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Training Programs for Smallholder Farmers at Ward Agricultural Resource Centres in Tanzania: Status and the Remaining Gaps

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Globally, Agricultural Resource Centres (ARCs) have been complementing the existing institutions in training smallholder farmers. Although the Government of Tanzania established Agricultural Resource Centres (ARCs) with the goal of bridging the gap in agricultural extension services for smallholder farmers, there is limited research on the effectiveness of these centres in delivering training programs. This study seeks to address that gap. The study employed a descriptive research design; a structured questionnaire was used to collect quantitative data, while focus group discussions (FGDs) and key informant interviews (KIIs) were for gathering in-depth qualitative information. The findings revealed that training programs offered at WARC focused mainly on crop production and relied heavily on private stakeholder support to offer training to smallholder farmers. The study concluded based on training areas that crops receive more priority in WARC training programs over entrepreneurship, livestock, record keeping, and fishery. With these findings, it is evident that the WARCs are not functioning as outlined in the government guidelines for their establishment. The guidelines specify that training should be comprehensive and address various aspects of improving the living standards of smallholder farmers in their specific contexts. Despite this, WARCs continue to play a vital role in providing training. To enhance their sustainability and effectiveness, WARC supervisors need to mobilize resources by fostering partnerships and securing funding from key agricultural stakeholders.

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INTRODUCTION

The agriculture sector in Tanzania, predominantly by smallholder farmers with less than two hectares of land, remains a cornerstone of the Tanzanian economy. In the last two years, it accounted for approximately 26% of Tanzania's GDP, employing a large portion of the population and providing livelihoods for about 65% of the workforce (Gebrekidan *et al.*, 2020; African Development Bank Group, 2023). The smallholder farmers are at the centre of ensuring the nation's food security, yet they often face numerous challenges, including limited training in modern farming practices and limited access to inputs and markets.

Improving the productivity and sustainability of smallholder farming has taken a central position in government policies and strategies for both economic growth and poverty reduction in Tanzania. Agricultural extension services are a critical component of agricultural policy that contributes to sector performance (United Republic of Tanzania, 2013).

Provision of Extension Services in Tanzania

Different institutions provide the services, including the Ministry of Agriculture, Training Institutions, Local Government Authorities, private providers and farmer organizations. Ahmad *et al.*, (2023) illustrate the current agricultural extension service delivery institutional framework in Tanzania. Different extension approaches are used, and various delivery methods include individual, group, and mass. Agricultural Resource Centres (ARCs)

have been used to complement the existing institutions in extension services due to their capability to enhance knowledge intensity. They are highly context-specific and provide opportunities for wide coverage of extension services. Globally, they are named differently, including names like Rural Resource Centres (RRCs), Small Farm Resource Centres (SFRCs), Agricultural Information Resource Centres (AIRC), and Learning Resource Centres (LRCs) in Cameroon, Southeast Asia, Kenya, and Vietnam respectively (Sward, 2008; Government of Kenya, 2010; Bertin *et al.*, 2014).

Given the above, and in the quest to improve extension services, the Tanzania government, through the Agricultural Sector Development Programme (ASDP I and II) under District Agricultural Development Plans (DADPs), started initiatives to establish Ward Agricultural Resource Centres (WARCs) (United Republic of Tanzania, 2007). The introduction of WARCs was, among other reasons, a response to sectoral ministries assessment results, which showed that the mode of delivery of extension services to smallholder farmers was a limiting factor for its effectiveness (United Republic of Tanzania, 2023). So, the WARC establishment aimed to improve the service, particularly by training smallholder farmers in different areas (entrepreneurship, crops, livestock, and fishery production and marketing). However, it also disseminates timely and accurate agricultural information, plans and conducts training sessions based on the community's needs, disseminates new technologies, and links farmers to value chain actors

such as input suppliers, marketers, and financial institutions (United Republic of Tanzania, 2007). The transformation of agricultural extension services is important to impart the right tools, knowledge and skills and ensure farmers adhere to Good Agricultural Practices (GAPs) (United Republic of Tanzania, 2013). Alongside establishing WARC, other measures, such as providing logistical support and increasing the number of agricultural extension agents at the village level, have been taken.

The primary focus of WARC is training because studies show that trained smallholder farmers consistently outperform their untrained counterparts in productivity. For example, a study by Gichuki *et al.*, (2023) in Kenya on Farmer Field Schools (FFS) revealed that participants experienced a 23% increase in crop yields compared to non-participants. This increase is attributed to adopting better farming practices and technologies taught during the training sessions. Similarly, a study by (Sebaggala and Matovu (2020) in Uganda reports the same results. Also, a study by Ahmad *et al.*, (2023) in Rungwe, Tanzania indicated that participation in training programs boosted their confidence to interact with fellow farmers and extension workers to improve farming practices. Temesgen, 2020; Pradhan *et al.*, 2021 reported that training programs often include components on financial literacy and market access, adding produce value chains, and helping farmers navigate the complexities of agricultural markets. Knowledge of market trends, price fluctuations, and negotiation skills enables farmers to sell their produce at competitive prices, maximizing their profits (Magesa *et al.*, 2020).

It is deduced that well-designed and executed training programs help smallholder farmers optimize their use of inputs such as seeds, fertilizers, and water, hence productivity. Improved agricultural productivity can lead to higher household incomes, better food security, and enhanced quality of life. Higher incomes allow

families to invest in education, healthcare, and other essential services, contributing to community development.

Problem Statement

So far, the government has established 278 WARCs out of 3927 targeted (United Republic of Tanzania, 2023). The establishment of the centres focused on enhancing agricultural productivity due to its hands-on training and participatory approach. Notwithstanding, efforts to establish more are underway, and they promised to establish new centres and revive the existing ones, with at least one WARC in each ward by 2025 (United Republic of Tanzania, 2017). The District Council facilitates these centres under the supervision of Ward Agricultural Extension Officers (WAEOs) or Village Agricultural Extension Officers (VAEOs). The current ASDP II, which is under implementation from 2017 to 2028, has a component of supporting training through WARCs for sustainable productivity growth and quality (United Republic of Tanzania, 2020). Despite the efforts made by the government of Tanzania to improve extension services through WARCs, there is a dearth of research on the status of the training programs offered and the limitations faced in realizing the aims. Therefore, this study analyses the status of training programs offered at Ward Agricultural Resource Centres in Tanzania. The aim is to provide empirical evidence on the performance and gaps that need attention to function effectively in the WARCs.

THEORY OF THE STUDY

This study is based on the **Diffusion of Innovations (DOI)**, theory which was developed by **Everett Rogers in 1962**. The theory explores how innovations such as new ideas, technologies, or practices spread within a community or social system over time. According to DOI, theory the process of diffusion involves the communication of an innovation through specific channels among members of a social system (García-Avilés, 2020).

The theory highlights five key elements that influence the diffusion process: the **innovation itself, communication channels, time, the social system, and adopters' categories**. It emphasizes that individuals adopt innovations at different rates, categorized as **innovators, early adopters, early majority, late majority, and laggards**, based on their willingness and ability to adopt new practices (Vargo *et al.*, 2020). The theory further explains that for any innovation to be successfully adopted, it must exhibit certain attributes, namely **relative advantage, compatibility, complexity, trialability, and observability**. These attributes determine how quickly and successfully an innovation will be accepted. For instance, an innovation that offers significant advantages aligns with existing values, is easy to use, can be tested before adoption, and whose results are visible will spread more rapidly within a target group.

The WARC's are intended to address the gap in agricultural extension services by providing farmers with critical training in modern farming techniques, entrepreneurship, record-keeping, livestock management, and fisheries (United Republic of Tanzania (2023). These training programs act as innovations that farmers must adopt to improve their agricultural productivity and livelihoods. The theory implies that the successful diffusion of new agricultural knowledge and practices depends on effective communication channels and social interactions facilitated by the WARC's. In this case, the structured training programs, key stakeholder involvement, and demonstration plots serve as channels through which innovations are communicated to farmers. The role of **early adopters** among the farmers is also significant, as these individuals often serve as role models who influence their peers' adoption of new practices. This social influence is crucial in rural settings, where communal relationships and trust significantly impact decision-making processes.

Moreover, the theory provides a lens to understand the challenges observed in the study findings,

particularly the emphasis on crop production training at the expense of other areas such as livestock, entrepreneurship, and fisheries. For an innovation to diffuse successfully, it must be **relevant** to the needs of the adopters (Goh & Sigala, 2020). The dominance of crop production training could reflect the farmers' immediate priorities or the perceived benefits of crop-based innovations. However, the theory also highlights the importance of diversifying training programs to ensure that all opportunities within the agricultural value chain are explored, making WARC's more inclusive and effective in addressing farmers' needs. The **attributes of innovation** proposed in the theory also align with the findings of the study. For instance, innovations such as recommended spacing, improved seed usage, and fertilizer application are relatively simple and observable, which explains their popularity among smallholder farmers. On the other hand, the low adoption of record-keeping and fisheries training could be attributed to perceptions of complexity or incompatibility with farmers' existing practices and resources. The theory suggests that to promote these underutilized innovations, WARC's should focus on reducing perceived barriers through hands-on training, practical demonstrations, and peer learning.

METHODOLOGY

Research Design

This study employed a descriptive research design. This is because the descriptive research design focuses on describing and understanding existing phenomena (Singh, 2023). The research design also utilizes structured methods (surveys, questionnaires, secondary data analysis) which were appropriate for this study.

Sample Size and Sampling Procedure

The sample size was determined using the Nassiuma (2000) formula, resulting in a sample of 189 respondents. According to Nassiuma (2000),

the following formula was used to obtain an appropriate sample size for the study.

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

Where:

n= the required sample size,

N = the population within the study area,

C= Coefficient of Variation,

e = Standard error.

The coefficient of variation would be used to obtain the sample. According to Nassiuma (2000), a coefficient of variation in the range of $21\% \leq C \leq$

30% and a standard error in the range of $2\% \leq e \leq 5\%$ are acceptable. Thus, for this study, a coefficient of variation of 28% and a standard error of 2% was ideal. The study sample was obtained from each of the four (4) Ward Agricultural Resource Centres, which together have 5537 smallholder farmers involved. Utilizing the equation:

$$n = \frac{5,537 \times (0.28)^2}{(0.28)^2 + (5,537 - 1)(0.02)^2} = 189$$

These respondents were proportionately randomly selected from four Ward Agricultural Resource Centres (WARCs) Mamire, Matufa, Nkaiti, and Nangara in Babati district, Tanzania, as shown in Table 1.

Table 1: Sample Size by Farmer Proportion

WARC	Target Population	Accessible Population	Proportion of farmers to be sampled	Proportionate Farmers Sampled
Mamire	3200	2212	40%	76
Matufa	4000	1500	27%	51
Nkaiti	1500	508	9%	17
Nangara	4800	1317	24%	45
Totals	13,500	5537	100%	189

Source: (Babati District Extension Section Report, 2024)

This proportional selection ensured that the sample from each WARC accurately reflected the population distribution across the wards, enhancing the representativeness of the study. However, during data collection, a researcher was able to reach 188 out of 189 respondents. The preliminary results were presented at the Tanzania Society of Agricultural Education and Extension (TSAEE) annual conference, held in the Dodoma region of Tanzania on August 6-7, 2024. To enhance the results and discussion section, various opinions were incorporated.

Data Collection

Data collected in this study included both quantitative and qualitative components. Quantitative data were gathered using a structured questionnaire administered with the assistance of Kobo Toolbox software. Qualitative data were

collected through focus group discussions (FGDs) and key informant interviews (KIIs), which complemented the quantitative findings by providing in-depth insights. FGD was done with smallholder farmers saved at WARCs in the district and KII was conducted with the Ward Executive Officer and Ward Agricultural Extension Officer who are chairperson and secretary of the centre management team respectively.

Data Analysis

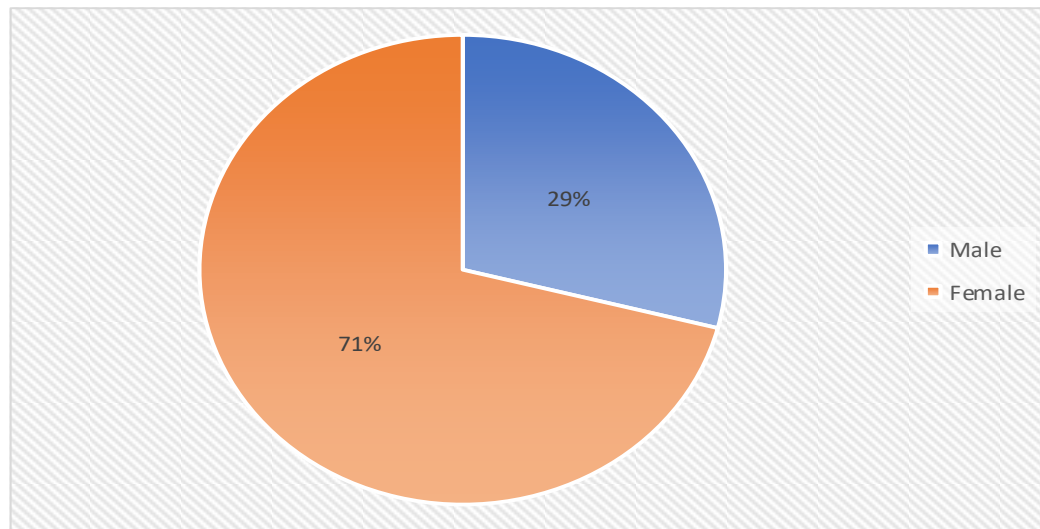
Quantitative data collected using Kobo Toolbox through mobile phones were imported to Excel for easy cleaning. Further data were imported to the International Business Machines (IBM) Statistical Package for Social Sciences (SPSS) version 25 computer program. In IBM-SPSS data were coded, and cleaned before performing statistical analysis. Additionally, qualitative data were analyzed

thematically. The findings were presented in tables and charts to facilitate interpretation.

RESULTS AND DISCUSSION

Gender of Smallholder Farmers

Figure 1: Gender of Smallholder Farmers



The dominance of male (71%) respondents suggests that men are more actively involved in agricultural activities or more likely to participate in surveys related to agricultural extension services. Bello *et al.*, (2021) argue that more men are actively engaged in crop farming as their primary source of livelihood as compared to women. One possible reason for the higher percentage of male respondents is the traditional gender roles prevalent in many rural areas, where men are often the primary decision-makers and landowners. This societal norm can lead to men being more engaged in agricultural activities and, consequently, more represented in agricultural surveys. Additionally, men may have better access to information and resources related to agricultural extension services, making them more likely to utilize WARCs. Additionally, respondents stated in an interview that men typically outnumber women at various village meetings.

"In many rural communities, men are typically the primary decision-makers when it comes to

agricultural practices and land management. This is why they are more engaged in agricultural programs, such as those offered by WARCs." The informant further explained, *"Since men are often the landowners, they have greater access to resources like extension services, which empowers them to make decisions and actively participate in training programs."* (KII-Ward Executive Officer 8th May 2024).

This highlights how traditional gender roles and resource access can contribute to the disproportionate representation of men in agricultural initiatives.

This result agrees with a study conducted in western Ghana by Ankrah *et al.* (2020), which depicted that men often have greater access to agricultural resources and extension services compared to women in many developing countries. In addition, a study conducted in Nepal indicated that cultural norms and gender roles significantly influence the involvement of men and women in agriculture,

often resulting in higher male participation (Spangler & Christie, 2020). Furthermore, a study by Glazebrook *et al.* (2020) on gender matters in the global South and North, found that gender disparities in access to agricultural extension services were common, with men typically having more access than women. This disparity can be attributed to various factors, including limited mobility, lower educational levels, and time constraints faced by women due to household responsibilities (Bello *et al.*, 2021).

Table 2: Education Level of Respondents (n=188)

Education level	Frequency	Percent
No formal education	3	1.6
Primary	148	78.7
Secondary	29	15.4
Certificate	4	2.1
Diploma	2	1.1
Degree	2	1.1
Total	188	100.0

This large proportion is attributed to the educational profile of smallholder farmers in rural areas, where access to higher education may be limited due to various socio-economic factors such as distance from educational institutions and financial constraints. In contrast, smaller percentages of respondents had achieved higher levels of education: 15.4% had secondary education, 2.1% had a certificate, and 1.1% each had attained a diploma or a degree. These findings are consistent with a study by Bisht *et al.* (2020) in India, which similarly found that a significant portion of smallholder farmers typically have primary education as their highest level of formal education. This demographic trend underscores the challenges in accessing higher education among rural farming communities, which can influence their capacity to engage with more advanced agricultural practices and technologies. Additionally, Balezentis's *et al.* (2020) study in Lithuania argues that limited

Education Level of Respondents

Education plays a significant role in agriculture, influencing farmers' ability to adopt new technologies and practices. Therefore, it was crucial to determine the education levels of respondents in this study. According to Table 1, the majority of respondents had attained primary education, comprising 78.7% of the sample.

educational opportunities in rural areas contribute to disparities in agricultural productivity and innovation adoption. Farmers with higher educational attainment levels are better positioned to understand and implement complex agricultural techniques and innovations.

Main Training Focus Areas at WARC

According to Table 2, most farmers (80.2%) received training focused on crops, highlighting the primary emphasis of WARC's educational efforts. Training on entrepreneurship accounted for 10.5%, followed by livestock at 7.6%, record-keeping at 1.2%, and fishery at 0.6%. This distribution indicates that WARC's training programs predominantly target crop production, with a substantial number of sessions dedicated to equipping farmers with advanced crop management techniques.

Table 3: Main Training Focus Areas at WARC's (n=188)

Focus area on training	Responses	
	N	Percent
Training focus on crops	138	80.2%
Training focus on livestock	13	7.6%
Training focus on fishery	1	0.6%
Training focus on record keeping	2	1.2%
Training focus on entrepreneurship	18	10.5%
Total	172	100.0%

This study used multiple response types of questions, therefore in the entire report, total responses may vary with the total number of respondents. Under this section, some of the farmers reported receiving training at WARC's in other areas that were not the study's focus, such as raising awareness about wildlife management, sexual violence, and gathering for administrative village meetings. The focus on crop training is attributed to the critical role that crop production plays in the livelihoods of farmers in the region. As crops are the primary source of food and income, it is essential to enhance farmers' skills in crop management to ensure food security and economic stability (Zakaria *et al.*, 2020). Crop training likely includes modules on modern farming techniques, pest and disease control, soil fertility management, and post-harvest handling practices. These areas are vital for improving yield quality and quantity, which directly impacts the farmers' economic well-being (Prithviraj *et al.*, 2020).

Entrepreneurship training, though less frequent with 10.5%, still plays a significant role in diversifying farmers' income sources and promoting agribusiness. This training equips farmers with skills in business planning, financial management, and marketing, enabling them to explore new ventures and improve the profitability of their farming operations. The relatively lower emphasis on entrepreneurship training could be due to the initial priority given to ensuring food security through crop production before diversifying into business aspects. Training focused on livestock, while important, accounted for a smaller percentage (7.6%) compared to crops. This could be because

livestock farming, although beneficial, may not be as prevalent or as critical to the immediate food security needs of the farmers in the region. However, livestock training is essential for those who engage in mixed farming, providing them with knowledge on animal husbandry, disease management, and breeding practices to improve livestock productivity and health as cited by a study conducted in Ethiopia (Duguma, 2020).

Record-keeping and fishery training received the least attention, with 1.2% and 0.6% respectively. The low focus on record-keeping training suggests that it might be an emerging area of interest, not yet fully integrated into the regular training curriculum. However, record-keeping is crucial for farm management, helping farmers track expenses, monitor production, and make informed decisions as indicated by a study conducted by Gichohi (2020) in Gitugi Ward of Murang'a in Kenya. The minimal focus on fishery training could be due to the limited number of farmers involved in fish farming in the area, reflecting the region's agricultural priorities and practices. These results align with existing literature on agricultural training priorities. A study by Mgendi *et al.* (2022) indicated that training programs in Tanzania often prioritize crop production due to its direct impact on food security and economic stability. Similarly, In Zimbabwe, a study by Dzingirai (2021) highlighted the importance of entrepreneurship training in fostering agribusiness development, although it remains a secondary focus compared to crop training.

With regard to the qualitative findings collected through FGD and KII in the study area, it was

established that the training offered to smallholder farmers in all of the four WARCs was mainly on crop production. In addition, participants went further by saying that they were not getting the quality of training they expected, and when they did, it was almost exclusively from private companies and non-governmental organizations (NGOs). The reason for the same kind of training being offered could be that the centre depends on outside sponsors to train farmers rather than being self-sufficient in organizing different training sessions. According to study participants, they have yet to witness the centres come into operation in full, despite being informed during establishment that various training and other services will be continuously available. During FGD, one farmer highlighted the following:

"The training offered at the centre is largely about the best production of various crops such as maize, sunflower, pigeon peas and other crops. Whenever these training are offered it is mainly by private companies and NGOs (FGD with farmers, Nkai Ward, 9th May, 2024).

Also, during the KII, the participant reported that the WARCs programs did not meet the requirements set forth when they were first established. The participant further depicted that for the WARC to be functional and bring the intended outcome, they need to be equipped; otherwise, they become useless.

"We have been informed that the centre's objective is to offer smallholder farmers extension advice. Along with many other things, there will be a library where farmers must go to learn and find all the resources. Sadly, at the moment, there are shelves there without any learning materials for farmers. Many of the things that were meant to be at the WARC are now missing, so what we're doing is scheduling training sessions for smallholder farmers based on the private organizations' visits, only if they need to train smallholder farmers that is where the centre building can be used" (KII-Ward Agricultural Extension Officer, Matufa Ward, 8th May 2024).

Without regular and comprehensive training in agriculture, smallholder farmers may experience fluctuations in income, unlinked with value chain for profitability due to inconsistent application of services offered at the WARCs which can lead to limited ability to adapt to market changes or capitalize on new economic opportunities.

Training Offered on Crops

The study determined the specific areas where smallholder farmers were trained in crop production. This was necessary to identify any gaps that may exist in the training provided. The results are indicated in Table 3.

Table 4: Training Offered on the Crops (188)

Focus areas in the crop production	Responses	
	N	Percent
Recommended spacing in crop planting	118	33.1%
Recommended fertilizer application	57	16.0%
The use of improved seeds	105	29.4%
Diseases and pests' control	55	15.4%
Irrigation	22	6.2%
Total	357	100.0%

The results show that the most common focus area in crop production training was recommended spacing in crop planting (33.1%), improved seed usage (29.4%), fertilizer application (16.0%), pests

and disease control and irrigation (15.4%), and irrigation (6.2%). This training indicates an effort by extension agents to increase crop production among smallholder farmers. According to Table 3,

33.1% of respondents indicated proper line spacing is crucial for optimizing plant growth, reducing competition for nutrients, and preventing disease spread, which can significantly influence crop yields. This finding is consistent with the study by Lamprey (2022) which highlighted the importance of appropriate plant spacing in improving agricultural productivity in sub-Saharan Africa. The second most common area of training was the use of improved seeds, with 29.4% of the responses. The use of improved seeds is vital for achieving higher yields and better resistance to pests and diseases. Improved seeds often come with traits that are beneficial under local climatic conditions, thus ensuring more reliable production outcomes. This aligns with the research by Sinyolo (2020) which emphasizes the significant yield advantages provided by the adoption of improved seed varieties in developing countries.

Recommended fertilizer application was the focus of 16.0% of the training sessions. Proper fertilizer application is essential for enhancing soil fertility and providing necessary nutrients for crop growth. This is supported by (Vanlauwe & Dobermann, 2020), who noted that effective fertilizer use is critical for sustainable agricultural intensification in Africa. Training in diseases and pest control was reported by 15.4% of the responses. Effective pest and disease management is crucial for preventing significant crop losses and ensuring the health of the crops. This training helps farmers to identify, prevent, and manage pest and disease issues effectively, contributing to improved crop health and yields. According to Deguine *et al.* (2021), integrated pest management training significantly improves the ability of farmers to manage pests sustainably. Irrigation was the least covered area in the training, with only 6.2% of the responses. Irrigation is critical, especially in regions with erratic rainfall patterns, to ensure crops receive adequate water throughout their growing period. The limited focus on irrigation training suggests a potential area for improvement, given the increasing variability in climate and the need for reliable water

management. This finding is in line with Burney *et al.* 2024 who highlighted the benefits of irrigation in enhancing agricultural productivity and resilience to climate change.

The quantitative findings were supported by the verdicts from the focus group discussions and interviews conducted in the study area. It was observed that smallholder farmers primarily receive training on good agricultural practices related to crop production. This training includes guidance on the use of fertilizers, pesticides, and insecticides, as well as information on improved seeds, planting techniques, and disease and pest control. During the FGDs, it was revealed that WARCs support farmers by providing access to information aimed at improving their farming practices. One participant remarked:

“I have truly profited from the education I received at the centre in terms of growing maize. I used to plant poor-quality seeds, and I could only harvest eight bags of maize. However, after receiving training and adhering to appropriate agricultural practices, I can now produce eighteen bags of maize per hectare” (FGD with farmer, Mamire Ward, 8th May 2024).

Additionally, in FGDs, participants highlighted that the WARCs provided services primarily to farmers in groups. The group considered the neighbourhood for convenient meetings and reducing expenses, particularly during hands-on learning. Apart from farmers reporting maize crops being prioritized in training programs at the centre, farmers were shown receiving training on modern technologies for the introduction of new crops in their region; for instance, Mamire and Nangara wards introduced bananas and Ngwara, respectively. During the FGD, participants mentioned that they received training on new methods for producing bananas, a new crop in their village that did incredibly well. One of the FGD participants stated:

“Truly, our village before the WARC training programs never thought if we could grow bananas, but today our village is evergreen; bananas are available throughout the year, and it has secured our families in food availability and economic stability” (FGD with farmers, Nangara Ward, 11th May 2024).

Furthermore, the key informant added that the Centre benefits different categories of farmers, but mainly in crop production areas.

“The centre offers training, especially on crops and livestock. In terms of crops, we are currently giving more training to young people on vegetable farming as you can see out there in the demonstration plot” (KII-WEO, Nangara, 11th May 2024).

Trainings Offered on Livestock Production

The study also examined the specific areas where smallholder farmers received training in livestock production. The results are presented in Table 4.

Table 5: Training Offered on Livestock Production (n=188)

Training areas under livestock production	Responses	
	N	Percent
Housing and management of livestock	13	61.9%
Growing livestock feeds	3	14.3%
The use of improved breeds	5	23.8%
Total	21	100.0%

The findings indicate that the most common training area in livestock production was housing and management of livestock, accounting for 61.9% of the responses. Proper housing and management are critical for maintaining the health and productivity of livestock. Good housing provides protection from harsh weather conditions, predators, and diseases, which in turn enhances livestock productivity and welfare. This finding aligns with the study by Singh *et al.* (2020), which emphasizes the importance of proper livestock housing and management practices in improving animal health and productivity in developing countries. Another area of training was the use of improved breeds, with 23.8% of the responses. Improved breeds are essential for increasing livestock productivity, as they often have better growth rates, higher milk yields, and greater resistance to diseases. This training helps farmers adopt better breeding practices to enhance the quality and productivity of their livestock. This finding is supported by Jayne and Sanchez (2021), who highlighted the significant benefits of using improved livestock breeds in enhancing agricultural productivity and livelihoods in sub-Saharan Africa. Training in the growing of

livestock feeds was reported by 14.3% of the responses. Adequate and nutritious feed is vital for the growth and productivity of livestock. Training farmers on how to grow and manage livestock feeds can ensure a steady supply of quality feed, thus improving livestock health and productivity. This aspect of training is crucial, as feed shortages are a common challenge faced by smallholder livestock farmers, particularly during dry seasons. This aligns with the findings of Pinotti *et al.* (2021), who noted that feed management is a critical component of sustainable livestock production systems. However, there is a gap in the training offered due to limited expertise of extension agents in this area.

Trainings Offered on Fishery

According to Table 6, the training areas in the fishery were quite limited, with only two areas being reported. Both the construction of dams and fish food preparation and feeding were mentioned by 50.0% of the respondents. The limited scope of training in fishery suggests a potential gap in comprehensive fishery education among the smallholder farmers in the Babati District.

Table 6: Training Offered on Fishery (n=188)

Training on Fishery	Responses	
	N	Percent
Construction of Dam	1	50.0%
Fish food preparation and feeding	1	50.0%
Total	2	100.0%

The construction of dams is a critical aspect of fishery, as it involves creating suitable habitats for fish farming. Proper dam construction ensures that the fish have an optimal environment to thrive, which includes adequate water quality, depth, and temperature control. Training in dam construction is fundamental for establishing sustainable fish farming practices. This finding is supported by the study of Respius *et al.* (2020), which highlights the importance of infrastructure development, such as dam construction, in enhancing the productivity and sustainability of fish farming in Tanzania.

Fish food preparation and feeding are equally important, as they directly influence the growth and health of the fish. Proper nutrition is essential for achieving good growth rates and maintaining the

overall health of the fish. Training in this area ensures that farmers can provide balanced diets to their fish, which is crucial for maximizing production and minimizing losses. This aligns with the research by Gule and Geremew (2022), which emphasizes that adequate training in fish nutrition and feeding practices is vital for successful fish farming operations.

Training Offered on Record Keeping

The study aimed to assess the specific areas in which smallholder farmers were trained in record keeping, an essential aspect of agricultural management. According to Table 7, the training areas were relatively limited, with only three key aspects being reported.

Table 7: Training Offered on Record Keeping (n=188)

Training offered on record-keeping	Responses	
	N	Percent
Activities and expenses during production	2	40.0%
Yield earned and sales	2	40.0%
Plans on the use of the income generated	1	20.0%
Total	5	100.0%

The most common areas of training were activities and expenses during production, and yield earned and sales, each reported by 40.0% of the respondents. These areas are fundamental for effective farm management as they allow farmers to track their inputs and outputs, analyze their cost structures, and measure their profitability. Proper training in these aspects helps farmers make informed decisions, optimize resource use, and improve financial planning. This finding is supported by the study by Bishoftu (2020) in Ethiopia which emphasizes the importance of

financial record-keeping in enhancing farm productivity and profitability.

In addition, 20.0% of the respondents reported receiving training on planning the use of income generated from their farming activities. This area is crucial for ensuring that farmers can effectively manage their revenues, reinvest in their farming operations, and improve their livelihoods. Effective income planning can lead to better financial stability and long-term sustainability for smallholder farmers. The findings indicate a need for more comprehensive training programs in record

keeping. While the current focus areas are important, expanding training to include other aspects such as inventory management, labour tracking, and debt management would provide a more holistic approach to farm management. These findings align with the research by Tindiwensi *et al.* (2020), which highlights the necessity of comprehensive financial management training for smallholder farmers to enhance their overall farm management skills and economic outcomes.

Trainings Offered in Entrepreneurship

The study sought to identify the areas in which smallholder farmers received training in entrepreneurship, a critical component for enhancing their business acumen and economic sustainability. As presented in Table 7, the training areas included access and use of loans, adding value to crops produced, and establishing crop businesses.

Table 8: Training Offered in Entrepreneurship (n=188)

Areas trained in entrepreneurship	Responses	
	N	Percent
Access and use of loan	3	20.0%
Adding value to crop produced	6	40.0%
Establishing crop businesses	6	40.0%
Total	15	100.0%

The results in Table 8 indicate that the most common areas of training were adding value to crops produced and establishing crop businesses, each reported by 40.0% of the respondents. These areas are vital for smallholder farmers as they move beyond primary production to value addition, which can significantly increase their income and market competitiveness. Value addition involves processes such as processing, packaging, and branding, which can transform raw agricultural products into more marketable and higher-value items. This finding aligns with the study by Das *et al.* (2021) in India which emphasizes the importance of value addition in improving the livelihoods of smallholder farmers by increasing the profitability of their produce.

Training in establishing crop businesses is equally important as it equips farmers with the skills to develop and manage agricultural enterprises. This includes business planning, market analysis, and financial management, which are essential for creating sustainable and profitable farming ventures. The research by Kangogo *et al.* (2020), supports this, highlighting that entrepreneurship training enhances farmers' abilities to run their farms as businesses, leading to better economic outcomes and resilience. Access and use of loans

were reported by 20.0% of the respondents. This area of training is crucial as it enables farmers to understand and utilize financial services to invest in their farming activities. Access to credit can help farmers purchase inputs, improve infrastructure, and expand their operations. The findings resonate with the study in Southeast Nigeria by Onah *et al.* (2024), which indicates that financial literacy and access to credit are key factors in enhancing the productivity and economic stability of smallholder farmers.

With regard to livestock, fishery, record-keeping, and entrepreneurship, the qualitative findings also show that there was limited training in these areas for smallholder farmers across all four WARCs. The reason might be due to limited resources (funding, expertise, and facilities) and choosing to concentrate on crop production to make the most significant impact with the resources available. Additionally, the current situation shows that it has become customary, for the functioning of the centre to depend on private companies and non-governmental organizations (NGOs). These private agencies largely offer training for smallholder farmers to meet their objectives rather than the needs of the farmers at the moment. One of the

possible causes for the centre's failure to cover additional training areas as intended could be its reliance on outside organizations' training facilitation. One of the key informants said:

"Usually until there are guests, this centre is unutilized. For instance, the truth is that you found us here at the centre today because you informed us that you would be coming by" (KII-Ward Agricultural Extension Officer, 10th May 2024).

Furthermore, during the FGDs, a farmer highlighted that:

"I am a livestock keeper. We were having a problem with livestock experts about how to get quality feed for our cattle, but the experts came from Tengeru in collaboration with our extension officer, we were called to attend training at our WARC and learned how to grow the best feeds for our animals" (FGD with farmer, 8th May 2024).

Regarding these findings, there is a need to develop a sustainable mechanism which will allow different stakeholders to facilitate the Ward Agricultural Resource Centres to perform their functions as intended.

CONCLUSIONS AND RECOMMENDATIONS

The study concluded that crops received more priority in the WARC training programs compared to entrepreneurship, livestock, record-keeping, and fishery. Additionally, the WARCs relied heavily on private stakeholder support to offer training to smallholder farmers. Based on these findings, the study recommends that the WARCs diversify their training programs to include entrepreneurship, livestock management, record-keeping, and fishery, enabling smallholder farmers to fully utilize the opportunities available within the agricultural value chain. Furthermore, the study suggests that mobilization efforts should be made to foster partnerships and attract funding from key stakeholders to ensure the WARCs operate based on

the guidelines established by the Government of Tanzania when introducing these centres. The funding would be used to improve facilities and establish demonstration plots, enabling the centres to effectively offer a wider variety of training programs.

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