 2020/2021 and 2021/2022 growing seasons respectively (Table 1).

Another significant problem with most of the selling points for inputs was the patchy network coverage. In the worst-case scenarios, beneficiaries were required to go days or weeks without having access to inputs like fertilizer. One of the respondents bemoaned, "I spent three nights at the selling point before the network was restored for me to access the farm inputs."

The delivery of the farm inputs to the farmers was also a challenge. The case in point is that the fertilizer is delivered to the farmers when the crops have already gone past the stage that requires such fertilizer. The shortage of fertilizers has been aggravated by poor logistics and malpractices from the officials. Since most selling locations were congested as a result of late input deliveries, corruption was encouraged. In order to sell the inputs, more money was required from the recipients. Because of this misconduct, some worthy beneficiaries were unable to access the inputs, defeating the aim of the program.

With the present statistics, the likelihood exists that the region's residents' health and well-being will be jeopardized by the high incidence of food insecurity and extremely poor food security, impairing their ability to become more productive and preventing them from focusing their efforts on raising the quality of their lives. These correlations may necessitate the enhancement or creation of complementary programs

that would eventually boost household productivity and improve the well-being of smallholder farmers.



CHAPTER VI

CONCLUSION

The most significant factors affecting food security, according to the study's findings, were access to fertilizer, land holding size, literacy level of the household head, ownership of at least an off-farm business, and credit availability. Poor implementation of an important food policy initiative (AIP) that was intended to minimize food insecurity and poverty was somewhat connected with the prevalence rate of food insecurity. The flopping of such well-planned feeding programs forces citizens into poverty and impedes the growth of the national economy. The commendations made in this paper should therefore exhort policymakers, to consider revising AIP implementation guidelines to enhance the program implementation. Policymakers should also consider implementing complementary food policy programs that would ensure that the gained inputs are being fully maximized by the beneficiaries. It can be concluded that AIP is an important food policy program for Malawians which can elevate both household and national food security levels if properly managed.

Participants in the focus groups suggested that one option to enhance the program and prevent mistakes of inclusion and exclusion that led to ineffective AIP implementation was to involve church and community leaders in the selection process of AIP beneficiaries. Based on the respondents' opinion, the allocation of inputs should be based on one's farm size and the delivery of farm inputs should be delivered not only on time but also in adequate amounts.

Other recommendations would include the following: Establishment of more farm input selling points to reduce distances covered by farmers who wish to access farm inputs. The Ministry of Agriculture, which is part of the government, should fix the network problems it ran into in addition to keeping an eye on the unethical activity of vendors redeeming AIP Inputs instead of farmers as these were some of the major

difficulties that made it easier for corruption cases to flourish. To overcome the network difficulties, the government should work with information technology (IT) specialists through the Ministry of Agriculture. If the AIP is to be properly implemented, the general public and the related stakeholders must also be educated on the harmful impacts of corruption. If corruption is discovered, the public should have the ability to effectively deny it and report it. Above all, the Malawian government must make sure that funds are provided to the Ministry of Agriculture in a timely manner to ensure successful AIP implementation for the upcoming growing season.



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PUBLICATION	<p>1). Spatial and temporal variations of soil microbial respiration under native and exotic tree species. International research journal of Science, Technology, Education, and Management, 3(4), 50-58. https://doi.org/10.5281/zenodo.10516151</p> <p>2). Smallholder Farmers' Household Food Security and Perceptions about the Affordable Inputs Program (AIP) in Malawi: Kasungu District. Proceedings at The 2nd Silpakorn International Conference on Total Art and Science 2023 (2nd SICTAS2023) jointly with The 3rd International Conference on Engineering and Industrial Technology 2023 (3rd ICEIT 2023) on November 8-10, 2023 at Dusit Thani Hua Hin, Phetchaburi, THAILAND. Pages 240-247</p> <p>3). Factors Affecting the Adoption of Natural-based Control Methods in the Management of Fall Army Worms (FAW) (<i>Spodoptera Frugiperda</i>) of Maize (<i>Zea Mays</i>) in Chongwe District of the Republic of Zamb. Proceedings at The 2nd Silpakorn International Conference on Total Art and Science 2023 (2nd SICTAS2023) jointly with The 3rd International Conference on Engineering and Industrial Technology 2023 (3rd ICEIT 2023) on November 8-10, 2023 at Dusit Thani Hua Hin, Phetchaburi, THAILAND. Pages 248-251</p>

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- 1). Certificate of Excellence in Reviewing, in recognition of an outstanding contribution to the quality of the journal. International Journal of Plant & Soil Science. Certificate No: PRIJPSS113139LAM. Date: 10.02.2024. Validation Link: <https://dashboard.peerreviewcentral.com>
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