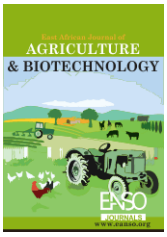

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Original Article

A Comparative Analysis of the Effects of the Agricultural Extension Services among Small-Scale Farmers in Mpulungu District, Zambia

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Agriculture, Extension Services, Small-scale Farmers, Food Security Pack Programme, Zambia.

ABSTRACT

In agriculture-oriented economies worldwide, agricultural extension services are influential in the crop productivity of small-scale farmers. In Zambia, despite the provision of extension services to small-scale farmers, some small-scale farmers have not felt their effects. Therefore, this study conducted a comparative analysis of the effects of the agricultural extension services on maize crop productivity of the 147 food security pack beneficiary households and 152 non-beneficiary households using a mixed methods design in the Mpulungu district of Zambia. The results revealed that the food security pack beneficiary and non-beneficiary households knew the extension services provided in the Mpulungu district. However, the extension workers concentrated more on the food security pack beneficiary households than the non-beneficiary households in the provision of extension services because they wanted the programme to succeed. The majority of the non-beneficiary households did not fully benefit from the agricultural extension services provided in Mpulungu district. The programme beneficiary households recorded higher maize crop productivity than the non-beneficiaries suggesting that the extension services had a positive effect. Challenges such as inadequate extension workers, lack of refresher training for extension workers and loss of trust in the extension system affected both groups. However, these challenges affected the non-beneficiary households more than the food security pack beneficiary households. The study concludes that extension services contribute to agricultural crop productivity. Therefore, the study recommends improvement in extension staffing levels, administrative support, in-service refresher training and capacity building of the extension workers. Also, the implementation of a universal extension service targeting strategy for small-scale farmers is recommended.

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INTRODUCTION

Agriculture is key to development in Southern Africa as it provides essential human needs such as food, clothing, shelter, medicine, recreation, wealth et cetera. It is a production venture that can guarantee food security among small-scale farmers both at community and household levels if well harnessed (Bahta et al., 2014). For agricultural production to thrive, both public and private extension and advisory services to commercial and small-scale farmers are inevitable as they provide timely information on the latest agricultural technologies focussed on land preparation, seed varieties, planting, harvesting, storage, marketing, and so forth (Barrett et al., 2010). Small-scale farmers have a high probability of being deprived of information concerning the latest agricultural technologies available through the latest technological platforms, hence, the existence of agricultural extension services to deal with underprivileged small-scale farmers (Shausi et al., 2019). Shausi et al. (2019) explain that these agricultural extension services incorporate educational information on the latest agricultural technologies regarding farming inputs and credit services, among others.

Agricultural extension and advisory services are provided by both public and private sector players in Zambia, though the public sector has been more dominant in the delivery of extension services than the private ones in all the 116 districts including Mpulungu, the area of study (Somanje et al., 2021). Mpulungu district is about 10,170 square kilometres and has 19,650 households with an estimated population of 98,073 people, representing 0.8% of Zambia's national population (Zambia Statistics Agency, 2022). The land of Mpulungu district is shared between the plateau and the valley. The valley is predominantly a fishing area where fishing activities are carried out on Lake Tanganyika (Department of Local Government [DLG], 2020). The plateau, on the other hand, has rain-fed crop and animal production (Central Statistics Office [CSO], 2018). Agriculture in Mpulungu district consists mostly of small-scale farmers engaged in subsistence farming (DLG, 2020). Mpulungu district has four (4) agricultural blocks that are further divided into fourteen (14) agricultural camps (DLG, 2020). Mpulungu district is characterised by subsistence farming that depends on rain-grown crops that include various food crops, with maize being the staple crop, hence, the focus of this study (Ministry of Agriculture, 2016). The district has a population of 27,314 small-scale farming households of which one-third (⅓), that is, 9,105, are male-headed, while two-thirds (⅔), that is, 18,209, are female-headed (DLG, 2020).

In the Mpulungu district, public agricultural extension and advisory services are provided to small-scale farmers by the Zambian government through the Ministry of Agriculture. However, the

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effect of these services is not felt by some small-scale farmers in the district as agricultural productivity has remained low among them due to the deprivation of the much-needed extension and advisory services (Ministry of Agriculture, 2016). The DLG (2020) Situation Analysis Report indicates that the agricultural extension services in Mpulungu district are unreliable and almost nonexistent in some rural areas. Further, the unreliability and nonexistence of agricultural extension services in the district are attributed to bad terrain and lean staffing levels in the Department of Agriculture (DLG, 2020). This has resulted in poor agricultural yield and ultimately seasonal and acute household food insecurity among some small-scale farmers in the Mpulungu district (DLG, 2020).

There has been no reliable scientific evidence-based data on the effect of the agricultural extension services in Mpulungu district of Zambia because no previous study has scientifically investigated this phenomenon. Researchers have not treated the analysis of the effects of agricultural extension services on agricultural production and productivity with the importance it deserves in Mpulungu district. Most of the information on extension services in the district is only available in the departmental administrative and periodic reports of the Ministry of Agriculture. Questions have been raised about the effectiveness of the agricultural extension services in Mpulungu district.

It is against this background that this study analysed the effect of the agricultural extension services on maize crop production targeting the food security pack programme beneficiaries and non-beneficiaries in Mpulungu district of Zambia. Specifically, the study assessed the awareness of the food security pack beneficiaries and non-beneficiaries on the provision of agricultural extension services; investigated the effects of the agricultural extension services on maize crop productivity for the food security pack beneficiaries and non-beneficiaries; compared the maize crop productivity for the food security pack beneficiaries and non-beneficiaries; investigated the challenges that the food security pack beneficiaries and non-beneficiaries encountered with the agricultural extension services; and established the existing opportunities for agricultural extension services to flourish in Mpulungu district.

The Food Security Pack programme is a government-financed agricultural food security programme aimed at enhancing household food security through food crop production by providing vulnerable but viable small-scale farmers with the agriculture start-up input package in all 116 districts in Zambia (Ministry of Community Development and Social Services [MCDSS], 2021). This package comprises cereal seed (maize, sorghum, millet, or rice), legume seed (sugar beans, cowpeas, soya beans or groundnuts), potato vines (optional), cassava cuttings (optional), basal and top-dressing fertilizer (mandatory), and lime for areas with acidic soils (optional) (Kafula, 2022).

The output of this study illuminates points where policymakers can start, in the quest to come up with an all-inclusive and reliable extension and advisory services in Mpulungu district and the nation at large. The findings of this study can be applied to other districts with similar characteristics to that of Mpulungu district, which was purposely sampled as a case study. The results give new insights to policymakers, planners, and implementers on the benefits, challenges and opportunities existing in Zambia's agricultural extension and advisory system. It is envisaged that the findings will have practical relevance to the government of Zambia as this study provided an opportunity to get an in-depth understanding of the phenomena studied. The study results can be used as a basis for improvements in strengthening the existing agricultural extension and advisory system in Mpulungu district and Zambia at large. Also, the study provides an opportunity for new research to look at issues that have not been covered relating to agricultural extension services in light of the current development policy debates.

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LITERATURE REVIEW

Overview of the Agricultural Extension Services

Enhancing the accountability and quality of agricultural extension service provision by putting agricultural extension services into the hands of both the public and private sectors has considerably lessened the financial load on the public sector (Aker, 2010). This has led to the provision of agricultural extension services that are more financially sustainable in Africa (Aker, 2010). However, in Southern Africa, about 5% of agricultural extension services are offered by the private sector (Tolera et al., 2014). Uddin et al. (2016) further explain that private agricultural extension services can perform better in response to demands from commercial farmers, but that small-scale farmers may not be aware of them, consequently, they may be unable to access them or not be in a financial position to acquire the services. As a result, they may ask for fewer services than they need. In this case, the delivery of agricultural extension services by the private sector may not be a suitable solution for small-scale farmers. A private-public partnership (PPP) would be able to offer agricultural extension services, along with a publicly funded but privately managed system that would enhance the effectiveness and efficiency of the system by embracing all farmer groups regardless of their economic status (Aker, 2010).

Tsafack, & Degrande (2022) point out that the environment in which farmers of today work is ever-changing, therefore, new ways to offer practical and efficient agricultural extension services are required. This is in line with the recently introduced idea of using Information and Communication Technologies (ICTs) in agricultural extension services and rural development projects (Tsafack, & Degrande, 2022). Aydogdu (2017) further explains that ICTs can convey information that is essential for agricultural development, such as weather focus, seed varieties, marketing information and other rewarding income diversification ventures in the short and long term. Conventional essential techniques that can be affordable and user-friendly for small-scale farmers include mobile phones that can increase both public and private agricultural information dissemination. Aker (2010) explains that by using cell phones, agricultural extension services may be conveyed at a much lower cost, but with high quality and valuable information.

Agricultural Extension Services in Zambia

The implementation of agricultural extension services in Zambia is guided by the National Agricultural Policy that incorporates essential components of agriculture to assist in the expansion of the agricultural sector (Ministry of Agriculture, 2016). One of the objectives of the policy is to strengthen agricultural extension service delivery points, improve the efficiency and effectiveness of the existing extension staff, and promote private extension services to supplement the public extension system (Ministry of Agriculture, 2016).

The Role of Extension Services in Zambia

In the year 2000, Zambia adopted the Participatory Extension Approach (PEA) as the principal channel for delivering extension services under the auspices of the World Bank-backed government study which looked at systems of stimulating extension service delivery in the country (Burrows et al., 2024). The PEA is a systematic learning process that focuses on joint learning using local and contemporary knowledge that encourages facilitation in place of teaching (Chavula et al., 2022). The Participatory Extension Approach adopted in Zambia's extension service delivery system is typically aimed at bringing about change in several areas such as production, food quality, product development, rural development or social improvement (Chavula et al., 2022). These extension and advisory services are delivered through two main channels namely, farm institutes, livestock service centres, and farmer training centres, on one hand, and the network of agricultural blocks and camps for fisheries, crops and livestock, on the other hand (Umar, 2016).

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Agricultural Extension Service Agents in Zambia

Agricultural extension services in Zambia are offered by both the public and private sectors. The public sector players are the government line ministries while the private sector players include non-governmental organisations, international development partners and farmer organisations. Notable among private sector players are major seed companies (Chavula et al., 2022). Some international NGOs implement projects funded by bilateral and international development partners. They employ full-time extension officers serving the project target areas with specific interventions. However, some NGOs and international development partners rely on extension staff from the public sector for follow-ups on their interventions (Somanje et al., 2021). Farmer organisations and cooperatives are also active in providing extension services to their members. Somanje et al. (2021) add that the Zambia National Farmers Union (ZNFU) is the most prominent farmers' organisation with its full-time staff providing various forms of extension services. Other players in the delivery of extension services are the Zambia Cooperative Federation (ZCF) and the Small-scale Farmers' Association (SFA) (Chavula et al., 2022).

Theoretical Framework

This study used the Unified Theory of Acceptance and Use of Technology (UTAUT) as the theoretical foundation. The UTAUT theoretical model, which is a brainchild of Venkatesh et al. (2003), embraces four fundamental facets of intentions on agricultural technology usage namely; performance expectancy, effort expectancy, social influence, and facilitating conditions. All four components of the UTAUT mentioned above were influential in this study as they aimed at determining user acceptance of agricultural technology disseminated through extension and advisory services and user behaviour on the same technology. 'Performance expectancy' in this study entailed the extent to which the vulnerable but viable small-scale farmers expected their acceptance of the agricultural technology and usage of the same would help them achieve higher agricultural productivity (Venkatesh et al., 2003), while 'effort expectancy' denoted the level of easiness associated with the acceptance of the agricultural technology and usage of the system by the vulnerable but-viable small-scale farmers (Lee et al., 2003). On the other hand, 'social influence' meant the extent to which the individual vulnerable but viable small-scale farmers perceived how agricultural technology could work for them as a result of testimonies from other farmers who have used the technology before (Hendrawan et al., 2023), while 'facilitating conditions' implied biographic and demographic characteristics of the vulnerable but viable small-scale farmers that could influence agricultural technology acceptance, adoption and usage, for instance, age, experience, voluntariness, et cetera (Samaradiwakara, & Gunawardena, 2014).

METHODOLOGY

Study Site

The study site for this research was Mpulungu district which is situated in the Northern Province of the Republic of Zambia shown in Figure 1. Mpulungu district is located on the shores of Lake Tanganyika and lies between latitude 9° south of the equator and longitude 31° east of the prime meridian (CSO, 2018). The district has a port of entry and exit through Mpulungu Harbour to neighbouring countries, namely; Tanzania, the Democratic Republic of Congo and Burundi (CSO, 2018).

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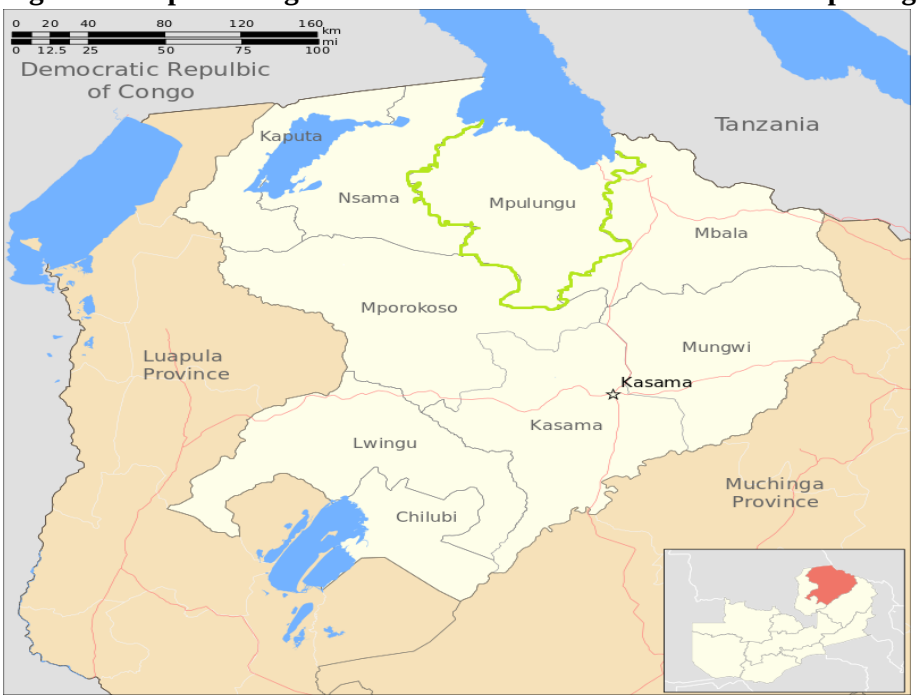
Figure 1: Map Showing the Location of Northern Province and Mpulungu District in Zambia



Key:

- Mpulungu district boundary
- Map of Northern Province (Insert)
- Lakes

Mpulungu district was selected as the area of study because of its easy accessibility, fertile land, and prolonged rainy season suitable for crop production, which in an ideal situation, should boost the crop productivity of the small-scale farmers in the district. The Central Statistics Office explains that the northern region of Zambia experiences a prolonged rainy season every year from early October to late April the following year (CSO, 2018).

Research Design

The study used a mixed-methods design where both qualitative and quantitative approaches were incorporated to gather descriptive and numerical data from the questionnaire respondents and interviews (Creswell, 2017). The mixed-methods design enabled the researcher to collect wide-ranging views on the effects of agricultural extension services on maize crop production among small-scale farmers in Mpulungu district (Creswell, 2017).

Sampling Techniques

The non-probability sampling technique was used to purposely select Mpulungu district as the area of study (Lury, 2018). This sampling technique was, also, used to select the technocrats namely, the District Agricultural Coordinator and the District Community Development Officer for interviews as key informants. Probability sampling using a simple random technique was used to select the food security pack programme beneficiaries and non-beneficiary household heads aged eighteen (18) years and above as questionnaire respondents.

Sample Size

To determine the sample size, the researcher used Slovin's Formula quoted in Glen (2023) which provides the sample size (n) using the known population size (N) and the acceptable error value

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(e) by fitting the N and e values into the formula: n = N ÷ (1+Ne2). The resulting value of n equals the sample size used (Glen, 2023).

The sample size for the food security pack beneficiaries was arrived at as follows:

N = 300, e^2 = 5%, n =?

Then, n = N/ (1 + Ne^2)

n = 300/ (1 + (300 * (0.05) ^2)

n = 172 correct proportional random sample of the food security pack beneficiaries.

The sample size for the non-beneficiary households was arrived at as follows:

N = 2690, e^2 = 5%, n =?

Then, n = N/ (1+Ne^2)

n = 2690/ (1 + (2690 * (0.05) ^2)

n = 348 correct proportional random sample of the non-beneficiaries.

However, since this was a control group, the sample size was reduced by half to lower the variance with the sample for the food security pack beneficiaries to a negligible level or bring them to almost the same sample size. Therefore, n = ½ x 348 = 174 non-beneficiaries.

Data Collection

The study used researcher-administered semi-structured questionnaires to collect data from the 147 and 152 food security pack programme beneficiaries and non-beneficiary household heads, respectively. Also, interview guides were used for collecting data from the District Agricultural Coordinator and the District Community Development Officer as key informants. Semi-structured questionnaires were used to collect respondents' biographic and demographic data; awareness of agricultural extension services; and effects of extension services. Also, data on maize crop productivity, challenges encountered, and opportunities for agricultural extension services to flourish were collected using semi-structured questionnaires. The combination of researcher-administered questionnaires and interviews helped to realise the validity and reliability of the data (Creswell, 2017).

Data Analysis and Presentation

The data were analysed using the Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics in the form of frequency distributions, percentages, arithmetic mean, standard deviations and standard error were generated to provide comparisons on the variables of interest (Lury, 2018). These statistics are presented in the form of tables and graphs. Qualitative data was analysed by developing a classification system that helped to generate categorical variables/themes that were subjected to analysis using SPSS software and are presented in tables (Flick, 2014).

RESULTS AND DISCUSSION

Biographic and Demographic Characteristics of the Respondents

The central units of the study were the food security pack beneficiary and non-beneficiary household heads. As such, the study sought to understand some biographic and demographic human characteristics of the household heads as respondents. According to Kucharčíková et al. (2023), the most important characteristics of human capital are gender, age, education, health status, household size, dependency ratio, and leadership potential. Arising from the above, the study analysed data on the respondents' sex and education levels.

Sex of Respondents

In both groups of the agricultural food security pack beneficiaries and non-beneficiaries, males were the majority at 51% and 53%, respectively, compared to females whose statistics for the beneficiaries were 49% and 47% for the non-beneficiaries as shown in Table 1.

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Table 1: Biographic and Demographic Characteristics of Respondents

Characteristic variables	FSPP Beneficiaries		FSPP Non-beneficiaries	
	n = 147	(%)	n = 152	(%)
Gender				
Males	75	51	81	53
Female	72	49	71	47

Source: Survey data

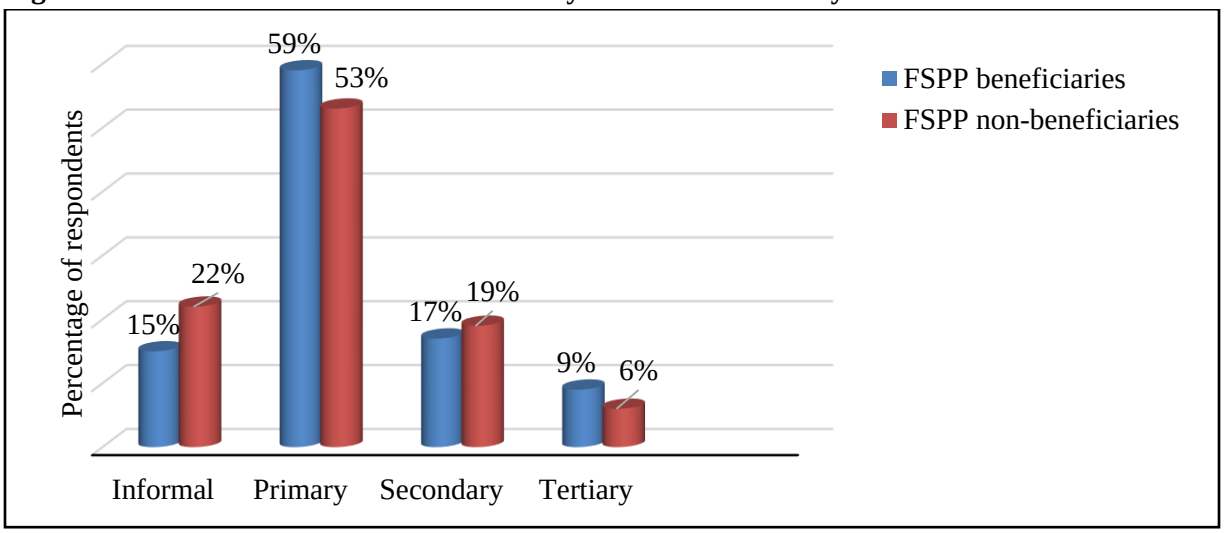
Notes: n = number of respondents %= percentage FSPP = Food Security Pack Programme

The findings revealed that there were fewer females than males heading households that participated in this study, though the situation analysis and poverty reduction strategy report for Mpulungu district indicates that the number of female-headed small-scale farming households is higher than the male counterpart. Out of a population of 27,314 small-scale farming households, one-third (⅓), that is, 9,105, are male-headed, while two-thirds (⅔), that is, 18,209, are female-headed (DLG, 2020). However, if the population was taken to be the determining factor, it would have been expected to have more female-headed households participating in small-scale farming than males because the population of females is higher than that of males in Mpulungu district projected at 50.4% for females and 49.6% for males as per 2021 statistical projections (CSO, 2018).

Educational Levels

Fifty-nine percent (59%) of the food security pack beneficiaries, who formed the majority of the small-scale farmers in this study, never went beyond primary education, just like the majority, 53% of the non-beneficiaries, who also did not go beyond primary schooling as shown in (Figure 2). Similarly, an unbearable number (15%) of the food security pack beneficiary household heads had never received formal education, like, the non-beneficiaries that had 22% of household heads that also did not receive formal education. There were low literacy levels among the food security pack beneficiary and non-beneficiary household heads in Mpulungu district. The findings confirm statistical projections that show continued illiteracy levels in Mpulungu district for the projected year 2023 (CSO, 2018).

Figure 2: Education Levels: FSPP Beneficiary and Non-beneficiary Household Heads



Source: Survey data

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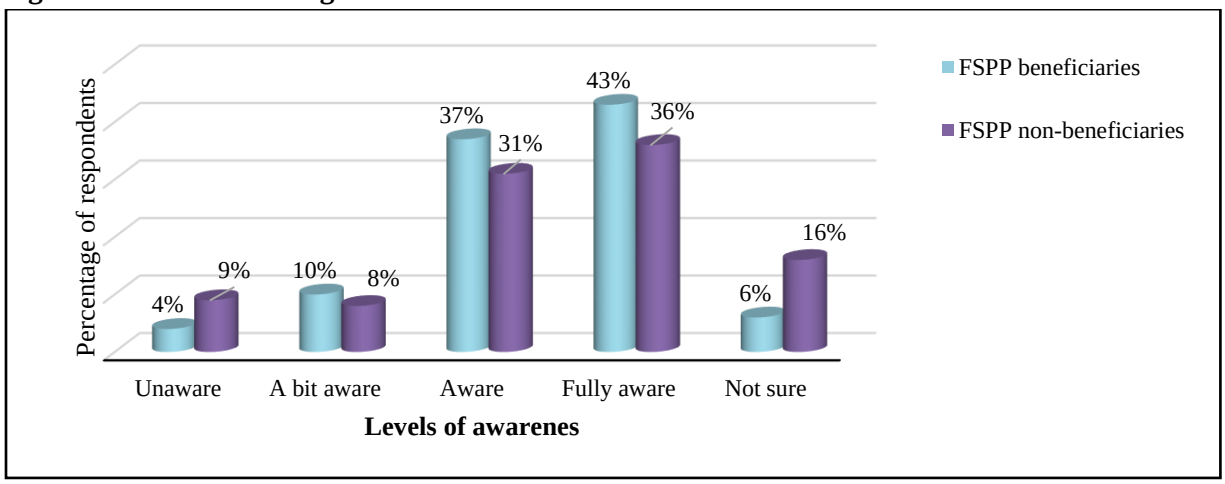
With high illiteracy levels, small-scale farmers are more likely to be deprived of the latest agricultural technologies through agricultural extension services either via information communication technologies (ICTs) or participatory approaches than literate farmers. If small-scale farmers have little or no education, they can hardly grasp, adopt and utilise the latest agricultural technologies to their full potential, thus, reducing the capability for crop productivity. This statement is supported by the study conducted by Mason et al. (2015) in Tanzania that used maize crop productivity as an indicator of household food security. The study results showed that households with family heads of higher education levels had higher maize crop productivity than those with non or lower education levels. The higher maize crop productivity was attributed to their enlightenment on agricultural technologies through extension services (Mason et al., 2015).

Awareness of Agricultural Extension Services

The study revealed that the majority 43% of the food security pack beneficiaries were fully aware of the agricultural extension services offered by the Ministry of Agriculture in Mpulungu district compared to the majority 36% of the non-beneficiaries who indicated the same. It was, also established that 37% of the food security pack beneficiaries were aware of the services though not fully aware compared to the 31% of the non-beneficiaries that said the same, as shown in Figure 3. Very few food security pack beneficiaries and non-beneficiaries were unaware of the agricultural services provided by the Ministry of Agriculture in the district with statistics standing at 4% for the beneficiaries and 9% for the non-beneficiaries as shown in Figure 3.

Figure 3: Awareness of Agricultural Extension Services



Source: Survey data

Notes: %= percentage FSPP = Food Security Pack Programme

The majority of the food security pack beneficiaries were aware of the agricultural extension services provided in the district because they directly benefited from them, while the majority of the non-beneficiaries did not benefit much from the extension services though they were aware of them as shown in Figure 4 below. Interviews with technocrats revealed that the food security pack beneficiaries, being participants in the government-funded food security pack programme, were purposely targeted for the provision of extension services to ensure that the government programme does not fail. One interviewee whose statement summarised the outcome from the questionnaire respondents explained that:

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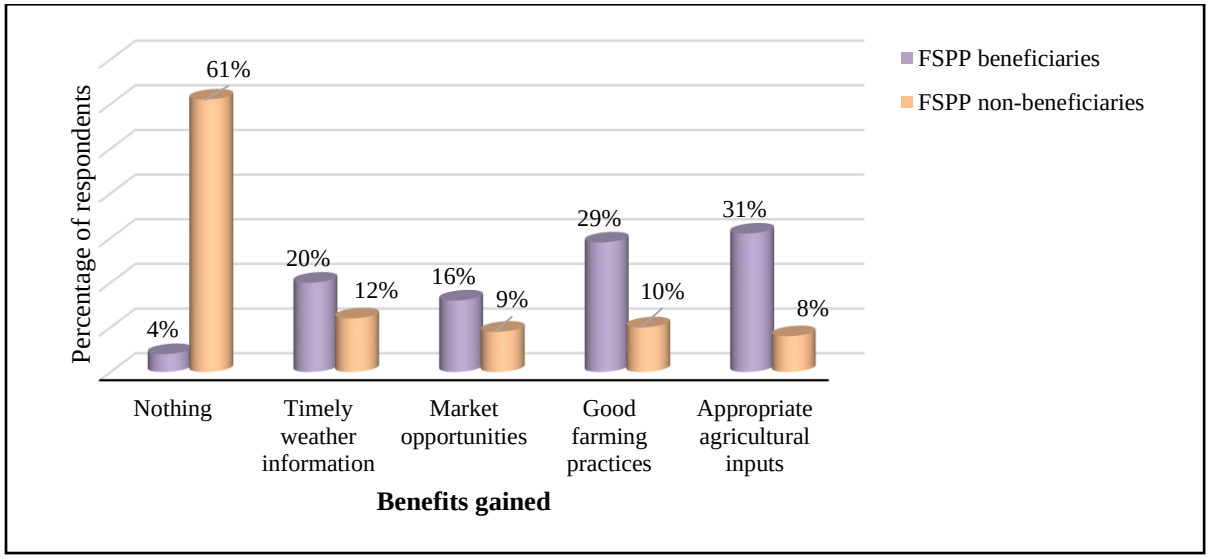
"The Department of Agriculture in the district concentrates more on food security pack beneficiaries in extension service delivery than other small-scale farmers that are not yet absorbed on the programme due to low staffing levels. The concentration on the food security pack beneficiaries is to enable the programme to succeed for scaling up".

The above sentiments from the technocrat are supported by Tucker et al. (2015) argument that an increase in the farmer population with an increased demand for agricultural extension services without a corresponding increase in the number of extension workers at the field level results in a poor extension worker-to-farmer ratio of 1:1200 in some cases in Zambia. Fowler, & White (2023) further add that the low ratio, which falls far below the international recommended standards, has stretched the capacity of extension officers to deliver effective extension services.

Effects of the Agricultural Extension Services

The majority 61% of the non-beneficiaries of the food security pack programme never benefited from the agricultural extension services provided in Mpulungu district compared to the minority 4% of the beneficiaries that did not benefit from the same services as shown in Figure 4. Thirty-one percent (31%) of the food security pack beneficiaries, who were the majority, directly benefited from the participatory approach to the use of appropriate farming inputs. The other positive effects that the extension services had on maize crop productivity of the food security pack beneficiaries were; learning about good farming practices (29%), receiving timely information on weather patterns (20%), and information on market opportunities for their maize crop (16%), in that order. As for the non-beneficiaries, the same benefits mentioned above were felt, though, with minimal effects ranging from 8% to 12% as shown in Figure 4.

Figure 4: Benefits Gained from Agricultural Extension Services



Source: Survey data

Notes: %= percentage FSPP = Food Security Pack Programme

The results show that the agricultural extension services had many positive effects on the food security pack beneficiaries compared to the non-beneficiaries. The independent samples t-test showed that the food security pack beneficiaries (N = 147) had a bigger mean on benefits gained from the agricultural extension services (M = 3.64) than the non-beneficiaries (N = 152) who had M = 1.91 as shown in Table 2.

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Table 2: Group Statistics on Benefits Gained from Agricultural Extension Services.

Variable	Group	N	Mean	Std. Deviation	Std. Error Mean
Benefits Gained	FSPP Beneficiaries	147	3.64	1.227	.101
	FSPP Non-beneficiaries	152	1.91	1.347	.109

Source: Survey data

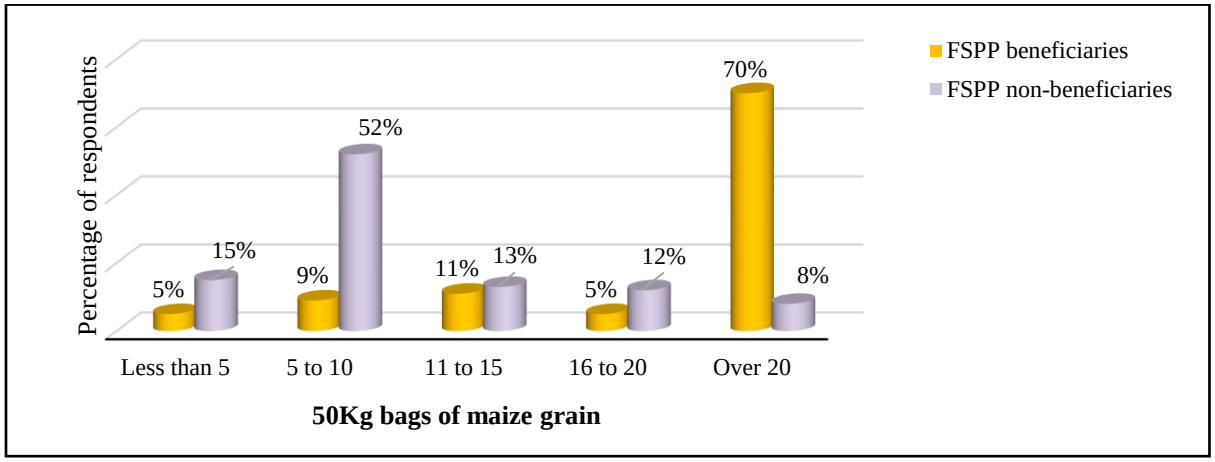
Notes: FSPP = Food Security Pack Programme; N = number of respondents; Std. = Standard

To establish the effect size of the agricultural extension services on the food security pack beneficiaries and non-beneficiaries, Cohen's d (M2 -M1) ÷ SDPooled was computed and projected at 1.3, which is a large effect based on Cohen's d parameters (Glen, 2023). As such, there was very firm proof that a statistically significant difference in agricultural extension service benefits gained between the food security pack beneficiaries and non-beneficiaries existed, with the former having more benefits gained than the latter as indicated in Table 2.

Maize Crop Productivity by the Food Security Pack Beneficiaries and Non-beneficiaries

Seventy percent (70%) of the food security pack beneficiaries, who were the majority, produced over 20(50kg) bags of maize grain on average, per 0.25 hectares of land in a single farming season compared to the 8% of the non-beneficiaries who produced the same amount of maize crop on the same size of a piece of land as shown in Figure 5.

Figure 5: Number of 50 Kg bags of Maize Grain Produced



Source: Survey data

Notes: %= percentage FSPP = Food Security Pack Programme

The majority (52%) of the non-beneficiaries yielded between 5 and 10(50kg) bags of maize grain per 0.25 hectares of land compared to the 9% of the beneficiaries that produced the same amount of maize crop. Only 5% of the food security pack beneficiaries produced less than 5(50kg) bags of maize grain compared to 15% of the non-beneficiaries that produced the same amount of maize grain on the same size piece of land as shown in Figure 5. Higher maize crop productivity was recorded among the programme beneficiaries than the non-beneficiaries suggesting that agricultural extension services played a part in high maize crop production and productivity. The independent samples t-test revealed that the food security pack beneficiaries (N = 147) had a larger mean on maize

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crop productivity (M = 4.25) than the non-beneficiaries (N = 152) who had M = 2.45 as shown in Table 3.

Table 3: Group Descriptive Statistics on Maize Crop Productivity

Variable	Group	N	Mean	Std. Deviation	Std. Error Mean
Maize crop productivity	FSPP Beneficiaries	147	4.25	1.265	.104
	FSPP Non-beneficiaries	152	2.45	1.127	.091

Source: Survey data

Notes: FSPP = Food Security Pack Programme; N = number of respondents; Std. = Standard

The above results show that the agricultural extension services had a more positive effect on maize crop productivity for the food security pack beneficiaries than non-beneficiaries. To determine the effect size, Cohen's d (M2 -M1) ÷ SDPooled was computed and estimated at 1.5. This is a large effect in line with Cohen's d principles. Therefore, there was solid evidence that a statistically significant difference in maize crop productivity between the food security pack beneficiaries and non-beneficiaries existed, with the beneficiaries having higher maize crop productivity than the non-beneficiaries due to the influence of the extension services, among other factors, as shown in Table 3.

Challenges Encountered with the Agricultural Extension Services

The majority, 33% of the food security pack beneficiaries, contended that there were inadequate extension workers to provide quality agricultural extension services to small-scale farmers in Mpulungu district, while the majority 35% of the non-beneficiaries indicated that they had completely lost confidence in the agricultural extension system as a result of not being covered. The high staff resignation rate came second from both groups as one of the challenges with the food security pack beneficiaries standing at 22% and the non-beneficiaries at 26% as shown in Table 4.

Table 4: Challenges Encountered with the Agricultural Extension Services

Challenges encountered	FSPP Beneficiaries		FSPP Non-beneficiaries	
	n = 147	%	n = 152	(%)
Loss of trust in the extension system	28	19	53	35
Outdated extension methodologies	16	10	12	8
High staff resignation rate	32	22	39	26
Contradictory extension strategies	23	16	22	14
Inadequate extension staff	48	33	26	17

Source: Survey data

Notes: n = number of respondents; % = percentage; FSPP = Food Security Pack Programme

Contradictory extension strategies were also cited as challenges with the food security pack beneficiaries recording 16% while the non-beneficiaries stood at 14%. The minority 10% of the food security pack beneficiaries argued that some extension methodologies administered by some extension workers were outdated, and this was validated by the minority 8% of the non-beneficiaries who said the same, as shown in Table 4. The challenge of low extension staffing levels that came out as top-most was, also, mentioned during the interviews with technocrats. One Zambian government official said:

"There is poor support for extension service delivery in the district which has led to some

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graduates avoiding the profession and in some instances, extension workers resigning. Most extension officers work with limited or no operational resources. In some cases, extension staff live in dilapidated houses, or are not placed in their designated area and commute long distances from homes to places of work at their own cost"

The above-discussed challenge of inadequate extension staff alongside the high staff resignation rate is supported by Tucker et al. (2015) who argue that an increase in the farmer population with an increased demand for agricultural extension services without a corresponding increase in the number of extension workers at field level result in a poor extension officer-to-farmer ratio which stretches the capacity of extension staff to deliver effective services.

The challenge of administering outdated extension methodologies by some extension workers was a result of a lack of in-service refresher training for agricultural extension employees. Tucker et al. (2015) explain that the current extension service delivery system, in Zambia, does not embrace extension in-service and refresher training adequately. They further argue that this can result in most extension staff meeting farmers with outdated extension service information which may lead to a loss of trust in the public extension service delivery system and ultimately low acceptance and adaption to innovation (Tucker et al., 2015).

Opportunities for Agricultural Extension Services to Flourish

The majority 45% and 39% of the food security pack beneficiaries and non-beneficiaries, respectively, explained that small-scale farmers' willingness and readiness to accept and adopt the latest agricultural technologies is fertile ground for the expansion of extension services in Mpulungu district as shown in Table 5. The availability of supportive structures, such as agricultural camps came second from both groups as one of the enablers for scaling up extension services, with the food security pack beneficiaries standing at 20% and the non-beneficiaries at 22%.

Table 5: Opportunities for Agricultural Extension Services to Flourish

Opportunities for extension services	FSPP Beneficiaries		FSPP Non-beneficiaries	
	n = 147	(%)	n = 152	(%)
Supportive structures	29	20	34	22
Agriculture Training institute	24	16	27	18
Agriculture Research Station	28	19	32	21
Farmers' willingness	66	45	59	39

Source: Survey data

Notes: n = number of respondents; % = percentage; FSPP = Food Security Pack Programme

The existence of a Provincial Agricultural Research Station was eulogised by both the food security pack beneficiaries (19%) and non-beneficiaries (21%) as one of the opportunities to foster the expansion of extension services in the district and province at large. The other opportunity mentioned by the minority food security pack beneficiaries (16%) and non-beneficiaries (18%) was the availability of a Provincial Agricultural Training Institute.

The farmers' willingness to accept the latest agricultural technologies that were mentioned by the majority of the respondents resonates with Burrows et al. (2024) explanation that the ever-growing interest by small-scale farmers to adopt new technologies and innovative interventions to improve their agricultural productivity may lead to the possible growth of extension services in Zambia. They further mention that this can only happen if there is a deliberate policy to compel the government to embark on reasonable investment in

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agricultural extension services (Burrows et al., 2024). Likewise, the submission by respondents that supportive infrastructure which included the Provincial Agricultural Training Institute and Provincial Agricultural Research Station as opportunities for the growth of the agricultural extension system in the district agrees well with Burrows et al. (2017) argument. Burrows et al. (2024) explain that, in Zambia, there are well-defined extension structures at sub-district, district, provincial and national levels, coupled with the existence of farmer and staff training facilities that can enable extension services to thrive if well supported by the government.

LIMITATIONS OF THE STUDY

The purposive sampling method used to choose Mpulungu district as the study area meant that the generalisation of the findings may not apply beyond the district unless those districts with similar characteristics (Lury, 2018). Since the study used researcher-administered questionnaires, the researcher did not reach all the sampled 172 and 174 food security pack programme beneficiaries and non-beneficiaries as intended due to impassable pathways. Nevertheless, questionnaires were administered to 147 (85%) and 152 (87%) of the 172 and 174 sampled beneficiary and non-beneficiary household heads, respectively. The percentage of the targeted respondents not reached was negligible to affect the generalisation of the findings within Mpulungu district.

CONCLUSION AND RECOMMENDATIONS

Agricultural extension services are fundamental to enhancing the crop productivity of small-scale farmers in Southern Africa, Zambia inclusive. The study demonstrates that the agricultural extension services in Mpulungu district of Zambia had a positive effect on the maize crop productivity of small-scale farmers. The study established that the provision of agricultural extension services in Mpulungu district was concentrated more on small-scale farmers who were the beneficiaries of the government-financed food security pack programme than those who were not yet absorbed into the programme. As such, the maize crop productivity of those small-scale farmers who did not receive much attention from extension workers was negatively affected due to a lack of information on agricultural technologies. There is evidence that there was a significant difference in maize crop productivity between the food security pack beneficiaries and non-beneficiaries, where the former produced more maize crops than the latter due to being well-abreast with the latest agricultural technologies through extension services.

Both the food security pack beneficiaries and non-beneficiaries encountered some challenges with extension services such as inadequate extension staffing levels and loss of trust in the extension system, among others. However, the challenges faced by the food security pack beneficiaries had less gravity than those of the non-beneficiaries. Nevertheless, despite these challenges, some opportunities to allow the scaling up of extension services to all small-scale farmers in the district existed. These opportunities included; small-scale farmers' willingness to accept the extension services, and the availability of supportive infrastructure such as; agricultural camps, a provincial farm institute and an agricultural research institute, among others. Owing to the positive effects of the agricultural extension services on maize crop production in Mpulungu district, the study recommends improvement in extension staffing levels with corresponding administrative support that can help to implement the universal targeting of small-scale farmers in the district.

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