

FACULTY OF NATURAL RESOURCES AND ENVIRONMENTAL SCIENCES

DEPARTMENT OF FISHERIES AND WATER RESOURCE MANAGEMENT

**THE IMPACT OF FISH PRODUCTION ON RURAL LIVELIHOODS IN
NGETTA SUBCOUNTY, LIRA DISTRICT**

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**A RESEARCH REPORT SUBMITTED TO THE FACULTY OF NATURAL
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OF THE REQUIREMENTS FOR THE AWARD OF A DEGREE OF BACHELOR
OF SCIENCE IN FISHERIES AND WATER RESOURCES MANAGEMENT**

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DECLARATION

I, **Akao Winifred**, hereby declare that this research report is my original work and has not been presented for a degree award or any other award in any higher institution of learning.

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LIST OF ABBREVIATIONS/ ACCRONYMS

AfDB	African Development Bank
Dr	Doctor
EIA	Environment Impact Assessment
FAO	Food and Agricultural Organization
FWR	Fisheries and Water Resources
GIZ	Germany Corporation
GMOs	Genetically Modified Organisms
HH	Household
ICT	Information and Communication Technologies
Ms.	Misses
NGOs	Non-government Organizations
No.	Number
UNICEF	United Nations Children’s Fund
ZARDI	Zonal Agricultural Research and Development Institute

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Aquaculture has been defined as farming fish and other aquatic organisms. Fish is used here generically to include all farmed aquatic organisms (National Oceanic and Atmospheric Administration, 2025). Aquaculture has emerged as a crucial component of rural economic development in Uganda, providing a stable source of income for many households and offering an alternative to traditional agriculture (Egessa & Sandor, 2022).

According to most recent available estimates by FAO (2022), Uganda follows Nigeria as the two leading countries in Sub-Saharan Africa in aquaculture production, with a significant increase in production from 800 tons in the year 2000 to about 103700 tons in 2019. This production was dominated with mostly Nile tilapia 69 % and catfishes 30%. Aquaculture was estimated to have employed nearly 153,000 Ugandans, many of whom involved in fisheries sub-sector and engaged in inland water fishing and few in fish farming (FAO, 2022). Despite the potential of aquaculture to enhance rural-livelihoods, challenges such as inadequate access to resources, inadequate technical knowledge, market barriers, and environmental concerns persist that hinder full adoption and sustainability (Adeleke et al., 2020). However, the challenges above may not outweigh the impacts of aquaculture in promoting socioeconomic transformation in rural communities.

In understanding the impacts, this study puts into consideration three specific objectives: the benefits, gender roles, and recommendations to improve aquaculture in rural communities. Women and men play different roles in aquaculture which determines the level of benefit reaped by each gender. According to a study conducted among aquaculture farmers at the shore of Lake Victoria, Tanzania, women and men were found to play different roles but those played by women were found to be restricted and often overlooked (Luomba, 2013).

Studies have not adequately explored such impacts among rural farmers such as those in Lira district. There is a pressing need for thorough economic assessment to quantify the impacts of fish farming on rural livelihoods in Uganda. Such assessments would provide evidence-based insights into the contributions of aquaculture to income, nutritional outcomes, and overall well-being of rural populations (FAO, 2020).

By understanding these economic dynamics, policy-makers can better support fish farming as a viable livelihood strategy. Therefore, the significance of this study lies in its potential to inform various stakeholders about the multifaceted benefits of fish farming and gender roles to improve aquaculture in rural communities.

1.2 Statement of the problem

Aquaculture remains an important agricultural sector in Uganda today. Since its inception in 1941, the sector has grown significantly with far reaching socioeconomic and developmental impacts (FAO, 2025). However, in spite of the recognized impacts and the sector's potential to improve household socioeconomic situations, the impacts in rural households are still poorly studied in Uganda.

Furthermore, women and men play different roles along fish production and value chain, from capture and aquaculture to processing to marketing (Luomba, 2013). Yet this is often overlooked, the differential roles shape the amount of benefits each gender can attain from aquaculture affecting household socioeconomic transformation and rural livelihood.

Moreover, existing stakeholders' interventions to boost fish production have always met with challenges in effectiveness, sustainability, and inclusivity. This is partly attributed to inadequate researched information about gender role dynamics in aquaculture to guide planning for more innovative and strategic interventions (Egessa & Sandor, 2022; FAO, 2025).

Therefore, the present was set to fill the gap by assessing the impacts of aquaculture on rural livelihoods in Lira district northern Uganda, putting gender roles and benefits as two of the specific objectives. The aim was to provide relevant stakeholders with reliable information to guide interventions to improve effectiveness of aquaculture in household socioeconomic transformation in rural areas.

1.3 Significance of the study

Global populations continue to rise and the demand for protein-rich food sources, such as fish, has increased substantially (FAO, 2020). Despite the roles of aquaculture in socioeconomic development and poverty alleviation, there is limited information regarding impacts of aquaculture on rural livelihoods in Uganda. This study was set to provide relevant information to the relevant stakeholders such as policymakers to formulate targeted policies to strengthen aquaculture

production in Uganda, researchers to advance aquaculture-related knowledge and technologies, and the district stakeholders to promote sustainable aquaculture practices in the district.

1.4 Justification

Aquaculture is one of the fastest-growing food production sectors globally, with projections estimating nearly 70% of the world's fish consumption by 2030 (FAO, 2020). This growth presents unique opportunities for household development, particularly in areas where traditional fishing and agriculture may not be enough to meet income and nutritional needs (Bene & Friend, 2011). Therefore, there is need to set priorities that include capacity to support aquaculture innovation and also setting a legal and policy framework for aquaculture practices and ensure community understanding of the framework, provide demonstration plots, set policies and systems for land registration and take measures for affordable fish production and supplies as well as marketing.

1.5 Objectives of the study

1.5.1 Main objective

The study aimed at providing information on the impacts of fish production to the rural livelihoods in Lira district.

1.5.2 Specific objectives

- 1) To investigate the economic benefits of fish production to the people in Lira district.
- 2) To examine the roles of women and men in fish production in Lira district.
- 3) To determine the interventions centered at boosting fish production in Lira district.

1.6 Research questions

- 1) What are the economic benefits of fish production to the different households?
- 2) What roles do women and men play in fish production?
- 3) What are the interventions centered at boosting fish production?

1.7 Conceptual Framework

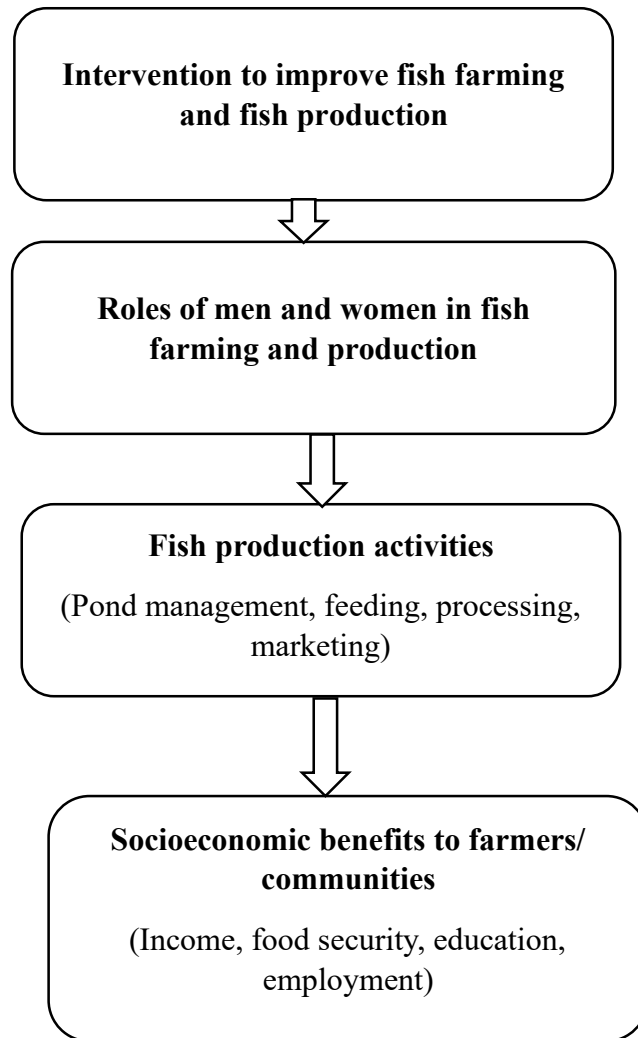


Figure 1.1 Conceptual Framework adapted from sustainable livelihood framework for the 21st Century (Natarajan et al., 2022).

1.8 Theoretical frame work

This study is supported by Sustainable Livelihood Framework previously developed by Natarajan et al. (2022). The framework discusses how households utilize available assets to enhance livelihood like fish production. Therefore, this framework helps in analyzing how aquaculture production contributes to socioeconomic transformation and resilience among rural farmers involved in aquaculture. Moreover, the framework puts into consideration factors with potential to influence household outcomes such as policies, institutions, and processes which matches the third objective of this study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Economic benefits of aquaculture to livelihoods

Aquaculture has been recognized as a vital source of income and employment for many communities (FAO, 2017). According to World Bank (2013), aquaculture contributes significantly to poverty alleviation by providing jobs and enhancing food security. The sector has shown remarkable growth, with an estimated increase in global aquaculture production leading to economic diversification in rural areas (Teece, 2018). Kumar et al. (2020) emphasized that aquaculture not only provided direct economic benefits through fish sales but also stimulated local economies by creating ancillary jobs in processing, transportation, and marketing. This multiplier effect is critical for rural development, as it enhanced the overall economic resilience of communities dependent on aquaculture. In food security, all people existing at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Tubiello, 2007). Aquaculture in small farmer systems in rural areas provided a high quality of animal protein and essential nutrients, especially for nutrition vulnerable groups, such as pregnant and lactating women, infants, and preschool children. In fact, almost half of the child deaths around the globe are linked to malnutrition.

In numerical reading, it is around 3 million young lives every single year (“UNICEF STATISTICS 14”, 2015).

2.2 Role of women and men in aquaculture

The division of labor in fish farming often reflected broader societal roles, with men and women performing different tasks within the production and marketing processes. In many countries, men are more likely to engage in tasks considered physically demanding or economically valuable, while women’s roles are often centered at less formal and lower-status activities. This gender division of labor is influenced by cultural expectations, as well as access to resources and decisionmaking power (Dey et al., 2008; Bene et al., 2015)).

2.2.1 The role of women in fish farming

According to Bene et al. (2016), women contributed significantly to aquaculture activities, especially in small-scale operations. Their involvement not only supported family livelihoods but also enhanced community food security.

According to Rathnayake et al. (2017), women were responsible for activities such as pond maintenance, fish feeding, and harvesting, with a particular focus on ensuring the fish were suitable for market sales. Women also took on tasks related to marketing and fish product processing, which allowed them to diversify income streams and increase household food security. However, their role in these activities were often undervalued and less visible compared to men's involvement in the technical aspects of aquaculture.

FAO (2020) highlighted that women were often underrepresented in decision-making processes within the aquaculture sector, despite their substantial contributions. This gender disparity can limit the effectiveness of aquaculture development programs. Empowering women through access to training and resources can improve their roles and consequently, the overall productivity of aquaculture systems (Dey et al., 2018).

In some regions, women managed the entire value chain, from feeding and pond management to fish processing and retailing. In rural Cambodia, women have been central to the success of integrated aquaculture systems, where they combined fish farming with vegetable and rice cultivation. Women manage the day-to-day activities, such as feeding fish, maintaining pond hygiene, and harvesting fish, as well as taking charge of processing and selling the fish (Chhun et al., 2020). This role in both production and post-harvest activities allows women to contribute significantly to household income, even though they may not always control the profits generated from fish sales.

2.2.2 The role of men in fish farming

Men's roles in fish farming are typically associated with the more technical, capital-intensive, and decision-making aspects of the aquaculture process. These roles include pond construction, installation of equipment (e.g., aeration devices), fish breeding, and water quality management. These tasks are often viewed as requiring specialized knowledge and physical strength, both of which are culturally associated with male labor (Kabeer, 2016). Men are also generally responsible for managing the financial aspects of fish farming, including securing credit, buying inputs (e.g., feed and seeds), and making major decisions regarding the marketing and sale of fish (Moutinho et al., 2016).

In a study of fish farming in Zambia, (Simpungwe et al., 2015) found that men were the primary decision-makers when it came to stocking and harvesting fish, with their roles expanding to managing fish sales, setting prices, and negotiating with buyers. This control over key economic

decisions was often reinforced by gender norms that prioritized men as the primary breadwinners and decision-makers within households. The involvement of men in high-value activities such as the sale of fish is linked to their access to markets and networks. In many cases, men controlled the transport and distribution of fish to urban markets, where they could sell fish at higher prices, while women remained involved in local-level marketing (Bene et al., 2015). This unequal access to market opportunities is one of the key barriers to achieving gender equality in the aquaculture sector.

2.3 Interventions centered at boosting fish production

2.3.1 Government policies and support programs

Several studies highlighted that supportive policies and regulatory frameworks can significantly boost aquaculture production. For instance, government subsidies, tax incentives, and grants for fish farmers help to lower production costs and encourage investment (Bene et al., 2015). The provision of loans with favorable terms, such as low-interest rates, is also an essential intervention in many developing countries (FAO, 2017).

The implementation of national aquaculture development plans has proven to be effective in fostering sector growth. For example, in the Philippines, the government's National Aquaculture Program helped increase production by focusing on sustainable practices, technology adoption and capacity building (Boehlert et al., 2011). Similarly, the introduction of market-oriented policies in countries like Thailand has created an enabling environment for private sector investments and improved the efficiency of aquaculture production (Luck et al., 2018)

2.3.2 Financial support and access to credit

Access to finance remains one of the biggest barriers to expanding aquaculture in developing countries. Financial support from governments, international organizations, and private institutions is essential to boosting aquaculture production (FAO, 2017). In many regions, fish farmers face difficulties in accessing capital for initial investment and operational expenses due to the high risks associated with aquaculture, such as disease outbreaks and market price fluctuations (World Bank, 2013).

Microfinance and credit schemes tailored for small-scale aquaculture farmers are gaining popularity as they provide the necessary financial resources to improve production systems. In Bangladesh, the government and NGOs have collaborated to offer microloans to small-scale fish farmers, enabling them to invest in high-quality inputs such as feeds, seeds, and infrastructure

(Hussain & Hoq, 2016). Financial programs have significantly enhanced aquaculture productivity by making resources more accessible to marginalized and resource-poor farmers.

2.3.3 Training and capacity building

Training and capacity building are critical interventions aimed at enhancing the technical skills of fish farmers. Various international and local institutions offer training programs to improve knowledge on best practices in aquaculture, including water quality management, disease control, and sustainable farming practices (FAO, 2017). According to (FAO, 2015), increasing the knowledge base of fish farmers through training has led to higher productivity and better sustainability in aquaculture systems.

Naylor et al. (2009) in Vietnam demonstrated that farmer education programs in pond management and the adoption of scientific aquaculture methods resulted in higher yields and better returns on investment. Moreover, the provision of extension services, which offered ongoing advice and support, ensured that aquaculture practices were continuously improved, fostering long-term success.

2.3.4 Technological innovations

Technological interventions have revolutionized aquaculture production in many countries by improving efficiency and productivity. The adoption of innovative technologies such as automated feeding systems, water quality monitoring tools, and genetic improvements in fish stocks has helped increase production rates and reduce costs (Schneider et al., 2015). Advances in breeding techniques, such as selective breeding and genetically modified organisms (GMOs), have enabled the production of more resilient and faster-growing fish species, further boosting aquaculture output (Tacon & Metian, 2009).

The integration of Information and Communication Technologies (ICT) in aquaculture has improved farm management. Technologies such as mobile phone apps for water quality monitoring and fish health management have been implemented in regions like Southeast Asia, allowing farmers to track conditions and make timely interventions (Dempster et al., 2021). This technological shift, supported by both public and private sector investments, is helping farmers adopt more efficient practices and mitigate risks.

2.3.5 Infrastructure development

The development of aquaculture-specific infrastructure, including hatcheries, feed mills, and transportation systems, is another vital intervention in boosting aquaculture production. In many

developing countries, inadequate infrastructure limits the scalability of aquaculture production. As a result, governments and international organizations have initiated various projects aimed at improving the infrastructure required for successful fish farming.

For instance, in Africa, the African Development Bank (ADB) has financed projects that develop aquaculture infrastructure, such as modern hatcheries, storage facilities, and road networks for better market access (ADB, 2019). Similarly, in India, the construction of specialized cold storage and processing plants has facilitated the value addition of fish, enabling farmers to extend the shelf life of their products and access broader markets (Mahalakshmi et al., 2018). The development of such infrastructure has significantly reduced post-harvest losses and improved the profitability of aquaculture ventures.

Despite the fact that many studies were conducted about the impact of fish farming on the livelihood of fish farmers globally. There is a clear gap in literature on how fish farming impacted a rural post-war community like Lira district Uganda, with emphasis on gender roles as one of the objectives. This study filled the gap by providing relevant information to the key stakeholders.

CHAPTER THREE: METHODOLOGY

3.1 Area of study

This study was conducted in Lira city located in Northern Uganda. The city is located in Lira district that lies between latitudes 10 21' and 20 42' north of the Equator, with longitudes 2053' and 3037' east of Greenwich meridian. The district is bordered by Agago in the North, Alebtong in the East, Dokolo in the South and Kole in the West. The city has a total population of approximately 246,437 with 48% and 52% being men and women respectively. The city population are engaged in trade, livestock keeping, crop growing and smaller proportion in fish farming (UBOS, 2024).

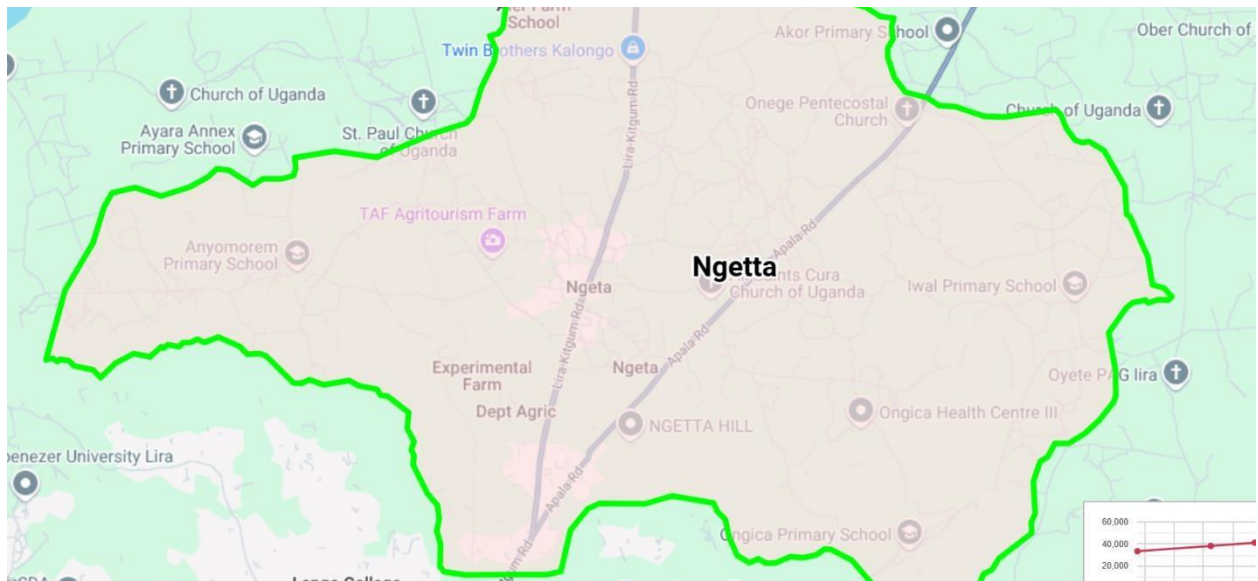


Figure 3.1: A map showing the selected area of study (Lira district local government, 2023)

3.2 Research design

This was a descriptive cross-sectional study using quantitative method of data collection to assess the impacts of aquaculture to the rural livelihoods.

3.3 Sampling design

This study utilized simple random sampling to select the study participants. The list of fish farmers was obtained with the help of the fisheries officer of Lira district and this list was used as a sampling frame. The names in the list were assigned computer-generated random numbers where names which were assigned number 1 to 70 were selected to participate in the study.

3.4 Sample size

70 respondents were sampled and interviewed and the sampling was based on Taro Yammae formula

of 1976 of: $n = \frac{N}{1+N(e)^2}$

Where, n = sample size, e is the error margin.

e is 5%, the allowable error corresponding to the 95% confidence interval and N is the estimated total population of fish farmers in Ngetta sub-county (Lira District sector profiles, 2025).

$$n = \frac{N}{1+N(e)^2} = \frac{85}{1+85(0.05)^2} = \frac{85}{1.2125}$$

= 70.1~70 Respondents

3.5 Data collection tools

The data was collected using interview structured questionnaire developed on Kobo-collect toolbox on a mobile tablet. This was done to ease data collection, reduce cost of printing the questionnaire, entering data manually after collection, and data protection. The questionnaire had four major parts covering socio-demographic information and other 3 parts covering all the three specific objectives. The tool was developed in accordance with the already stated conceptual framework in the proposal.

3.6 Data analysis

The collected data was downloaded from kobo-collect main server to Microsoft Excel 2013. Descriptive statistics such as frequency and percentage was used to describe socio-demographic information of the study participants, benefits of aquaculture, gender roles in aquaculture, and recommendations of farmers involved in aquaculture. The results were presented on relevant frequency tables and bar graphs.

3.7 Limitations of the study and its solution.

Unwillingness of the respondents to disclose some information. The study was faced by a challenge of some respondents not willing to disclose some information like a question on traditional barriers in fish farming. The challenge was minimized by assuring the respondents that the information collected was mainly for study purpose only.

Funding. There were no proper sources of funding but this was handled through proper financial allocation and effectively using the limited funds to complete the research.

CHAPTER FOUR: PRESENTATION OF FINDINGS

4.1. Socio-demographic information of the respondents

The results in Table 4.1 indicate that; 44.3% and 55.7% of the respondents were males and females, respectively. Furthermore, the results show that; 50.0%, 12.9%, 27.1%, and 10.0% of the respondents had attained tertiary, secondary, primary, and no formal education level, respectively. Among the respondents, those having fish farming as their primary source of income and took it as an occupation were; 52.9%, and 45.7%, respectively.

Table 4.1: Distribution of respondents based on socio-demographic characteristics

Variable	Frequency (n=70)	Proportion (%)
Gender		
Male	31	44.3
Female	39	55.7
Level of education		
No formal education	7	10.0
Primary	19	27.1
Secondary	9	12.9
Tertiary	35	50.0
Primary sources of income		
Business/ Others	10	14.3
Crop farming	20	28.6
Fish farming	37	52.9
Livestock farming	3	4.3
Occupation		
Fish farming related	32	45.7
Full time farmers	18	25.7
Part-time farmers	11	15.7
Others	9	12.9

4.2 Benefits of fish farming to the rural livelihood

The results in Table 4.2 show that 92.2%, 98.6%, 97.1%, and 90.0% of the respondents benefit from fish farming through improved economic situation, increased employment opportunity, increased access to food, and improved educational opportunities respectively.

Table 4.2: Economic benefits of fish production to the rural livelihood

Variable	Frequency (<i>n</i> = 70)	Proportion (%)
Improved economic situation in households		
Yes	65	92.9
No	5	7.1
Not sure	0	0.0
Increased employment opportunities		
Yes	69	98.6
No	1	1.4
Not sure	0	0.0
Improved access to food		
Yes	68	97.1
No	2	2.9
Not sure	0	0.0
Contributed to social development		
Yes	61	87.1
No	6	8.6
Not sure	3	4.3
Improved educational opportunities		
Yes	63	90.0
No	3	4.3
Not sure	4	5.7

4.3 Gender roles in fish farming

There was a higher participation of men in all activities along the fish value chain than women. These included pond management, 89.0%, harvesting, 77.0%, fish processing, 44.0%, and marketing, 69.0% except fish feeding, 66.0% where men and women participated equally (Figure 4.1).

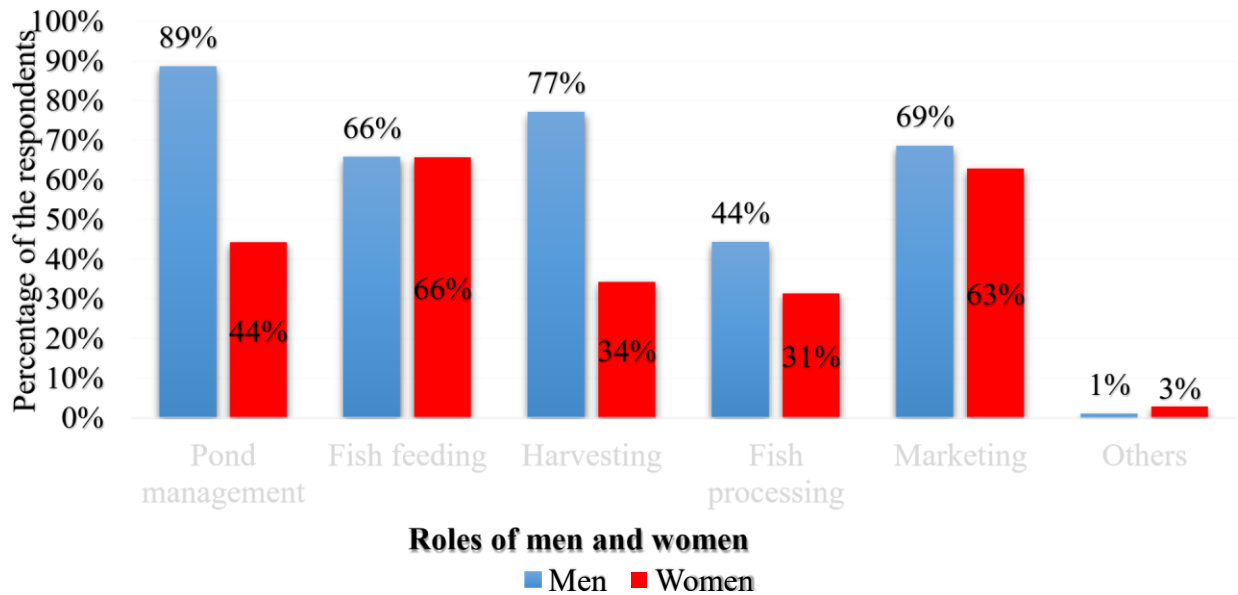


Figure 4.1 A bar graph showing the roles of men and women in fish farming

4.4 Interventions to boost fish farming

Interventions to improve fish farming need to target and address the prevailing challenges facing fish farmers in the study area. In this study, 100.0% of the respondents reported inadequate capital and maintaining water quality. Additionally, 37.1% and 25.7% reported lack of training and market access, respectively. (Table 4.3). Additionally, 82.9% reported getting training support from the government, despite recommending for more training, 81.4% (Table 4.3).

Table 4.3: Interventions to boost fish farming

Variable	Frequency (n=70)	Proportion (%)
Challenges facing fish farming		

Inadequate capital	70	100.0
Poor quality fish stock	16	22.9
Difficulty in disease management	11	15.7
Maintaining water quality	70	100.0
Market access	18	25.7
Lack of training	26	37.1
Others	19	27.1
Support received from the government		
Financial aid	22	31.4
Training programs	58	82.9
Technical assistance	39	55.7
Equipment provision	22	31.4
Market access	19	27.1
Others	5	7.1
Recommendation to improve fish farming		
More training program	57	81.4
Better market access	34	48.6
Improving financial options	58	82.9
More research and development	37	52.9
Others	8	11.4

CHAPTER FIVE: DISCUSSION OF RESULTS

5.1. Introduction

This chapter focuses on the discussion of the relevance of the findings of the study, how they contrast or align with other similar studies, and their implications on the fisheries sector. The present study was to examine the impacts of fish production to the rural livelihoods in Lira district, with focus on three specific objectives i.e. 1) to investigate the economic benefits of fish production to the people in Lira district, 2) To examine the roles of women and men in fish production in Lira district, and 3) to determine the interventions centered at boosting fish production in Lira district. Therefore, the discussion is based on these specific objectives.

5.2. The economic benefits of fish production to the people in Lira district

This study showed that the majority of participants benefited from fish farming because it improved their economic situation (Table 4.2). The present finding aligns with that of a cross-sectional study conducted in Calabar, River state in Nigeria where fish farming was noted as a significant factor in economic transformation among the farmers (Olaoye et al., 2013). Similarly, the present is consistent with the findings of a study conducted in Saki-East Local, Government Area of Oyo State, Nigeria where fish farming was regarded one of the most lucrative agricultural activities in the area (Oyedele et al., 2023).

Fish farming has continued to provide a reliable source of livelihood to the farmers. While in the local market, a fish (smoked or fresh) costs about 10,000 Uganda shillings to 45,000 Uganda shillings. The income generated from selling fish is used to pay school fees as reported by the majority of the participants in the study. The finding underscores the need for strengthening fish farming for poverty reduction and socioeconomic transformation. Additionally, participants reported increased employment opportunities provided by fish farming in the study area. The present finding is consistent with other studies that fish farming provided employment such as one in Nigeria (SAMUEL, 2021; Wuyep & Rampedi, 2018). From farm to the market, fish farming supports different actors (labor force) along the value chain (feeding, catching, treatment, transportation, selling, etc.), hence providing employment to the population. Like in other developing countries, unemployment rate in Uganda is still among youths. Although fish farming is not yet a popular agricultural venture among farmers across Uganda, promotion of fish farming is therefore, one of the ways to create jobs for the country's population (Chan et al., 2021).

Furthermore, the majority of the participants reported that fish farming improved access to food. This finding is in line with studies conducted in western Kenya where non-fish farmers experience more food shortages than fish farmers, with children of fish farmers being better nourished than those in households of non-fish farmers (Ochieng, 2017). Similarly, fish farming was reported to have diversified the nutritional need of many communities in Nigeria (Wuyep & Rampedi, 2018). Fish is one of the high-protein, nutrient-rich food items that provides essential vitamins (A, D, B12) and minerals (iodine, zinc, iron). The finding re-echoed the need to strengthen fish farming to fight malnutrition in low and middle-income countries including Uganda (Bondad-Reantaso & Subasinghe, 2013).

5.3 The roles of women and men in fish production in Lira district

There was a higher participation of men in all activities along the value chain in fish farming than women. These included pond management, harvesting, fish processing, and marketing except fish feeding. The dominant roles played by men represents the ongoing gender roles in aquaculture, where socio-cultural norms, economic factors, and access to resources always play a big role. Studies conducted in different regions of Africa, Asia, and Latin America indicated that men always controlled high-value, market-oriented activities such as pond construction, harvesting, and sales, whereas women get involved in feeding and post-harvest processing which are often unpaid or lowly-paid (FAO, 2020). For instance, a study conducted in Bangladesh and Tanzania indicated that men dominated pond management and marketing while women were found handling small scale processing activities and fish feeding (Gopal et al., 2017). The men's dominance in most of the activities is partly influenced by gender norms. Activities such as digging and handling of nets in pond management are perceived as men's because of the physical strength required. Additionally, men always have higher chance to own land and to access credit compared to women, which allows them to make more investment in fish farming. Moreover, women often lack collateral, restricting their ability to expand beyond subsistence-level feeding role (IFAD, 2018). Furthermore, women face movement restrictions in Lango sub region that constrain their capacity to engage in long distance trade with higher profits. This partly explains the male dominance in fish marketing activities. Women engaged in fish marketing are often engaged in local markets (World Fish, 2025). Therefore, this finding underscores the need for interventions to support and increase women participation in fish farming.

5.4 Interventions to boost fish farming.

Interventions to improve fish farming have been implemented despite the many existing challenges faced by fish farmers in the study area. For instance, in this study, all fish farmers reported inadequate capital. This finding is consistent with the findings of a cross-sectional study among small-holder fish farmers in Northern Nigeria where inadequate financial capital was the leading impediment in fish farming (Falola et al., 2022). Lack of financial capabilities limit investments in fish farming such as accessing high quality juvenile fish, disease management, and proper feeding. Feeding alone accounts for 50-70% of the cost incurred in fish farming (Tacon & Metian, 2015) while disease management accounts for about 30% of the costs (Maezono et al., 2025). Another important investment is accessing storage and water treatment and testing equipment which require adequate capital. Without adequate capital, all these are affected and often felt heavily among small-holder fish farmers who have smaller profit margins. The present finding calls for deliberate government action to provide the necessary financial support in terms of subsidy to support small-holder fish farmers in making adequate investment to improve fish production. Additionally, the majority reported inadequate training. This is similar to a finding of a study implemented in India where lack of technical training was the major barrier among small holder fish farmers (Khan et al., 2021). Training is required in various aspects of fish farming such as feeding, pond management, processing, and storage of caught fish among others. Lack of technical knowledge leads to poor practices that can hinder high fish production. Poor technical knowledge among fish farmers in Kenya was determined to be a major challenge in pond management, especially water quality (Mwainge et al., 2024). Similarly, serious challenges in water quality were reported among small holder fish farmers in Rwenzori region in Uganda due to lack of technical training (Ssekyanzi et al., 2022). The present finding calls for a need for relevant stakeholders to strengthen farmers training to boost fish production in the city. On the other hand, most farmers recommended improved access to market to improve fish sales and profits. In Uganda, most farmers have access to local markets that are often limited (Tibenda et al., 2017). The prevailing challenges in preservation and storage pose risk of fish spoilage and financial losses (Bukonya & Hyuha, 2016). Moreover, this limits their access to national or international markets to realize better profit. Establishing better supply chain for fish farmers can increase access to better markets for fish.

CHAPTER SIX: CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This study revealed the positive impacts of fish farming on the livelihood of people in Ngetta Sub County and Lira district at large. Fish farming provides important livelihood options for people who are full time farmers, part time farmers and those in to fish farming related activities. Fish farming is important because it creates employment, provides food and generates income for the households. However, fish farmers face several limitations that include poor water quality and quantity, limited capital and trainings, high cost of fish feeds, predators, weed infestation, inadequate storage facilities, poor fish stock, lack of awareness and unfavorable government policy on fish farming in wetlands and wetland use of which some of these challenges have been solved through support from government and Non-government Organizations.

6.2 Recommendations

The government should invest adequately in raising awareness and training supported by relevant formal and non-formal education and institutions. Training will help farmers keep updated with best practices and emerging technologies in fish farming and this can help the fish farmers in the rural communities and poor people to improve on their livelihoods by being involved in fish farming.

The government, through its relevant ministries should adopt the participatory systems approaches to identify poor farming households and support them with adequate resources to boost fish farming among them through financial support, improved market access and technical support.

There is need for fish farmers to form cooperatives that can be supported by the government which enables them to raise resources and share experiences which will enable them get access to finances and improve on their farming practices.

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Appendices

Appendix 1: Photos taken from the field.



Photo 1: Showing how the worker is draining water out of the pond by lowering the outlet pipe.



Photo 2: Showing the smoking kiln.



Photo 3: showing the maggots cultured in trays.



Photo 4: inspecting the quality of the developing maggots.



Photo 5: Slashing of the pond slope and dykes.



Photo 6: setting of happas in a pond for holding fingerlings



Photo 7: Culturing of azolla in tanks for feeding fish.



Photo 8: Culturing of duck weed in tanks for feeding fish.

Figure 4: Selected field photos

Appendix 2: Questionnaire Questionnaire.

Dear respondent, I am called AKAO WINIFRED, a student of Busitema University Namasagali Campus with registration no: BU/UP/2017/1245 pursuing a Bachelor of Science Degree in Fisheries and Water Resources Management. This course requires a student to conduct a research and write a report that is submitted to the university in partial fulfillment of the requirement for

the award of a degree. My topic for this case is therefore: “Assessing the impacts of fish production to the rural livelihoods in Ngetta Sub County in Lira District, Uganda.

Any information you will give shall be treated with maximum confidentiality and shall only be used specifically for academic purpose. You are therefore kindly requested to give honest and genuine information and your participation in this exercise is of great importance and highly appreciated.

Section 1: Demographic Information (Bio-Data) Date.....

1. What is your age?

- a) Under 18
- b) 18-30
- c) 31-40
- d) 41-50
- e) Above 50

2. What is your gender?

- a) Male
- b) Female
- c) Non-binary
- d) Prefer not to say

3. What is your marital status?

- a) Married
- b) Single
- c) Divorced
- d) Widowed

4. What is your level of education?

- a) No formal education
- b) Primary education
- c) Secondary education
- d) Tertiary education
- e) Postgraduate education

5. What is your occupation?

- a) Full-time farmer

- b) Part-time farmer
- c) Fish farming related
- d) Other (please specify) _____

6. What is the primary income source for your household?

- a) Fish farming
- b) Crop farming
- c) Livestock farming
- d) Business/Other

Section 2: Involvement in Fish Farming

7. Are you directly involved in fish farming?

- a) Yes
- b) No

7(a). If yes, what activities do you engage in within fish farming?

- a) Fish breeding
- b) Pond management
- c) Feeding the fish
- d) Harvesting
- e) Marketing the fish
- f) Others (please specify) _____

7(b). If no, who in your household is responsible for fish farming?

- a) Male family member
- b) Female family member
- c) Both
- d) Other (please specify) _____

8. Do you think fish farming is considered a male-dominated or female-dominated activity in your community?

- a) Male-dominated
- b) Female-dominated
- c) Equal participation
- d) Other (please specify) _____

9. How would you describe the participation of women in fish farming in your community?

- a) Highly involved
- b) Moderately involved
- c) Not involved
- d) Not sure

10. What roles do women typically play in fish farming in your area? (Select all that apply)

- a) Pond management
- b) Fish feeding
- c) Harvesting
- d) Fish processing
- e) Marketing
- f) Others (please specify) _____

11. What roles do men typically play in fish farming in your area? (Select all that apply) a)

- Pond management
- b) Fish feeding
- c) Harvesting
- d) Fish processing
- e) Marketing
- f) Others (please specify) _____

12. Are there any cultural or societal barriers that prevent women from fully participating in fish farming?

- a) Yes
- b) No
- c) Not sure

13. How do you perceive the gender division of labor in fish farming in terms of fairness?

- a) Fair
- b) Unfair
- c) Neutral

14. Do you think there is a need for more gender inclusivity in fish farming in your area? a)

- Yes
- b) No

c) Not sure

Objective 2: Benefits of Aquaculture to Rural Communities

To explore the economic, social, and environmental impacts of aquaculture on rural areas.

Section 3: Economic Benefits of Aquaculture

15. Has fish farming improved the economic situation of your household?

- a) Yes, significantly
- b) Yes, moderately
- c) No change
- d) Not sure

16. Has fish farming created employment opportunities in your community? a) Yes, many

- b) Yes, a few
- c) No
- d) Not sure

17. Are there any financial programs or funding available to support fish farming in your community?

- a) Yes
- b) No
- c) Not sure

18. Have you been able to diversify your sources of income due to involvement in aquaculture?

- a) Yes
- b) No
- c) Not sure

19. Do you sell your fish locally or internationally?

- a) Locally
- b) Internationally
- c) Both
- d) Not selling

20. Has fish farming improved access to food for your family and community? a) Yes

- b) No

c) Not sure

Section 4: Social Benefits

21. Has fish farming contributed to the social development of your community (e.g., improved infrastructure, social cohesion)?

a) Yes

b) No

c) Not sure

22. Are there any community groups or cooperatives related to fish farming? a) Yes

b) No

23. Does fish farming have a positive impact on women's social status in your community?

a) Yes

b) No

c) Not sure

24. Does fish farming improve educational opportunities in your community? a) Yes

b) No

c) Not sure

25. Do you believe fish farming contributes to reducing poverty in rural areas? a) Yes

b) No

c) Not sure

26. Has the health of your community improved due to the availability of fish as a dietary supplement?

a) Yes

b) No

c) Not sure

27. Do you think fish farming enhances women's empowerment in rural areas? a) Yes

b) No

c) Not sure

Objective 3: Interventions to Boost Aquaculture Production

To identify the policies, programs, and practices aimed at enhancing aquaculture productivity.

Section 5: Interventions and Challenges

28. Are there any government or NGO interventions aimed at improving fish farming in your area?

- a) Yes
- b) No
- c) Not sure

29. What kind of support do you receive from the government or NGOs? (Select all that apply)

- a) Financial aid
- b) Training programs
- c) Technical assistance
- d) Equipment provision
- e) Market access support
- f) Other (please specify) _____

30. Are there any specific training programs available to improve fish farming practices in your area?

- a) Yes
- b) No
- c) Not sure

31. How effective do you think these interventions have been in improving aquaculture production?

- a) Very effective
- b) Moderately effective
- c) Not effective
- d) Not sure

32. What are the major challenges you face in fish farming?

- a) Lack of capital
- b) Poor fish stock
- c) Disease management
- d) Water quality issues

- e) Market access
- f) Lack of training
- g) Others (please specify) _____

33. Do you think that more financial support is necessary to boost aquaculture production?

- a) Yes
- b) No
- c) Not sure

34. Would you benefit from access to modern fish farming technologies (e.g., automated feeding systems, disease diagnostics)?

- a) Yes
- b) No
- c) Not sure

35. Are there government policies that positively affect fish farming in your region? a) Yes

- b) No
- c) Not sure

36. Do you feel that the local government is supportive of the fish farming industry?

- a) Yes
- b) No
- c) Not sure

37. Are there any incentives for fish farmers to increase production (e.g., tax reductions, subsidies)?

- a) Yes
- b) No
- c) Not sure

38. Is there adequate access to affordable and quality fish feed in your area? a) Yes

- b) No
- c) Not sure

39. Are there any cooperative efforts to address fish farming challenges in your community?

- a) Yes
- b) No

40. Do you think the government should invest more in fish farming infrastructure (e.g., ponds, hatcheries, transport)?

- a) Yes
- b) No
- c) Not sure

41. Are there environmental sustainability programs in your area aimed at enhancing fish farming?

- a) Yes
- b) No
- c) Not sure

42. How do you perceive the future of aquaculture in your community?

- a) Very promising
- b) Moderately promising
- c) Not promising
- d) Not sure

43. What other interventions do you think are necessary to improve fish farming?

- a) More training programs
- b) Better market access
- c) Improved financing options
- d) More research and development
- e) Other (please specify) _____

44. Are there any practices in your area that have been adopted to boost aquaculture production?

- a) Yes
- b) No
- c) Not sure

45. How would you rate the overall impact of aquaculture on your community's development?

- a) Very positive
- b) Positive
- c) Neutral

d) Negative

46. What role does fish farming play in the livelihood of women in your community? a) Major role

b) Moderate role

c) Minor role

d) No role

THANK YOU FOR YOUR TIME