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EXAMINING THE EFFECTIVENESS OF GOVERNMENT FISH FARMING EMPOWERMENT SCHEMES: A CASE STUDY OF LUBWA FISH FARMING BLOCK OF CHINSALI DISTRICT MUCHINGA PROVINCE

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ABSTRACT

This study was conducted to examine the effectiveness of government fish farming empowerment schemes: a case study of lubwa fish farming block of Chinsali District; Research questions included: What types of government fish farming schemes are in chinsali? What are the impacts of government scheme on the livelihood of fish farmers? What are the effects of government schemes among small scale farmers on aquaculture development?. The sample size for this study was determined based on the minimum sample size that would be required for analysis at ward level. Given that Chinsali District is divided into 11 wards, 1 farming block was selected as sample size , thus 60 registered small-scale fish farmers were sampled randomly using simple random technique. The Sampled small-scale fish farmers were individually visited at their various farms for interviews and through telephone interviews. This investigation was accomplished through a mixed research approach involving both quantitative and qualitative research methods .A semi-structured questionnaire was used as a tool to collect data from small scale fish farmers on the effectiveness of government fish farming empowerment schemes and activities being undertaken, indigenous knowledge about fish farming and, the impact of fish farming empowerment schemes among small scale farmers on aquaculture development. The data was statistically analysed using Statistical Package for Social Sciences (SPSS) version 17 and Microsoft Excel 365 was used for graphical representation. Targeted variables in the research were small-scale fish farmers (independent variables) and, the empowerment schemes and other Aquaculture activities (dependent variables) respectively. The research results indicated that small-scale fish farming plays a significant role and, has demonstrated that government empowerment schemes have contributed to the development of aquaculture in Zambia particularly chinsali district. Further, government empowerment schemes are closely related to improvements in living conditions of fish farmers. The study recommended carrying out further research on the role that government empowerment schemes play in enhancing social and economic development. The study further recommends for more empowerment schemes in fish farming.

Keywords: Fish Farming, Scheme, Empowerment.

I. INTRODUCTION

1.0 Overview

In this chapter, the background is presented. This is done by first introducing the background to the proposed research topic. This is followed by the statement of the problem, the general and specific objective and the research questions. In addition, the theoretical frameworks adopted by the study is explained. The chapter concludes the significance of the study, scope of study and the operational definition of concepts to be used in the study. Small scale fish farming is becoming very popular in developing countries because of its ability to improve the welfare of people particularly less wealthy and landless-food insecure households through employment, income generation and nutrition from direct consumption.

1.1 Background

Fish is vital for nutrition and income globally, supplying about 20% of protein for one-third of the population. In Zambia, fisheries contribute significantly to GDP and employ over a million people, highlighting its importance for economic growth and transformation.

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The continuous decline in the productivity of capture fisheries in Zambia has resulted into various improvements on the aquaculture sub-sector to curb the high demand for fish and fish products from the increasing human population. Although the fish industry contributes positively to both economic and social development, about 50% of the estimated fish demand is unmet. This is due to population growth in Zambia leading to growth in the demand for fish in the country both for local and the international market. In addition, capture fisheries are operating at a fully exploited or over-exploited level (European Commission 2018:01). This development has lead to the development of aquaculture production which is beginning to respond to the ever-increasing demand for fish. Many people throughout Zambia are getting involved in fish farming.

The aquaculture sub-sector currently contributes about 27% to the total fish production in the country. The sector has experienced some increase in production from 12,988 metric tonnes in 2015 to about 64,413 metric tonnes in 2021; this increase is mainly attributed to the commercialization of the sector which has led to the increase in the number of small holder farmers venturing into fish farming and the increase in private sector investment (National Fisheries and Aquaculture Policy).

Previously, the fisheries sector in Zambia did not have a standalone policy. Fisheries and aquaculture programs were incorporated into the National Agricultural Policy and the Second National Agricultural Policy. However, these Policies fell short in adequately tackling the challenges surrounding coordination and regulation within the fisheries and aquaculture subsectors. This is because they cover a number of other sub-sectors including crop production and livestock which has tended to reduce the emphasis on fisheries. Additionally, the fisheries sector now confronts emerging concerns such as fish disease outbreaks, unsustainable fishing methods and the impacts of environmental degradation and climate change. Together, these challenges have necessitated the development of a standalone policy for the sector.It is with this in mind that Zambia's National Fisheries and Aquaculture Policy (NFAP) was launched on the 7th of June 2023. The overall objective of the policy is to transform the fisheries and aquaculture sub-sector in order to enhance sustainable fisheries and aquaculture development. Such a policy is also a pre-requisite to effectively address concerns in the sector. The purpose of this policy analysis is to provide an in-depth understanding of the National Fisheries and Aquaculture Policy. The Policy is discussed, as well as an analysis of its objectives and strategies for implementation.

However, the increase in the number of small-scale fish farmers has not significantly helped reduce the deficit in demand. The sector has received recognition through the Eighth National Development Plan and other cooperating partners who are implementing initiatives to improve productivity through financing by the Citizen Economic Empowerment Commission (CEEC) and African Development Bank (AfDB). Therefore, to increase the output of fish production through aquaculture, the government of the Republic of Zambia and its cooperating partners have putting in several mechanisms. In the first place, the Ministry of Fisheries and Livestock with the support of the Food and Agriculture Organization (FAO) developed a medium-term development plan focusing on the fish industry known as the National Aquaculture Development Plan (NADP) 2015 to 2020 with a focus on improving fish production in the country in order to meet the growing demand for fish.

Another major institution that has come on board to support the aquaculture industry is the European Union working together with the European Investment Bank (EIB) and other cooperating partners, the government of the Republic of Zambia has been supporting the emergency of small-scale fish farming in the country through granting loans and skills training.(European Commission 2018:01; Kaminski et al 2018:04). This support has been extended to small-scale fish farmers in Muchinga Province of which Chinsali District is a part of. This has also seen the rise of small-scale fish farmers not just in Muchinga Province but throughout the country. According to the 2017/2018 Livestock and Aquaculture Census Report: Summary Report (Ministry of Fisheries and Livestock 2019:03), as of January, 2018, a total of 9615 households were involved in fish farming in Zambia, of which 1017 are from Muchinga Province.

Thus, this Chapter gives an introduction of examining on the effectiveness of government fish farming empowerment scheme: a case study of mulakupikwa and lubwa wards of Chinsali District Muchinga Province.

1.2 Statement of the Problem

Although initiatives like supplying high-quality fingerlings have been implemented, there has been a limited emphasis on equipping small-scale farmers in Zambia with knowledge regarding fish farming and its effects on

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capture fisheries. The government and its partners see fish farming as an essential instrument to support diminishing capture fisheries and encourage rural economic and social progress. It is regarded as a way to reduce poverty by increasing household earnings. To promote aquaculture, it is crucial to enhance farmers' awareness of optimal practices. This research investigated government aquaculture initiatives in Chinsali District, Muchinga Province, to evaluate their impact and efficacy.

1.3 Objectives

1.3.1 General Objective

The main objective of the study is to examine government aquaculture empowerment schemes in Chinsali district

1.3. 2 Specific Objectives

- To establish types of fish farming schemes in Chinsali district
- To assess impacts of government schemes on the livelihoods of fish farmers
- To determine challenges associated with government fish farming schemes among small scale farmers

1.4 Research Questions

- What types of government fish farming schemes are in Chinsali District?
- What are the impacts of government schemes on the livelihoods of fish farmers**?**
- What are the challenges associated with government fish farming schemes among small scale farmers

1.5 Theoretical Framework

The study utilized developmentalism and structuralism models to assess government schemes for small-scale fish farming in Chinsali District, focusing on income generation and living standards. Developmentalism emphasizes empowering individuals to enhance their livelihoods and self-governance, highlighting the potential of aquaculture for food security and welfare improvement. However, technology benefits the wealthy disproportionately, and policies often fail to address the challenges faced by small-scale farmers. Conversely, structuralism examines the systemic barriers hindering economic growth in developing nations, making it suitable for analyzing fish farming and aquaculture in Zambia.

The researcher aims to investigate the impact of small-scale fish farming on household living conditions within families, particularly in Zambia, where cultural norms often restrict women's involvement in economic activities. The study will compare female participation in fish farming to male involvement, focusing on the structural challenges women face. Utilizing the sustainable livelihoods framework, the research emphasizes the importance of people-centered, participatory approaches in enhancing livelihoods. It will also analyze factors influencing fish farming, such as government support through training and funding for small-scale initiatives in Chinsali District.

1.6 Significance of the Study

This study will provide the much-needed information on the effectiveness of small-scale fish farming in improving household living conditions. It will further enlighten policy makers to develop systems that will enhance the participation of more people especially the poor into fish farming ventures thereby reducing the levels of poverty especially in rural areas. Through this investigation, an increase in the use of participatory and sustainable approaches towards poverty eradication will be enhanced. In addition, this study will add to the existing body of knowledge on the role that small-scale fish farming plays in improving livelihoods, especially among the poor. Also, the study is important because it brings to the attention of various stakeholders such as government, NGOs, traditional leaders, and agriculturalists, on the need for them to support the aquaculture sub-sector.

1.7 Scope of the study

This research is focussed on the limits of assessing government fish farming schemes In Muchinga province particularily Chinsali District. The research will adopt a mixed-methods approach, combining both qualitative and quantitative data collection techniques to gain a comprehensive understanding of the issues at hand. Surveys and structured interviews will be conducted with small-scale farmers to gather quantitative data on government schemes. Additionally, as well as assessing the effectiveness of support services provided by government agencies, non-governmental organizations (NGOs), and community-based organizations (CBOs).

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II. LITERATURE REVIEW

2.0 Overview

Chapter two explores relevant theories and reviews related studies about small-scale fish farmers in Chinsali District, Zambia. It highlights the lack of literature on enhancing their livelihoods, addressing unsustainable fishing practices in a landlocked country with abundant inland fisheries. **2.1 Aquaculture**

Aquaculture is the farming of aquatic organisms such as fish, shellfish and even plants. It refers to the cultivation of both marine and freshwater species and can range from land-based to open-ocean production. Fish-farming is however a sub-section of aquaculture focussed only on finfish species. The use of fish-farming in stimulating economic growth, poverty alleviation, food security, and environmental services is rising globally (Shakouri & Yazdi 201). At the same time it is important that the threats of unsustainable aquaculture practices are avoided but existing certification standards do not effectively address ecosystem sustainability (Brummett 2013). This highlights a need for improved aquaculture governance and knowledge generation and dissemination to ensure it develops in a sustainable manner (Shakouri & Yazdi 2012). In recent years fish-farming has become more commonly noted as a sustainable food source. Fish forms a large part of the human diet and is recognised as a healthy source of protein (Igumbor et al. 2012). Aquaculture is also noted as a method of providing fish without placing pressure on sensitive fisheries if done responsibly.

Interventions include addressing regulatory constraints to enhance aquaculture growth, such as expediting assessments and land transfers, setting standards, and facilitating market access. Collaboration between industry and government is crucial, with DAFF supporting sector development through a specialized team and engaging with producer associations on policy implementation..

2.2 Aquaculture globally

This research study focused on fish farming in Chinsali District, evaluating government empowerment schemes' effectiveness in Mulakupikwa and Lubwa wards. The study aimed to identify types of schemes, assess their impact on farmers' livelihoods, and analyze aquaculture development effects. Findings indicated that small-scale fish farming, involving 1 to 3 ponds mainly cultivating tilapia, significantly contributes to household income, ranking second after crop production, with annual earnings over K10,000 for top earners. Identified schemes included the Zambia Aquaculture Enterprise Development Project, Scaling Up Nutrition (SUN II), and the Community Development Fund, which positively influenced aquaculture and improved fish farmers' living conditions. Overall, government schemes are crucial for advancing aquaculture and enhancing livelihoods in Chinsali District.

As outlined above, aquaculture in Africa is predominantly freshwater (FAO, 2020a). If freshwater aquaculture continues to expand, water limitations due to competition for freshwater with crop production and other uses can occur (UNFCC, 2007). Freshwater is used in land-based systems to maintain pond level and replace water loss through seepage and evaporation. To reduce the pressure created by increased land occupation and enhanced water use, increased intensification and production efficiency of aquaculture production systems for efficient water usage should be implemented while simultaneously decreasing the feed conversion ratios (Mungkung et al., 2014). Switching to mainly marine water systems is not necessarily a solution to address the aforementioned challenges, as a significant share of water in aquaculture is used indirectly through the production of aquafeed (Mungkung et al., 2013).

Another environmental concern relates to water pollution and eutrophication. Expanded aquaculture production can lead to increased pollution and eutrophication due to more extensive use of fertilizers, drugs/antibiotics, wastewater discharges containing nutrients from faeces and feeds, and other chemicals (Waite et al., 2014). In Africa, fed aquaculture is significantly higher than non-fed aquaculture, accounting for over 90% of production annually over the past two decades (FAO, 2020a). Untreated aquaculture wastewater contains high levels of phosphorous and nitrogen from uneaten feeds and waste which can result in chronic levels of organic matter (Cao et al., 2007).

This, in turn, negatively affects production as bacterial decomposition of organic matter reduces oxygen levels, eutrophication results in algal blooms, water quality deteriorates and diseases break out (Cao et al., 23 2007). The impact of aquaculture on the level of eutrophication can be reduced through improvements in technology

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and management to mitigate water pollution. Improved management practices include the use of settling ponds prior to releasing wastewater, better incorporation of filtration systems, and modern production systems like recirculating aquaculture systems as well as utilizing biofloc technology (Waite et al., 2014).

Several aquaculture policies and initiatives at country, regional and continental level are in place to ensure a sustainable increase in aquaculture production in Africa. The African Blue Economy Strategy (ABES) was developed to guide African Union (AU) member states in the development of an inclusive blue economy (AU-IBAR, 2019). The blue economy concept promotes better stewardship of the oceans and "blue" resources through economic, rational and sustainable use. This concept has been incorporated into several continental policies and/or initiatives, such as the AU Agenda 2063, the 2014 Framework and Reform Strategy for Fisheries and Aquaculture in Africa, and the 2014 Africa's Integrated Maritime Strategy. Under the ABES, there are three strategic objectives related to fisheries and aquaculture to be achieved through specific intervention measures. These include:

i) Optimizing conservation and sustainable use of fisheries and aquaculture resources while minimizing conflicts with other blue economy sub-themes

ii) Achieving the full wealth creation potential of fisheries and the aquaculture sector to optimize contribution to the blue growth and

iii) Ensuring sustainable social, economic, environmental and equity outcomes and human rights while protecting natural capital and blue investments. At the regional level, fisheries and aquaculture policies/initiatives fall under the agricultural policies of the main Regional Economic Communities (RECs).

These policies consider all major continental and international strategic frameworks that impact or are impacted by fisheries, such as the AU's New Partnership for Africa's Development Program (NEPAD), the Comprehensive Africa Agricultural Program (CAADP) and the Sustainable Development Goals. Not all RECs have elaborated policies focused on aquaculture; however, they are undergoing a reform process guided by the Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa (PFRS) (AU-IBAR, 2014).

The African contribution to world aquaculture production is still insignificant (~2.7%) (Halwart ,2020) albeit significantly increasing with larger-scale investments in Egypt, Nigeria, Uganda and Ghana producing substantial quantities of fish (Cai et al. ,2017; FAO ,2018). The region recorded a twenty-fold production increase from 110,200 to 2,196,000 tons from 1995 to 2018 with a compound annual growth rate (CAGR) of 15.55% (FAO ,2016; Halwart ,2020). The growth of aquaculture production was due to the advent and intensification of private sector controlled small and medium scale enterprises (SMEs; Satia ,2011). Also, the development of big commercial enterprises mostly stimulated by the combination of burgeoning public support, expertise, foreign direct investment, interest in aquaculture, global awareness raised through the New Partnership for Africa's Development (NEPAD) Fish for All Summit of 2005 as well as the implementation of the FAO Special Program for Aquaculture Development in Africa (SPADA) contributed to aquaculture growth (Satia ,2011).

Aquaculture In Southern Africa

The aquaculture sub-sector has great earning potential and needs to be given the necessary attention that will enable it to fully contribute to the economic growth of Southern Africa. Some of the priority actions include developing tailor-made training programmes, expanding existing educational offerings, offering post-graduate bursaries and conducting in-depth research about the sub-sector in all its aspects.

The growth of the fish-farming sector in Southern Africa also offers a host of socio-economic benefits. It has significant potential for rural development, especially for the marginalised coastal communities (Republic of Southern Africa & Aquaculture Lab). Growth the sector could also assist Southern Africa in combatting continuing high levels of underweight and nutritional deficiencies, overweight and obesity among both adults and children which is a rapidly growing public health problem in Southern Africa (Monteiro & Cannon 2012). Certain countries, particularly China are in fact showing interest in South Africa's aquaculture sector. A Southern Africa-China bilateral agreement has been developed in which China is providing technical expertise in order to support Southern Africa in addressing its skills and technology problems in the field of aquaculture (Tshetlo 2014). The Asian market is in huge demand for fish products, which could be a potential opportunity for export from South Africa (Radebe 2013). Due to the different climatic conditions Southern

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Africa could also provide niche fish products for export that are far easier to farm locally than in Asia. This has been seen through Southern Africa's abalone farming industry that is able to provide top quality abalone to Asia (Radebe 2013). The aquaculture landscape in South Africa is set to change as development continues to accelerate and expand into all nine of the provinces (Molewa 2013) The literature review suggests that there is growth potential for the fish-farming sector in South Africa, but further research is needed to determine the nature of the market for farmed fish in Southern Africa.

2.3 Aquaculture globally

Chinsali District has magnificent water bodies that support Fisheries and aquaculture, notable among them are chipoma falls, Chambeshi River among others. For this reason, it is not uncommon to find fish farming in Chinsali district which in the view of was adopted as a means of diversifying livelihood from traditional farming practices. However, the fish farming sub-sector in Chinsali District has not been spared from the challenges that the other Districts are faced with.Fish farming is defined as the practice of raising fish in the captive environment to be killed and sold for human consumption (FAO, 2015). The farmed fish are typically mass reared in overcrowded unnatural conditions and their well-being is largely ignored. It is therefore clear that fish farming is different from capture fishing, which implies catching fish directly from the wild.

Locally (Zambia), literature reviewed shows that the growth of small-scale fish farming is mainly due to high demand for fish as a result of population growth. This sentiment is supported by the European Commission (2018:01) who point out that population growth in Zambia is the leading cause of growth in the demand for fish in the country. The development of small-scale fish farming is also due to support rendered by national and international development programs (Mudenda 2009; Harrison 1996). For example, according to Masuka and Maiza, 'small-scale fish farming was highly encouraged by the government in provinces and areas that had abundant water resources but did not have major capture fishery to supplement food production.

According to Kaminski et al (2018:04), in a study conducted in Zambia titled "Aquaculture in Zambia: An overview and evaluation of the sector's responsiveness to the needs of the poor" the development of small-scale fish farming in Zambia is also due to the 'growing importance of promoting aquaculture as an enterprise. It is believed that pursuing aquaculture as a business would enable farmers to sustainably manage their systems for increased incomes.' Consequently, many people in Zambia have undertaken small-scale fish farming as a business by relaying on family labour to grow their small-scale fish farming businesses (Masuka & Maiza 2016:01).

In similar perspective, Zambia estimates the average annual fish production to be at 75,000 mt and 20,000 mt for capture and aquaculture fisheries respectively. It is also estimated that the fisheries sub-sector contributes about 0.4% to the GDP (CSO 2015). This relatively small contribution at a macro level often masks the significant contributions of fish production in the rural economy, and the nutrition security of the Zambian population. Fish farming provides income to about 1,000,000 people who earn their income directly as fish farmers or indirectly as traders, processors and other service providers along the value chain (Musumali et al. 2015).

The majority of smallholder fish farmers are found in the north of the country, while the larger, more market-oriented aquaculture producers are located in the central and southern areas of Zambia. Less is known about the eastern region in terms of aquaculture and fisheries production. The regions vary considerably in their socioeconomic and ethnic contexts. The inclusion of diverse areas in the sample allowed for comparisons of various social, economic and environmental factors. Such as improved understanding of the small-scale sub-sector as a whole, provided an opportunity to gain insights into the challenges and opportunities faced by fish farmers throughout the country.

In recent years, Zambia's aquaculture industry has attracted significant attention from major aquaculture companies, particularly in the Copperbelt, Lusaka, and Southern provinces (ZAEDP, 2016). This development has presented new investment opportunities for farmers to establish large-scale cage-based fish farming facilities (ZAEDP, 2016). This enhances production by accessing high-quality commercial inputs (Kaminski et al., 2019). The adoption of efficient management practices, such as the utilization of high-quality seeds and commercial feed, and the monitoring and tracking of feed conversion ratios (FCRs), and these farms can produce superior quality and larger fish for the urban market (Avadi et al., 2019).

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2.4Types of Fish Farming Schemes in Chinsali District

A study was conducted to assess the performance of aquaculture in Chinsali and Shiwangandu districts of Muchinga Province. A total of 162 respondents were randomly selected, The survey results revealed that 10% of the respondents were between 20 and 30 years old, 43% were between 31 and 40 years old, and 33% were between 41 and 50 years old. Small-scale farmers constituted the vast majority (96%) of respondents, while medium-scale farmers accounted for only 4%. Despite these challenges, there is great potential for a thriving and highly productive aquaculture sub-sector to benefit an increasing number of fish farmers. Increasing the level of investment in aquaculture within Muchinga province of Zambia would significantly contribute to the production of sufficient fish for both local consumption and exportation, thereby generating employment opportunities for the youth, particularly in Chinsali and Shiwang'andu (DoF, 2017). The Aquaculture Seed Fund, under the administration of the Citizens Economic Empowerment Commission (CEEC), has extended support to the aquaculture sub-sector in the Muchinga province. The commission has disbursed approximately K27 million to farmers in the province, with the objective of strengthening the aquaculture value chain. The province is home to two major aquaculture facilities, namely the Chinsali Aquaculture Research Station (CARS) and the Isoka Government Fish Farm (IGFF). A comprehensive analysis of the performance of the aquaculture sub-sector in Chinsali and Shiwang'andu districts was conducted to identify the number of fish farmers operating on both small and commercial scales, as well as the challenges they faced and the opportunities available.

2.5 Impacts of Government Schemes on The Livelihoods of Fish Farmers

Globally, literature reviewed shows a lack of research directly on the actual contribution of small-scale fish farming in improving household living conditions. However, various authors have touched on matters that reflect the contribution of small-scale fish farming in some way to issues related to improving living conditions of people who practice small-scale fish farming. Areas such as poverty reduction, food security and improved nutrition are some of the areas connected to improved living conditions that various researchers have dealt with. For example, according to Belton (2013:94), small-scale fish farming is seen as a powerful tool of 'alleviating rural poverty, improving household food security, and contributing to socioeconomic development more generally' and has therefore received attention and institutional support from various sectors of society including governments. Poverty reduction, food security and improved nutrition are key elements in improving living conditions. As Bondad-Reantaso & Perin (2019:03) sums it up, small-scale fish farming improves livilihoods and provides income opportunities to enhance the quality of human life. These sentiments are in line with the view of Boto (2013) , who states that small-scale fish farming is considered by the international development community as 'an important domestic provider of the much needed, high quality, animal protein, generally at prices affordable to the poorer segment of society. The above sentiments are supported by Mulokozi, et al., (2020:02), who augues that 'aaquaculture adoption can have various positive impacts at different levels from farm and household to community and national levels, by contributing to food and nutrition status to people. Mulokozi, et al., (2020:02), further states that fish farming 'also helps to improve the purchasing power due to income generation from selling fish and create employment opportunities, which in turn significantly influence food demands and consumption.'

Literature reviewed further shows that small-scale fish farming contributes significantly to income generation among those who practice it. According to a study conducted in Bangladesh by Rahman et al (2011) with the title, "Impact of Fish Farming on Household Income: a Case Study from Mymensingh District", small-scale fish farming is outlined as the major contributor to household income among those who practice it.

2.4 The effects of the government schemes among small scale farmers

Generally, Literature reviewed at a global level show that small-scale fish farming is a powerful mechanism for employment and income generation among those involved in it throughout the world. This is affirmed by Snowman (2018:60) who points out that small-scale fish farming is the main income generator to improve livelihoods in Asia, Africa and Latin America. It also generates foreign exchange for people involved in small-scale fish farming. This is affirmed by Mathew (2013:50), who states that 'small-scale fisheries contribute significantly to foreign exchange revenue in many developing countries'.

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According to Asif, et al., (2015:290), aquaculture is a significant socio-economic activity, especially for rural communities because it contributes to livelihoods, food security and poverty reduction through such mechanisms as income generation, employment and diversified farming practices. Bostock J, et al., (2018:2897) emphasise that global fish farming has grown dramatically over the past 50 years to around 52.5 million tonnes in 2008 worth US$98.5 billion and accounting for around 50 per cent of the world's fish food supply. Small scale fish farming plays a very significant role towards the building up of the world economy to uplift human livelihoods. The development and promotion of fish farming practices contribute positively towards generating income for the poor rural communities and as well support local and national economies.

The Food and Agricultural Organisation of the United Nations (FAO) (2015:9) has implored that the role of small-scale fisheries in local economies and the links of the subsector to the wider economy needs to be recognised. Flores and Filho, (2014:331) pointed out that small scale fish farming stands out for a strong social and economic appeal, because of potential income generation and diversification of rural establishments. Furthermore, FAO (2017:69) sees the sub-sector as a significant source of foreign currency earnings, income generation, employment, food security and nutrition in many developing countries.

According to FAO (2017:36), small scale fish farming is another option which has proved to be successful for some famers in Siaya in Kenya to increase their sources of income and food security, diversifying their near subsistence livelihoods. The argument by Flores and Filho (2015:333) shows that several studies globally have demonstrated the feasibility of fish farming in generating income and nutritional quality of food. The statement by FAO (2018:1) also affirms that poor farmers in parts of Asia have a traditional practice to consume or sell to generate income. This is owed to the fact that the selling of fish for generating income is a very common practice at the level of small scale farmers to improve livelihoods.

In Zambia artisanal fishers, contribute significantly toward livelihoods and food security among communities in Chanyanya fishing camp. Artisanal fishing provided income, employment and food security for local and national communities. 94% of them gain their livelihood from fishing. The money earned from fishing is used for building houses, fishing equipment, health care, paying fees for their children's school and others (Sonjiwe, Musuka and Haambiya, 2015).

Personal critique of literature review

The literature reviewed is balanced, highlighting both theoretical and practical aspects of small-scale fish farming worldwide. It enhances economic and social development, providing rural employment and additional income. However, most studies focus on developing countries, limiting a global perspective on its benefits

III. RESEARCH METHODOLOGY

3.1 Overview

This chapter outlines the methodologies that was used in the study. It first explains the research design, target population and sampling design. It further outline the sample determination, data collection methods and data analysis techniques to be used. The chapter concludes by focusing on triangulation, limitations of the study and ethical considerations for the study.

3.2. Research Design

This research used a mixed research approach involving both quantitative and qualitative methods. The instrument that were used to collect data included structured questionnaires and the observation sheets. In addition, information was coded using Microsoft excel before being transferred into Statistic package for Social Sciences (SPSS version 16) for analysis.

3.3. Target Population

The target population for this study included all households (families) that were actively practicing small-scale fish farming in the two (2) wards of Chinsali District namely Mulakupikwa and Lubwa wards.

3.4. Sampling Design

The sample size for this study was determined based on the minimum sample size that would be required for analysis at ward level. Given that Chinsali District is divided into 11 wards, 1 farming block wards was selected as sample size in order to get a balanced view of the experiences and an equal number of respondents were selected from each ward.

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3.5 Sample size Determination

The sample size for this study was determined to ensure sufficient representation at the ward level. Out of Chinsali District's 11 wards, 2 were selected, with an equal number of respondents chosen from each to achieve a balanced perspective. According to the 2022 Aquaculture Census Report, Zambia had 10,102 fish farming households, with Muchinga Province contributing 1,693 households. Chinsali District is among the contributors to this figure, alongside seven other districts in the province.

District	No. of farmers	%
Chinsali	580	20
Isoka	245	9
Mpika	210	7
Shiwangandu	875	30
Kanchibiya	165	6
Lavushimanda	425	15
Nakonde	198	7
Mafinga	186	6
Provincial Total	**2,884**	**100**

Table 1: The number of Fish farmers in Muchinga Province

Ward	No. of Respondents		%
Mulakupikwa	25		**50**
Lubwa	25		**50**
	50		**100**

Table 2: Number of Respondents from target Population and ward

According to Department of fisheries Chinsali has N = 109 registered Small-scale fish farmers under government schemes in Mulakupikwa and Lubwa ward of which 30% is n= 23, thus n=23 won't give the true representation of the population for this study, thus greater than 30% of the population was randomly selected using the lottery method,

The formula was used

$$\mathbf{n/N\ X\ 100\ =\ C}$$

Where **n** = the number of selected registered farmers

N = Total number of registered small-scale fish farmers in the district

C = Represents a greater or equal to 10 % of the small-scale farmers in the district

3.6. Data Collection Method

3.6.1 Primary Data

Primary and Secondary Data Collection:

Primary data was gathered using semi-structured questionnaires and face-to-face interviews, while secondary data was collected by reviewing published and unpublished works, such as books, reports, journals, newspapers, and online resources. The secondary data was compared with primary data to draw well-rounded conclusions.

Triangulation:

A mixed-methods approach was employed, combining qualitative and quantitative methods. Data was collected through questionnaires from 60 households engaged in fish farming in Chinsali District, supported by the eclectic theoretical model for comprehensive analysis.

Data Analysis:

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Collected data was analyzed using SPSS version 17 and Microsoft Office Excel 365. SPSS facilitated statistical analysis, while Excel was used for graphical representation.

Limitations:

The study was confined to households actively practicing small-scale fish farming in Chinsali District. Data collection focused on family heads, including children heading households due to unique circumstances.

Ethical Considerations:

Ethical protocols were strictly followed, including obtaining permissions from local authorities, securing informed consent from respondents, maintaining confidentiality, and using the information solely for research purposes.

Establishment of Research Gaps:

While small-scale fish farming is recognized as a source of income, little research exists on its role in improving household living conditions. This study aimed to fill this gap by assessing the effectiveness of government fish farming empowerment schemes in Chinsali District, focusing on Mulakupikwa and Lubwa wards.

IV. PRESENTATION OF RESEARCH FINDINGS AND DISCUSSION OF RESULTS

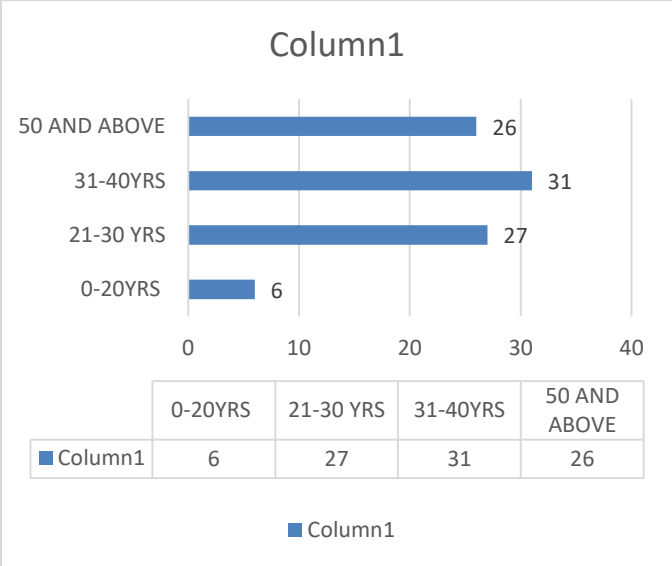
4.0. Overview

In this chapter, the findings of the study are presented based on all four areas that data was collected on, that is on the demographical factors of the sample and on the three specific objectives of the study. The chapter further discusses the finding of the study.

4.1 Demographical factors for the sample

4.1.1 Description of age, sex, marital status, educational level, occupation, household size, Number of females and males, type of house and number of rooms in house.

4.1.1.1 Population sample Gender distribution



4.1.1.2 Population sample Age distribution

The age range for the 60 population sampled was as follows: 6 were 20 years old or less representing 10%; 27 were 21 to 30 years old representing 45%; 1 was 31 to 40 years old representing 2%; 22 were 41 to 50 years old representing 38%; 4 were 50 years or older representing 7% as reflected in the table and graph below:

4.1.1.3 Population sample Marital Status distribution

The marital status of the sampled population included 2 individuals that were divorced representing 4%. It also included 37 individuals who were married representing 62% and 21 who were single representing 35% of the total sample. The results are further presented in the table and graph above.

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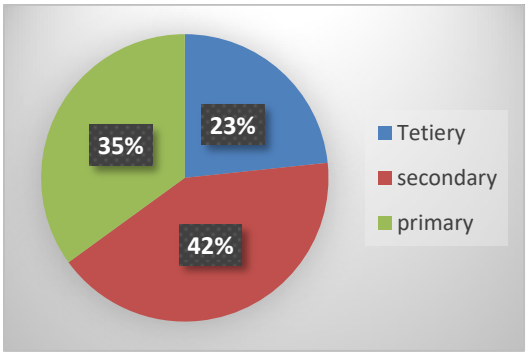
4.1.1.4 Population Sample Level of Education distribution



In terms of levels of education attained by the sample, 25 were primary level representing 42%, 21 were secondary 35% and 14 were tertiary representing 23%. The results are presented in the table and graph below:

4.1.1.5 Population Sample Occupation distribution

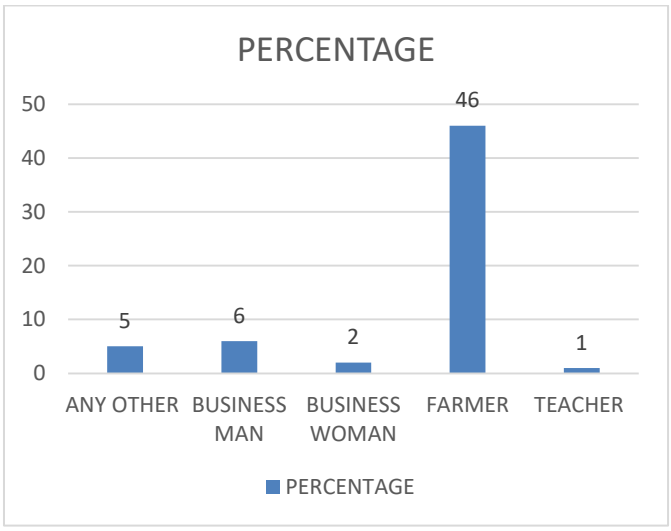


Figure 5: Occupation distribution of the sample population

The following represents the occupations of the sample: 1 was a teacher representing 2%; 5 respondends representing 10% had no specific occupations; 36 were farmers representing 72%; 8 were Businessmen representing 16%. The information is further presented in the table and below

4.1.1.6 Population Sample Household Size Distribution

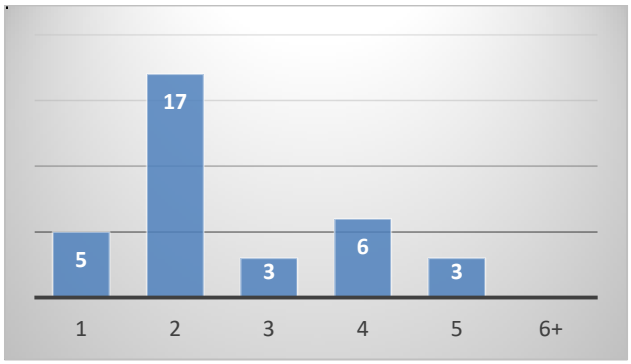


Figure 6: Household size distribution of the sample population

he sample included household sizes as follows: 1 member (8%), 2 members (28%), 3 members (5%), 4 members (10%), 5 members (5%), and 6 members (44%), with a total of 60 respondents represented.

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4.1.1.7 Population Sample by type of house materials used

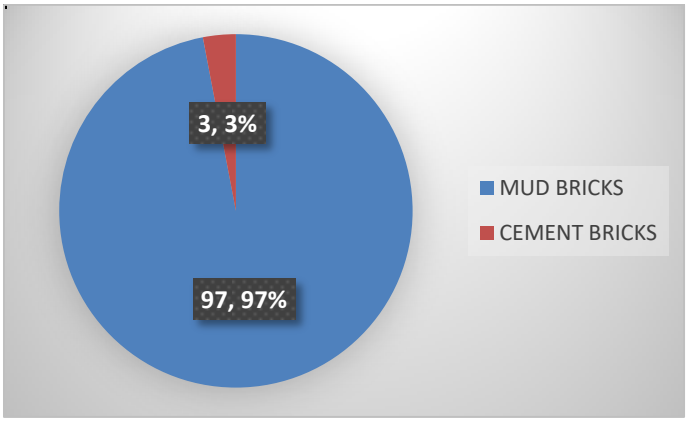

Figure 7: Types of house materials used of the sample population

The following were the materials used in making the houses that the sampled population were living in: 2 of the sampled population representing 3% reported that their houses were made out of cement blocks; 58 reported that their houses were made from mud representing 97%. The findings are further presented in the table and graph above.

4.1.4 Population Sample by Number of Rooms per household

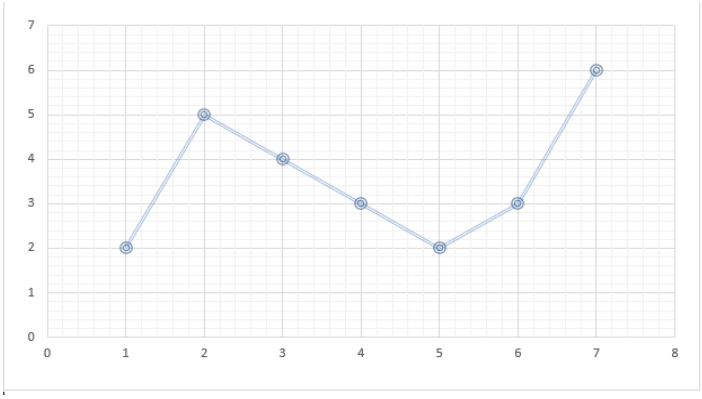

Figure 8: Number of rooms per household of the sample population

In the sample, 18% had two rooms, 10% three rooms, 48% four rooms, 14% five rooms, and 10% six rooms, with 24 households reporting four rooms being the most common configuration.

4.2 Types of Fish Farming Schemes In Chinsali District

The first specific objective of this research was to establish types of fish farming schemes in Chinsali Distric. In order to achieve this, eight questions were prepared and administered to small-scale fish farmers in the District.

4.2.1 Types of Government fish farming scheme

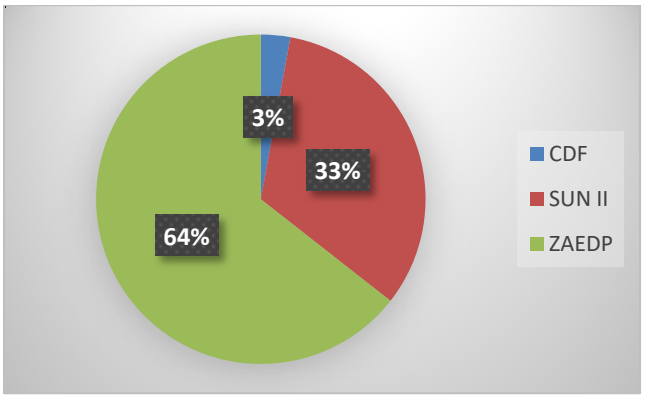

Figure 9: Types of government fish farming scheme

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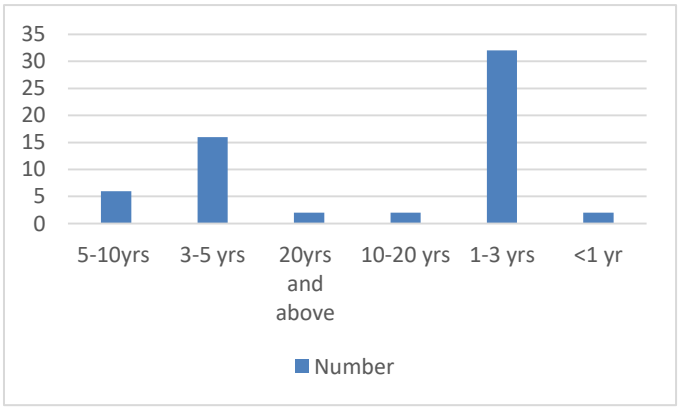
The table and below represents the types of Government fish farming scheme, 2 were under CDF representing 3% , 20 were under SUN II representing 34% and 38 were under ZAEDP representing 63%.

4.2.2 Years of operation/ Length of practicing fish farming



Data from 60 small-scale fish farmers indicated that 3% practiced for less than 1 year, 53% for 1-3 years, 27% for 3-5 years, 10% for 5-10 years, and 6% for over 10 years. Thus, most farmers have 1 to 3 years of experience in fish farming.

4.2.3 Types of culture facilities (ponds)

The research further wanted to find out the types of fish ponds small-scale fish farmers were building in Chinsali District. It was discovered from the 60 respondents that 7 of fish farmers were using concrete ponds, 3 semi-concrete ponds while 53 small-scale fish farmers were using earthen ponds. The results are further presented in details in the table and below:

4.2.4 Number of culture facilities (ponds)

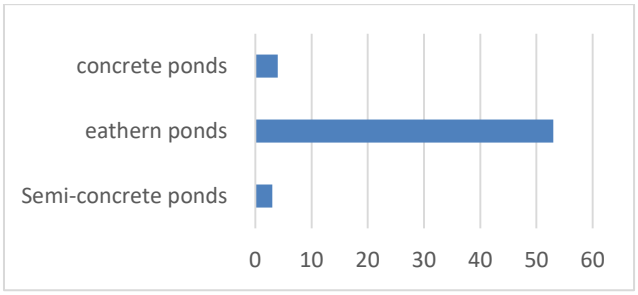


Figure 11: types of Culture facilities (Ponds)

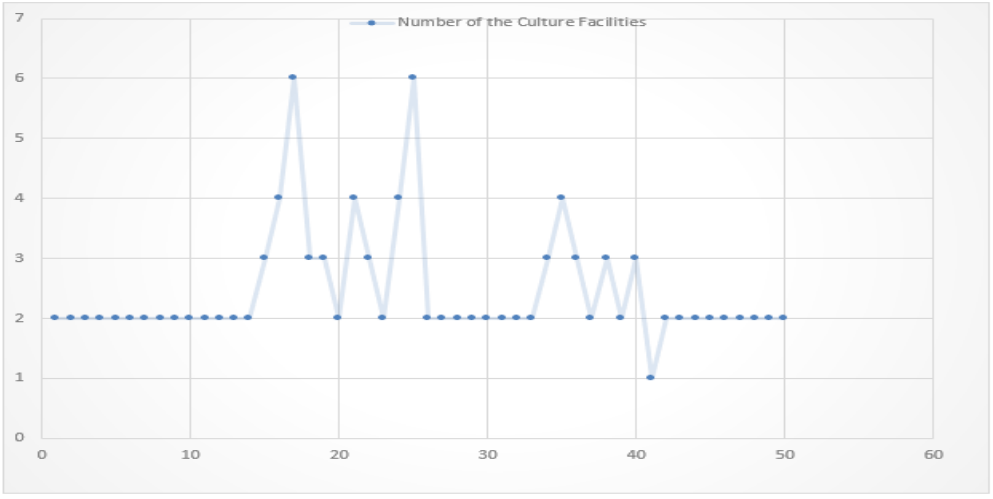


Figure 12: Number of culture facilities

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The research on small-scale fish farming in Chinsali District aimed to determine the number of fish ponds owned by farmers. Findings revealed that 1 respondent had 1 pond (2%), 45 had 2 ponds (75%), 8 had 3 ponds (13%), 4 had 4 ponds (7%), and 2 had 6 ponds (3%).

4.2.5 Size of the fish ponds

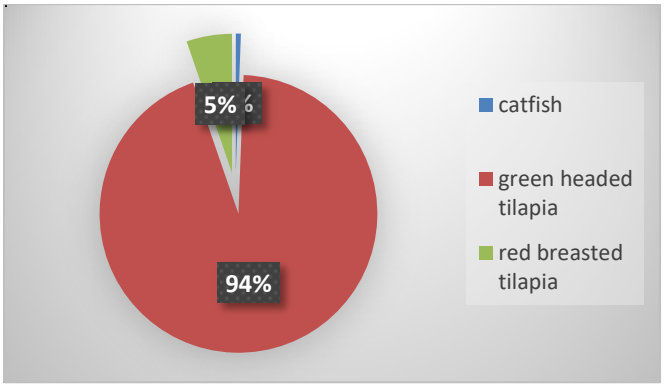
The following are the results obtained from the 60 respondents: 1 of the respondents owned fish ponds which were 100 – 200m2 representing 7%; 20 of the respondents owned fish ponds 200 – 300m2 size representing 33% and ; 39 of the respondents owned fish ponds 400 – 600m2 bigger representing 65%.

4.2.6 Source of the water for the fish ponds

To add more depth to the study, the researcher further wanted to find out the sources of water for fish ponds for the respondents. The results showed that 2 out of the 60 respondents were using borehole and ground water representing 4% and; 58 respondents were using rivers / streams to supply their fish ponds with water representing 96%.

4.2.7 Types of fish stocked in the fish ponds

In relation to types of fish stocked by small-scale fish farmers in Chinsali District, it was discovered that all respondents stock tilapia fish 98% and 2% Catfish. Data obtained also showed that 1 of the respondents also stock cat fish representing 1% while 48 respondents also stock green headed Tilipia 80% and 11 Red breasted Tilipia 11 representing 18%. This information is highlighted in the table and graph below



4.1.8 types of feed administered

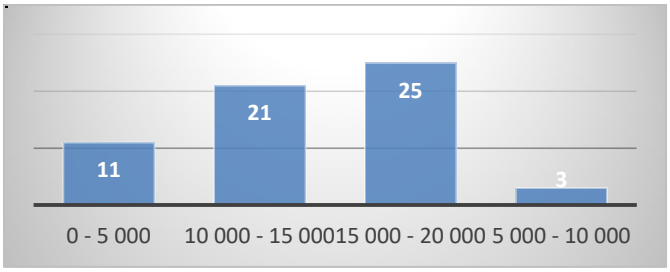
Data collected showed that 56 use commercial feeds representing 93 % while 4 use on farm feeds representing 7%.

4.2 Impacts of Government Schemes on The Livelihoods of Fish Farmers

The research aimed to assess the contribution of small-scale fish farming to income generation in Chinsali District by evaluating three areas among respondents. The study focused on the annual average income of fish farmers, revealing that 14 earn less than K10,000, 26 earn between K10,000 and K20,000, while others fall into higher income brackets. Additionally, various income sources were identified, with 27 respondents earning from both fish and crop farming, 2 from multiple ventures including livestock rearing, and others engaged in diverse combinations of fish farming and other agricultural activities.

Household income derived from fish farming

Figure 16:: Household income derived from fish farming



The researcher aimed to determine the annual income generated by small-scale fish farmers. Results showed 22% earn under K5000, 6% earn K5000-K10,000, 42% earn K10,000-K15,000, and 30% earn over K15,000.

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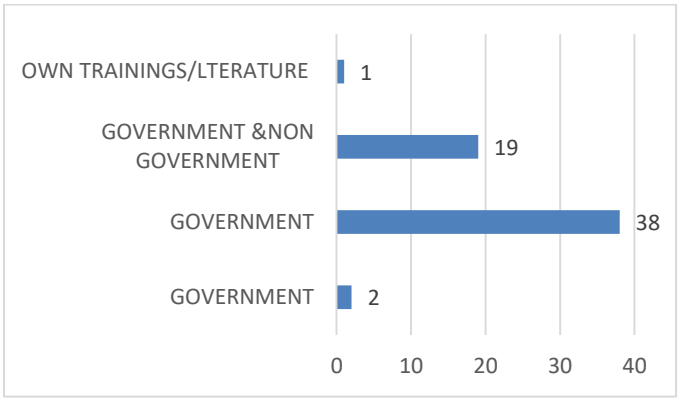
Additionally, to assess the performance of fish farming ventures, 6% reported a decline, 22% noted fluctuations, while 43% affirmed that conditions were improving. Detailed results are illustrated in the accompanying table and graph.:

4.3 The effects of government schemes among small scale farmers on aquaculture development

The third specific objective of this research was to investigate the possible effect of government scheme among small scale farmers on aquaculture development. In order to achieve this, three (3) different areas were assessed among the respondents by the researcher. The findings are presented in the following paragraphs

4.3.1 Trainings in fish farming



The researcher also wanted to find out the number of fish farmers practicing fish farming who were trained in fish farming management. 57 of the 60 respondents affirmed that they had undergone some form of training in fish farming representing 94%. On the other hand, 1 of the 60 respondents responded they didn't undergo training representing 2% and 2 indicted sometimes representing 4%. The results are shown in details in the table and presented above.

4.4.2 Organizations and Institutions the offer Trainings

The researcher also wanted to find out the number of fish farmers practicing fish farming who were trained in fish farming management. 2 of the 60 respondents affirmed that they had undergone some form of training in fish farming from government and private consultants representing 3 %. On theother hand, 38 respondents obtained traings from government representing 63%; 19 obtained training from both government and NGos; and 1 is an expert in fish farming.

4.4.3 Annual Production per fish farmer

The researcher also wanted to find out the annual production of each fish farmer from their ponds. 39 respondents harvested between 0 – 1000 kgs representing 78%; 10 respondents harvest 1000 -2000 kgs representing 20% and; 1 harvested 2000 -3000 kgs representing 2 %.

4.5 Discussion of Findings

4.5.1 Discussion of the demographical factors for the sample

In Chinsali District, data on small-scale fish farmers revealed that 72% are men, likely due to greater access to land and development opportunities, while traditional beliefs limit women's participation, accounting for only 28%. The majority of fish farmers are aged 21-30 (45%), with 62% being married. Notably, 90% have primary or secondary education, challenging stereotypes about the uneducated in this sector. Most farmers (77%) primarily engage in fish farming, followed by businessmen (10%) and others (8%), indicating fish farming's significance as a valuable income-generating venture.

Household sizes assessed in tables 6 and 8 revealed that many respondents come from large families; 44% belonged to families of six or more, while 28% had two members. Further analysis of housing types showed that only 3% lived in cement block houses, with 97% residing in mud brick homes, indicating a diverse socioeconomic background among small-scale fish farmers. The number of rooms in respondents' houses varied from 1 to 6, with 26% having four rooms, 20% three rooms, and 15% five rooms. This reflects varied living conditions among the farmers.

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4.5.2 Types of Government fish farming in Chinsali district

Data collected from Chinsali District highlights various challenges in fish farming practices. An investigation encompassed eight areas, revealing the distribution of government fish farming schemes: 2 under CDF (3%), 20 under SUN II (34%), and 38 under ZAEDP (63%). The Zambian government, in collaboration with major institutions like the European Union and African Development Bank, has initiated support for small-scale aquaculture, offering loans and training to farmers. The SUN II program employs a multisectoral approach to promote fish culturing as a nutrient source. The age distribution indicates a dominance of fish farmers aged 21-30 years (45%), with 36% in the 41-50 bracket, while 62% are married, supporting societal norms. Furthermore, 90% of small-scale farmers have completed education, challenging the stereotype of uneducated individuals in this sector.

4.5.3 Discussion on the impact of Government Scheme on the livelihood of the Fish Farmers

The study assessed the effects of government fish farming schemes on the livelihoods of fish farmers in Chinsali District. It focused on income generation, with findings showing that some farmers earned less than K10,000, while others made over K50,000 annually. Many integrated fish farming with other ventures, enhancing food security and dietary variety. The research noted that 22% earned under K5,000, but 43 respondents saw income improvements. Factors affecting income included capital, market dynamics, support, and access to resources. Additionally, 94% of respondents received training, predominantly from government sources.

V. CONCLUSION

5.0 Overview

This chapter presents the conclusion to the study. It further presents the recommendations drawn from the study.

5.1 Conclusion

This research study aimed to bridge the knowledge gap on fish farming, specifically analyzing government fish farming empowerment schemes in Chinsali District, focusing on Mulakupikwa and Lubwa wards. The study sought to establish the types of fish farming schemes, assess the impact of these schemes on fish farmers' livelihoods, and evaluate their effects on aquaculture development. It found that small-scale fish farming is a recent development in Chinsali, with most farmers owning 1 to 3 tilapia ponds. Three schemes - the Zambia Aquaculture Enterprise Development Project, Scaling Up Nutrition II, and the Community Development Fund - are currently operational. The study also revealed that fish farming significantly increases household income, making it the second largest income source after crop production, while positively impacting aquaculture development and improving living conditions for fish farmers.

ACKNOWLEDGEMENTS

I Firstly thank the almight God for giving me the strenghth to successfully complete this research project. The successful completion of this project was also as a resuilt of the overwhelming support of the following: Ministry of fisheries and Livestock, Scaling Up Nutrition Project, Transforming Landscapes for Resilience and Development, Zambia Aquaculture Enterprise Development Project and Citizen Economic Empowerment Commission. I also would like to thank my family members, friends, fellow students to mention but a few. Lastly, I would also like to thank my supervisor Dr. Chibomba,K. for his unwavering support during the time of caring out the research project.

DEDICATION

This research paper is dedicated to the almighty God who has been a source of strength, Grace and Wisdom throughout the period of conducting the project. Also, I dedicate this work to the following people: auntie Bridget Syabbalo; my sister Thandiwe Mukuli and to my son Chipo Kambole, for their unwavering support and encouragement through this journey.

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