

ANALYSIS OF FACTORS INFLUENCING RURAL HOUSEHOLDS' PARTICIPATION IN INLAND FISHERIES: A CASE STUDY OF GREATER TZANEEN LOCAL MUNICIPALITY, LIMPOPO PROVINCE



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Abstract

The study investigated factors that influence the participation of rural households in inland fisheries in the Greater Tzaneen Local Municipality of the Limpopo Province. Data was collected from sixty rural households using purposive and simple random sampling techniques. The objectives were to identify and profile the socio-economic characteristics of rural households and, to determine factors that influence the participation of rural households in inland fisheries. Descriptive statistics and Binary logistic model were employed to achieve these objectives. The findings show that only 42% of rural households participate in inland fisheries. Additionally, about 5% of females are reported as participants of inland fisheries in the Mopani District Municipality. Moreover, gender of the household head has a positive influence on participation while, access to credits, type of agricultural activity and source of income had a negative influence. The study recommends that women be motivated to participate in inland fisheries to enhance food security and improve their livelihoods.

1. Introduction

The importance of inland fisheries in a rural context has been given less attention in many parts of the world. This stems from the unrecognition of the sector as a source of food security and livelihoods. In South Africa, various authors such as Kotzè (2015) and Britz et al. (2015) have pinned the unsuccessfulness of the sector on the lack of policy to govern fishing activities. Recently, the South African government released the National Freshwater (Inland) Wild Capture Fisheries Policy which intends to unlock the country's fishery potential (Department of Forestry, Fisheries and Environment [DFFE], 2021). Furthermore, the inland fisheries policy in South Africa aims to address historical inequalities of participation in inland fisheries, particularly for the disadvantaged groups due to lack of access rights, lack of resources, poor education, insufficient resources, access to value

chains, markets and lack of capacity to participate in fishery management (DFFE, 2021).

Global and South African studies on inland fisheries have indicated that the contribution of inland fisheries to livelihoods has been under-valued despite the numerous reports of people participating in the sector (Tapela et al., 2015; Funge-Smith & Bennette, 2019; Moreau & Garaway, 2021). Despite this, authors have identified that households participate in inland fisheries for small-scale and subsistence purposes to generate food and income (Britz et al., 2015; Tapela et al., 2015).

Several benefits of participating in fisheries can be drawn from various research. For example, fisheries serve as a preventive measure for food insecurity, it is a diversified livelihood strategy,

a source of employment and generates income (Smith et al., 2005; Martin et al., 2013). Therefore, these benefits aspire households to participate in the sector. Moreover, Iruo et al. (2018) emphasize that participation in fisheries reduces households' vulnerability to poverty. Deng (2020) elaborates that the presence of freshwaters such as rivers, lakes, reservoirs, ponds and huge floodplain indirectly signifies the availability of fish which serves as a motivation to participate in fishing activities.

Congruently, various social and institutional determinants that influence participation in fisheries have also been studied across the globe. These determinants include gender, age, marital status, level of education, household size, access to extension services, access to modern transport (Nenna, 2012; Endalew et al., 2020). Inoni et al. (2017) argued that education increases the likelihood of participating in fish production since an educated fisher might find it easier to use current fishing technologies. Similarly, gender is important in determining the roles that men and women perform in inland fisheries (Manyungwa-Pasani et al., 2017).

Kuehn et al. (2014) on the other hand analysed factors influencing fishing participation by bass anglers residing in New York's Lake Ontario Region. The study by Kuehn et al. (2014) found that personal achievement, level of commitment and interest and; family support significantly influence fishing participation.

An earlier study by Kibusu et al. (2006) investigated the factors influencing the involvement of local communities in the fishing industry in Lake Victoria, Tanzania. The ability to fish, household size and the number of household dependents were found to have a positive effect on influencing the involvement of local communities participating in fishing. Lately, Rantlo (2022) employed the binary logistic model to investigate the factors influencing farmers' participation in fish production in Lesotho. Several factors were found to influence farmers' participation in fish production, this includes institutional, technical and social factors. Although these important factors have been identified to affect the participation of households in fishing activities, several constraints have also emerged which hinder participation to some extent. For example, Hebano (2021) identified overfishing, knowledge and skills of fishers, climate change, poor transportation, lack of fish training and price as some of these constraints.

Moreover, South African studies on inland fisheries focus on issues like the history of inland fishery policy and the utilization of water resources for inland fisheries (Britz, 2015; Ellender et al., 2009). Other studies investigated the health of different fish species within inland waters (Jooste et al., 2014; Sara et al., 2018). As a result, studies that focus on the participation of rural

households in inland fisheries, particularly in the Greater Tzaneen Local Municipality have not been conducted. Given this background information this current study sort to analyses the factors influencing rural households' participation in inland fisheries.

1.1. Objectives

To identify and describe the socio-economic characteristics of rural households.

To determine factors that influence the participation of rural households in inland fisheries.

1.2. Limitations of the Study

The study was limited to only a few households that participate in inland fishing activities within the Mopani District. Therefore, there exists a greater potential for expanding the study to the whole province of Limpopo to conclude about the participation status of rural households in inland fishing activities and its benefit to rural livelihoods and food security.

2. Methodology

2.1. Description of the Study Area

A positive paradigm was adopted in the study so to investigate the factors that influence rural households' participation in inland fisheries in the Greater Tzaneen Local Municipality (GTLM), Limpopo Province, South Africa. This local municipality is situated on the south-western part of the Mopani District Municipality and is bordered by Maruleng (on the South), Lepelle-Nkumpi Local Municipality (on the south-west), Molemole Local Municipality (on the west), Greater Letaba Local Municipality (on the north), Greater Giyani Local Municipality (on the north-east) and Ba-Phalaborwa Local Municipality (on the east). Covering a land of 3242.6 square kilometres, the GTLM encompasses Haenertsburg (in the west), Rubbervale (in the east), Modjadjiskloof (in the north) and Trichardsdal (in the south). Tzaneen, Nkowanokwa, Lenyenye, Letsitele and Haenetzburg are the main towns of the municipality. Reports of fishing activities for recreational and small-scale in have been reported by the 2018 Mopani District Municipality Integrated Development Plan. This municipality is home to dams such as Tzaneen Dam which primarily provides water for irrigation and domestic use. However, other activities such as angling, boating and canoeing are permitted except for swimming due to the existence of hippopotamus and crocodiles (Department of Water and Sanitation [DWS], 2015). Various fish species such as Trout and Bass are found in both dams and rivers in this municipality (Greater Tzaneen Local Municipality Integrated Development Plan, 2018/2019). Therefore, opportunities for small-scale fishing activities to address food insecurity, poverty

and malnutrition in the surrounding rural villages exist (DWS, 2015).

2.2. Data Collection Method

Data were collected from rural households through structured questionnaires. The questionnaire was developed to capture the social, institutional, and economic information of the respondents. Sixty (60) households were sampled to participate in the study. Thus, this sample included the participating and non-participating households. A face-to-face approach was used to gather information from the participants. Both purposive and snowball sampling were adopted to identify the participants. These sampling procedures were chosen due to the unknown number of fishing and non-fishing households in the study area.

2.3. Data Analysis

To identify and describe the socio-economic characteristics of the households, the study used descriptive statistics. The binary logistic regression was employed to determine the factors that influence rural households' participation in inland fisheries. The binary logistic regression works like the linear regression model but with a binomial response expressed as a probability that falls between 0 and 1 (Sperandei, 2013).

In this study, it is assumed that the household is faced with two decisions regarding participation in inland fisheries. That is, to participate or not participate. With this being the case, these two options take the form of 1 and 0 (such that 1 is participating and 0 is not participating). Therefore, the binary logistic model is expressed as:

$$\ln\left(\frac{P_i}{1 - P_i}\right) = \beta_0 + \beta_1 X_1 + \dots + \beta_n X_n + e_i$$

Where:

P = is the probability that the households participate in inland fisheries

$1 - P_1$ = is the probability that the household does not participate in inland fisheries

\ln = is the natural logarithm

β_0 = is the intercept

β_1, \dots, β_n = are the coefficients of the estimated parameters

X_1, \dots, X_n = are the independent variables

e_i = is the error term.

3. Results and Discussion

3.1. Descriptive Results for Demographic and Institutional Information of Households in GTLM.

This section presents the demographic and institutional information of participants in the study area. These participants are the rural households of the MDM. As observed in Table 1, the age of the head of the household lies between 19 and 82 years with the average age standing at 48 years. The age of the household head is important in determining the household welfare. Thus, the minimum age suggests that most household heads still can be active in economic activities. In addition, the minimum household size is 1 with a maximum of 8 members. However, the mean household size of the total sample is 4 members. Endalew et al. (2020) attest that a large family size increases the household's participation in the production of fish due to the demand for food and other expenses. Households in the study area might travel a regular distance of 2km to the nearest market. This suggests that the majority of the households reside next to the market as can be seen by the minimum distance (0.10km) travelled. In the same vein, the minimum income is R450.00 per month. The minimum income is lower than the R624.00 poverty line that an individual need to access basic food items in South Africa in a month (Statistics South Africa, 2021). However, the mean income of the household is R2754.33 per month which suggests that some households are above the upper-bound poverty line of R1335.00 per month.

Table 1. Descriptive results for age, household size, distance to the market and total household income

Variables	Minimum	Maximum	Mean	Standard Deviation
Age of household head (years)	21	82	48	15.727
Household size (number)	1	8	4	1.761
Distance to market (km)	.10	3.50	2	1.106
Total household income (South African Rand per month)	450	13000	2754.33	2340.395

Source: Survey results (2021)

Table 2 presents the descriptive results for categorical variables. As seen from the results in Table 2, about 42% of the respondents

participate in inland fisheries while the majority are non-participants (58%). According to Endalew et al. (2020), variables

such as distance to the fishing area, access to modern transportation and extension services are some of the factors that hinder households' participation in fisheries. In this study area inland fisheries are distinguished by gender. For instance, the results show that many of the participants are males (68%) while 32% are females. From these results, only 59% of the males

participate in inland fisheries. Very few females are engaged in inland fisheries (5%) as seen from the results in the below table. These results agree with current and previous literature that fishing is mostly dominated by males (Sonjiwe et al., 2015; Sunny et al., 2019).

Table 2. Descriptive results for dummy and categorical variables in percentages

Variables	Percentage (%)	Variables	Percentages (%)
Inland fisheries participation		Marital status	
Participating	42	Single	48
Not participating	58	Married	45
		Widow/er	7
Gender		Agricultural production	
Female	32 (5 part.)	Practice agriculture	37
Male	68 (59 part.)	Do not practice agriculture	63
Access to credit			
Yes	25		
No	75		

Where: part. refers to participation in inland fisheries

Source: Study results (2021)

About 37% of households are involved in agricultural production. Surprisingly, the majority of the households (63%) mentioned that they do not engage in agricultural activities. This might be a result of the unavailability of land for agricultural purposes, lack of agricultural funds, absence of motivation for agricultural activities and lack of resources (Nxumalo & Oladele, 2013; Qange & Mdoda, 2020). Despite this, many of the households (75%) reported having no access to credit while 25% have access. Therefore, access to credit not only assists households to acquire food but also to purchase fishing and agricultural inputs (Mwangi & Kariuki, 2015; Abdalla, 2016).

3.2. Binary Logistic Results on Factors Influencing the Participation of Rural Households in Inland Fisheries

The factors that influence the participation of households in inland fisheries were estimated and the results are shown in Table 3. The results for the model fit of the binary logistic regression are also summarized in the below table. As apparent from the results, the -2Log likelihood is 43.931 while, Cox and Snell R Square and Nagelkerke R Square are at 46,6% and 62,8% respectively. The Nagelkerke R Square results simply mean that the model accounts for 62.8% of the variability in the dependent variable. In addition, the model $\chi^2=37.672$, $p<0,001$. Therefore, collectively, these results imply that the model is fit for the study. Thus, four variables were found to be significant and are discussed in this section.

Table 3. Binary logistic results for factors influencing the participation of households in inland fisheries

Variables	B	Std. err.	Wald	Sig.
Constant	12.163	5.807	4.387	.036
Age of household head	-.033	.038	.756	.385
Gender of household head	5.196	1.878	7.658	.006***
Number of household members	.386	.265	2.119	.146
Marital status	-.819	.630	1.693	.193
Level of education	-.698	.599	1.357	.244
Access to credit	-2.628	1.352	3.776	.052**
Distance to market	.058	.462	.016	.899
Agricultural production	-.933	.491	3.615	.057*
Total household income	.000	.000	1.410	.235
Household head source of income	-.182	.101	3.239	.072*
Model fit results				
-2 Log-likelihood	43.931			
Cox and Snell	46,6%			
Nagelkerke R Square	62,8%			
Model Chi-Square	37.672			
Model significance	.001			

Note: ***, ** and * indicate significance level at $p < 0,001$; $p < 0,05$; and $p < 0,01$ respectively.

Source: *Study results (2021)*

Gender of the household head exerted a strong relationship with participation in inland fisheries as established by the regression estimates in Table 3. These results suggest that gender plays an important role in influencing participation in inland fisheries. Therefore, the likelihood of the household participating in inland fisheries increases when the household head is a male. For instance, studies have shown that inland fisheries are mostly monopolized by males (Manyungwa-Pisani et al., 2017). Likewise, various authors have also reported that women's role in fisheries is at times undervalued, uncredited, and underappreciated by society, policymakers, and the fishery sector (Harper et al., 2020). Hence, there is a lack of clearly defined gender roles and responsibilities within fisheries. Despite this, Pizzali (2001) and Bassey et al. (2015) emphasize that both males and females participate in inland fisheries for various reasons and their contributions are accepted differently by society.

Upon assessing the outcome of the estimated results, it was observed that access to credit resulted in a negative but significant value. The implication, in this case, is that having access to credit is likely to decrease the participation of households in inland fisheries. This might suggest that access to credits is limited and sourced from family and friends, rather than commercial banks. This then implies that with the limited available credits, households might utilize them for household emergencies such as food and clothes rather than investing in inland fisheries. Cliffe

& Ankirotimi (2015) found that lack of access to credit affects participation in fisheries.

Regarding agricultural production, the variable had a negative association with participation in inland fisheries. These results, therefore, suggest that households' engagement in agriculture is likely to decrease their participation in inland fisheries. For instance, if households generate more income from agriculture, these households might not participate in inland fisheries. However, agricultural activities might serve as a diversified livelihood and risk management strategy for households participating in inland fisheries (Nwabeze, 2016; Amevenku et al., 2019). Additionally, Mamun-ur-Rashid & Gao (2012) established that participating in both livestock and fisheries improves household welfare.

A statistically significant negative association between the source of household income and participation in inland fisheries was found by the regression. These results imply that, depending on the different types of sources of income, if these sources generate enough income to sustain the livelihood of the household, the participation of these households in inland fisheries is likely to decrease. Several authors have established that households who are engaged in inland fisheries tend to diversify their sources of income to deal with unforeseen circumstances that might arise from fishing activities such as low fish output and climate change (Rahman et al., 2011; Parashar et al., 2016; Oladimeji, 2018).

Hence, this study argues that the type of income sources that the household has is likely to influence participation in inland fisheries such that, if the source generates less income, the household might participate in inland fisheries. But, if the source generates more income, the household might not engage in inland fisheries activities.

5. Conclusions and Recommendation

This study aimed to analyze factors influencing rural households' participation in inland fisheries. The study noted that less than half (42%) of the sampled respondents were engaged in inland fisheries. This, therefore, suggest a low inland fisheries participation among rural households in the study area. Gender of household head, access to credits, agricultural production and source of income were noted as drivers of inland fisheries at the household level. The study, therefore, concludes that a combination of institutional and socio-economic factors of rural households can be targeted to promote inland fisheries at the household level. Some of these factors are similar to those found by other authors such as Nenna, 2012; Manyungwa-Pasani et al. (2017) & Endalew et al. (2020). Thus, to promote inland fisheries at the household level, the study recommends that increased access to credits via formal sectors such as banks could potentially encourage households to access enough credits to invest in inland fisheries without worrying about their welfare security. The inverse relationship between agricultural production and sources of income suggests that households not participating in inland fisheries probably consider inland fisheries as optional and not as a key form of livelihood. Therefore, it is recommended that information on the potential benefits of inland fisheries and a diversification livelihood strategy be made available to increase farmers' and households' interest in engaging in inland fisheries.

Ethics

The study was granted an ethical clearance in 2020 by the University of Limpopo (TREC/38/2020:PG)

Informed Consent

All the respondents who participated in the study gave their consent and voluntarily participated in the study.

Authorship contribution

Jenny Potsiso Mokhaukhau-collected, analysed the data and interpreted the results; drafted the paper.

Abenet Belete- supervised the study and approved the article for publication.

Johaness Jan Hlongwane- co-supervised the study and reviewed the paper for publication.

Jabulile Zamukuhle Manyike- reviewed and edited the paper.

Conflict of interest

The authors declare no conflict of interest.

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