Women Labour Force Participation in Small Scale Fisheries in Ukerewe District, Mwanza-Tanzania

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ABSTRACT

Globally, it is perceived that women are excluded from participating in certain sectors of the economy, especially in developing countries where some high paying economic activities are traditionally considered male-dominated. This has resulted in most well-paying jobs being dominated by men. This study aimed to empirically investigate women's labour force participation in small-scale fisheries in the Ukerewe District, Mwanza region, Tanzania. Specifically, the study examined the factors determining women's participation in small-scale fisheries in the area. The study was guided by the theory of labour supply as explained by the standard neoclassical microeconomic model, a widely applied theory in empirical labour supply analysis. Pioneered by economist Alfred Marshall between 1870 and 1890 in the analysis of demand and supply, the theory assumes that economic agents make informed and rational decisions based on complete certainty about prices and wages, and that individuals face their own budget constraints independent of others' actions. Hence, it is an application of consumer behaviour theory. Individuals are assumed to allocate time to market work and non-market activities (leisure). Utility is maximised by choosing a combination of goods and leisure hours subject to time, price, and income constraints. Labour force participation is one dimension of labour supply, where individuals decide not only how many hours to work but also whether to work at all. The study adopted a cross-sectional design, collecting data only once to capture a snapshot of the phenomenon at the time of data collection. The study population included all women participating in the fishery business, with a sample of 152 selected for the study. These women were drawn from three different beaches—Izinga, Bulubi, and Malelema—along Lake Victoria in Ukerewe District, areas dominated by fishing businesses. Data were collected through face-to-face interviews using a structured questionnaire. Descriptive statistics and a logit regression model were used to analyse the data. The empirical results from the logit model indicated that personal characteristics such as age, education level, and the number of children were statistically insignificant, while factors such as family income, marital status, and environmental security were statistically significant with P values of 0.000, 0.023, and 0.000 respectively. The study concludes that individual characteristics like age, education level, and family size, as well as socio-economic factors such as family income, marital status, and environmental security, play a major role in influencing women's participation in the fishing sector in the study area. The study recommends that empowering women by raising their incomes, enhancing their decision-making at the family level (especially for married women), and improving security at workplaces can increase their participation rates in the fishing sector.

Keywords*:* Labour Force, Small-Scale Fisheries and Economic Institutions, Women Labour Force Participation

I. INTRODUCTION

Small-scale capture fisheries contribute over half of the global marine and inland fish catches, with nearly all of this catch intended for direct human consumption. This sector provides employment for over 90% of the world's 35 million capture fishers and supports approximately 84 million additional jobs in related fields such as processing, distribution, and marketing (Bene et al., 2017). Many rural residents, particularly in Asia and Africa, also participate in seasonal or occasional fishing activities that often go unreported (Food and Agriculture Organization [FAO], 2007). Women make up nearly 47% of the workforce in primary and secondary sectors associated with small-scale fisheries. Moreover, over 95% of small-scale fishers and workers in post-harvest sectors reside in developing countries (Campbell & Hanich, 2014).

Lake Victoria, the world's largest tropical lake at 68,000 square kilometers, has a shoreline of approximately 3,450 kilometers, with Tanzania bordering 33%, Kenya 16%, and Uganda 51% (Controller and Auditor General [CAG], 2013). The lake basin supports around one-third of the population in Kenya, Tanzania, and Uganda, equating to approximately 30 million people (CAG, 2013). Historically, fishing has been a vital source of food, employment, and economic benefit for communities living around Lake Victoria.

In Tanzania, the fishing sector involves both men and women, with increasing recognition of women's vital contributions to sectors such as agriculture, food security, horticulture, sericulture, and fisheries. Women, who make up the majority of agricultural laborers, contribute significantly to both the volume and quality of output (The WorldFish Center, 2018). Despite these contributions, women continue to face unequal access to resources and social status (Garcia & Estrada, 2016).

In the Lake Victoria region, women play a prominent role in fishing and aquaculture activities, with estimates indicating that they make up between 70% and 87% of the fish workforce, especially within the artisanal fish trade (Luomba, 2018). While women contribute at every stage of the fishing process—from pre-harvest to post-harvest—their involvement is frequently overlooked, reflecting widespread discrimination within the sector (Luomba, 2018).

Studies on labor force participation in the fishing sector show that women often engage in support activities such as cooking for fishers, selling fish at landing sites, and providing labor in fish processing facilities. Women typically represent about half of the workforce in these facilities and also benefit from fish processing by-products, which they sell to poultry feed manufacturers (Kweka et al., 2016).

Despite their considerable contributions, women in the artisanal fishing industry receive minimal attention from both governmental and non-governmental organizations (Medard et al., 2019). Various studies have explored factors influencing women's labor force participation in different sectors. For instance, Hafeez and Ahmad (2022) identified job availability, education, and skills as key determinants of educated married women's employment decisions in Punjab, India. Kus (2017) highlighted the significant role religion plays in female labor force participation in India, underscoring its importance for economic development and women's empowerment.

Most research focuses on formal sectors such as teaching, mining, engineering, and healthcare, often overlooking informal sectors like fisheries. Limited research exists on women's labor force participation in Tanzania's fishing sector. García and Estrada (2016) pointed out that cultural norms and assumptions, such as the belief that male family members should represent women, often exclude women from fisheries interviews and discussions. This oversight results in gender-blind policies that fail to support sustainable livelihoods for women and their communities, perpetuating social inequalities (Garcia & Estrada, 2016).

This study aimed to examine women's labor force participation in small-scale fisheries in Tanzania, with a focus on women in Ukerewe District, Mwanza Region. This focus stems from the scarcity of data regarding women's roles in the small-scale fish capture industry and the significant involvement of women in various stages of the fishing value chain in developing countries.

1.1 Problem Statement

Women's participation in the labor force is increasingly acknowledged as vital for driving economic growth and sustainable development. However, within the context of small-scale fisheries, particularly in developing regions such as Ukerewe District, Mwanza, Tanzania, women's roles often remain marginalized and undervalued (Kleiber et al., 2015; Harper et al., 2017). Small-scale fisheries play a critical role in supporting household livelihoods, enhancing food security, and alleviating poverty, with women frequently contributing to various stages of the fisheries value chain, including processing, marketing, and distribution (FAO, 2020). Nonetheless, gender-specific barriers, such as limited access to resources, inadequate institutional support, and socio-cultural constraints, hinder women's full participation and economic empowerment in this sector (Lentisco & Lee, 2015; Weeratunge et al., 2010).

In Ukerewe District, while fishing is a primary source of employment and livelihood, women's participation is often informal and lacks official recognition and policy support. Gender disparities in labor force participation impede equitable development and perpetuate poverty among women in fishing communities (Siar, 2003). Furthermore, research specifically examining the factors influencing women's participation in small-scale fisheries within Tanzania is limited, creating a significant knowledge gap regarding the barriers and opportunities for enhancing women's roles in this sector. Without comprehensive insights and targeted interventions, achieving the Sustainable Development Goals (SDGs) related to gender equality (Goal 5) and poverty reduction (Goal 1) in these communities may remain unattainable (United Nations Development Programme [UNDP], 2021).

This study aims to bridge this research gap by investigating women's labor force participation in small-scale fisheries in Ukerewe District. By analyzing the factors influencing their involvement and identifying potential institutional frameworks that could facilitate their engagement, this research intends to provide actionable recommendations for policymakers and stakeholders. Such efforts can help foster a more inclusive and sustainable fisheries sector that empowers women and supports local socio-economic development.

1.2 Research Objective

This study aimed to identify the primary factors influencing women's participation in small-scale fisheries in Ukerewe District. Understanding these factors is crucial for addressing the barriers that limit women's involvement and for fostering pathways to enhance their participation in the sector. Socioeconomic factors, such as income needs, family responsibilities, and access to resources, play a significant role in shaping women's engagement in small-scale fisheries. For instance, women may be attracted to this sector as a means of supplementing household income, particularly in communities where economic opportunities are limited (FAO, 2020). However, challenges such as restricted access to capital, markets, and fishing equipment can impede their full participation. Additionally, women in small-scale fisheries often occupy less visible or informal roles, such as fish processing or sales, which can constrain their earnings and social recognition (Kleiber et al., 2017).

Cultural factors, including traditional gender roles and societal norms, also significantly influence women's participation. In many fishing communities, cultural expectations allocate fishing-related activities to men, while women are often tasked with domestic duties or supportive roles. These norms can limit women's access to fishing resources, training, and leadership opportunities within the sector (Béné et al., 2016). Addressing such cultural barriers necessitates community education and advocacy that recognize and value women's contributions.

Institutional factors, such as government policies, local regulations, and support services, also impact the extent of women's participation in and benefits from small-scale fisheries. Policies that lack gender sensitivity or fail to address the specific challenges women face can inadvertently restrict their access to resources and limit their engagement in fisheries activities. Conversely, institutional frameworks that promote gender equity can empower women, facilitate equitable access to resources, and create opportunities for their economic advancement (UN Women, 2018).

In the view of that, identifying these socioeconomic, cultural, and institutional factors not only underscores the challenges women face in fisheries but also points to areas for targeted intervention. Addressing these barriers can enable stakeholders—including local governments, community organizations, and development agencies—to promote gender equality, reduce poverty, and advance sustainable development in fishing communities.

1.3: Research Question

The general question that guided this research was asking **"**What are the key factors influencing women's labor force participation in small-scale fisheries in Ukerewe District, Mwanza, Tanzania, and how do these factors affect their socio-economic empowerment and contributions to the sector?".

II. LITERATURE REVIEW

2.1 Theoretical Review

The standard neoclassical microeconomic model of labour supply, developed by Alfred Marshall between 1870 and 1890, is a common framework in labour supply analysis. It focuses on utility maximisation within budget constraints, assuming rational decision-making with certainty about prices and wages. Individuals independently allocate their time between work and leisure to maximise utility, influenced by time, price, and income factors. Labour force participation, a key aspect of labour supply, involves decisions on whether to work and how many hours. In the neoclassical model, individuals work if the market wage exceeds their reservation wage. Women's employment decisions are influenced by factors affecting reservation and market wages, such as the presence of young children, non-labour income, childcare availability, societal attitudes, and education, which can enhance their potential earnings.

The neoclassical approach explains labour force participation through a two-stage process: deciding whether to supply labour and then determining employment status based on factors like employer preferences, job-seeking incentives, and job offer acceptance. However, it has limitations, including ignoring household interdependence, not distinguishing between productive and recreational activities, and overlooking institutional roles in women's labour participation (Wamuthenya, 2009).

Feminist theory, rooted in the work of thinkers like Simone de Beauvoir and further developed by liberal feminists, emphasises equality and liberty, arguing that women have equal reasoning abilities to men. It advocates for equal opportunities in education, legal rights, and employment, aiming to eliminate discrimination through policy changes and supportive institutions (The WorldFish Center, 2018). However, feminist theory also has limitations in explaining socio-economic factors affecting female labour force participation.

This study combines neoclassical labour supply theory and liberal feminism to address gaps in understanding women's labour force participation in the fishing sector.

2.2 Empirical Review

Women's involvement in small-scale fisheries in Tanzania, including Ukerewe District, plays a critical role in household food security, economic contributions, and community sustainability. However, various studies have shown that, their participation is often constrained by various by social, economic, and cultural factors. Empirical studies highlight both the achievements and barriers faced by women in the fisheries sector. Various researches have been conducted on this area while focusing on different key themes of the subject matter and have come up with differing findings and conclusions regarding determinants of women's participation in the fishing sector.

Empirical studies on women's labour force participation in small-scale fisheries highlight multiple factors. For example, Mollet (2011) identified marital status, presence of children, age, education, family composition, and husband's income as supply-side factors, while government policies and wages were key demand-side factors. In less developed countries, marriage and childcare responsibilities often limit women's employment outside the home, as seen in Botswana, where women mainly occupy informal sector jobs due to limited opportunities and cultural barriers (Siphambe & Motswapong, 2007). Women in the fishing sector face challenges like low pay, limited resources, and exclusion from policy-making, with their work often undervalued as domestic duties (Othmani & Zuroni, 2020). Socioeconomic factors significantly influence women's labor force participation in small-scale fisheries. Income needs and household responsibilities drive women's engagement in the sector. Studies in Lake Victoria Basin indicate that women often enter fisheries to supplement household income, especially in resource-poor communities (Medard et al., 2019). However, limited access to fishing gear, capital, and formal markets constrains their full participation (Béné et al., 2016).

Research has also highlighted the dual burden of economic and domestic responsibilities that women face. This dual role can limit their productivity and mobility within the sector. For instance, in Ukerewe District, women engaged in fisheries often balance their roles as fish processors with childcare and household duties, reducing their capacity to fully participate in income-generating activities (Luomba, 2018).

Despite women's significant contributions, their participation in small-scale fisheries is hindered by a lack of training and education, often forcing them into the informal sector. Exclusion from policy formulation further limits their involvement (Luomba, 2018).

Factors influencing women's employment decisions include job availability, education, and skills. Higher education levels correlate with greater labour market participation, as women with higher education can afford domestic help and face fewer childcare constraints. However, inflexible wage employment hours may push women into the informal sector (Wamuthenya, 2009). Demographic factors like age, family size, and household structure also impact labour force participation, with childcare responsibilities particularly reducing participation among young women (Olsen & Mehta, 2006). Modernisation and changes in fertility rates also influence female labour participation. Women with older children or those heading households are more likely to seek employment due to the need to support their families (Siphambe & Motswapong, 2017).

Cultural norms and traditional gender roles profoundly impact women's participation in fisheries. Fishing is often perceived as a male-dominated activity, with women relegated to supportive or less visible roles (Harper et al., 2017). In Ukerewe District, cultural restrictions and taboos often prevent women from accessing fishing grounds or leadership roles within fisheries organizations (Medard et al., 2019). These societal norms also influence women's access to training and capacity-building opportunities, further marginalizing their role in the sector (Kweka et al., 2016). Furthermore, family structure significantly affects women's labour market participation, with marriage and child-rearing often deterring employment, especially in traditional households. Married women with young children are more likely to be unemployed, and marriage negatively impacts labour participation in countries with traditional family structures (Cipollone et al., 2013). Higher education levels for women and their partners increase labour market participation. Age effects show increased participation among women aged 35-44, with a decline in older age groups. Family care burdens consistently reduce women's labour market involvement across different welfare regimes.

Additionally, institutional and policy related barriers seriously impact women's labour force participation in the fishing sector. Institutional frameworks, including policies and regulations, can either hinder or promote women's participation in fisheries. Studies have shown that gender-insensitive policies often fail to address the unique challenges faced by women in small-scale fisheries. For example, a performance audit by the Controller and Auditor General (2013) highlighted the lack of gender-disaggregated data in Tanzania's fisheries management, which limits the ability to design targeted interventions. Conversely, supportive policies that promote women's access to credit, training, and cooperative membership can enhance their participation. Evidence from other regions of Tanzania suggests that women's inclusion in decision-making processes within fisheries organizations leads to better resource management and equitable distribution of benefits (Kisusi & Ndesanjo, 2023).

Women's economic contributions to small-scale fisheries are substantial but often undervalued. Their roles in fish processing, trading, and marketing contribute significantly to household incomes and local economies

(Garcia & Estrada, 2016). However, limited access to formal markets and value chains reduces their earnings and economic empowerment. Research by Lentisco and Lee (2015) found that women's lack of access to modern processing technologies and financial services hampers their ability to scale up their activities and compete effectively.

Empirical studies for example that of Weeratunge et al. (2010) and UN Women (2018) emphasize the importance of gender-sensitive approaches to addressing barriers to women's participation. Initiatives such as capacity-building programs, microfinance schemes, and community education campaigns have shown promise in empowering women in fisheries. For example, projects in other parts of East Africa have successfully increased women's access to resources and decision-making platforms through cooperative organizations (Weeratunge et al., 2010). In Ukerewe District, community-based interventions that integrate gender considerations into fisheries management could help bridge the gap. These interventions must be complemented by national policies that prioritize gender equity in resource allocation and capacity-building programs (UN Women, 2018).

The existing literature provides a comprehensive understanding of the factors influencing women's participation in small-scale fisheries. However, specific studies focusing on Ukerewe District remain limited. There is a need for localized research that examines the interplay of socioeconomic, cultural, and institutional factors in shaping women's roles in fisheries. Future studies should also explore the impact of emerging challenges, such as climate change and market globalization, on women's participation in the sector. By addressing these gaps, researchers can provide evidence-based recommendations for stakeholders to enhance gender equity and support sustainable development in small-scale fisheries in Ukerewe District and beyond.

III. METHODOLOGY

3.1 Description of the Study Area

This study was conducted in Ukerewe District, one of eight districts in the Mwanza Region of Tanzania. Located 45 km (25 nautical miles) north of Mwanza, the district is accessible via a ferry journey of approximately 3 hours costing $14–$19. Comprising 38 islands in Lake Victoria, Ukerewe includes 15 permanently inhabited islands, with Ukerewe Island being the largest and Nansio serving as the district headquarters. Geographically, it lies between Longitudes 31°30' and 32°5' East and Latitudes 1°30' and 2°20' South. Ukerewe is bordered by Ilemela and Magu to the south, Bunda and Musoma (Mara Region) to the east, Sengerema to the southwest, Kagera Region to the west, and Kenya and Uganda to the north.

Administratively, the district is divided into four divisions (Mumbuga, Mumlambo, Ilangala, and Ukara), 25 wards, and 76 villages, with Nansio Township hosting the main administrative offices. It covers an area of 6,400 km², including 640 km² of dry land and 5,760 km² of Lake Victoria waters. According to the 2022 Census, the population is 387,815, comprising 191,217 males (49.3%) and 196,598 females (50.7%), with an annual growth rate of 1.2% (NBS, 2022). Major ethnic groups include the Kerewe, Kara, and Jita, along with communities such as the Sukuma, Wahaya, and Chagga.

Economically, Ukerewe is among Tanzania's poorest districts, with a per capita GDP of approximately Tshs 130,000. Subsistence agriculture, practiced by 92% of the population, focuses on cassava, maize, rice, and potatoes, with additional crops like bananas, coffee, and vegetables grown mainly for local consumption. Farming is constrained by limited arable land, traditional techniques, and declining soil fertility due to overuse and land fragmentation. Livestock farming also contributes modestly, focusing on indigenous breeds.

Fishing is a primary livelihood, supporting 85–90% of households. Artisanal fishing dominates, though foreign companies engage in semi-industrial practices. Key fish species include Nile perch, Tilapia, and Dagaa, along with locally known varieties like Furu and Ningu. Methods include gill netting, long-lining, and dagaa seining, although some practices like beach seining are legally prohibited.

3.2 Research Design

This study employed a cross-sectional design, collecting data once from a cross-section of the population (sample) to assess the phenomenon at that specific time, allowing for swift data collection (Kothari, 2004). The study population included all women involved in fishing at Izinga, Malelema, and Bulubi beaches in Ilangala and Ukara Divisions, in Ukerewe district, though their exact number was unknown.

This study employed both probability and non-probability sampling. Mwanza region and Ukerewe district was selected purposely because Ukerewe District is very prominent for fishing activities. Among the 25 fishing beaches in Ukerewe district 3 fishing beaches were selected purposely due to the fact that most of the fishing activities are found in these beaches. A simple random sampling technique was used to select 152 women to represent all women involved in fishery businesses from the above-mentioned beaches. Since the actual population

of women involved in fishery activities in Ukerewe was not unknown, the following formular for sample size determination was adopted from Kothari, (2004):

$$n = \frac{z^2 p.q}{e^2}$$

Where:

n= sample size

z=the value of the standard variance at a given confidence level and should be worked out from table showing area under normal curve

p= sample proportion

q= 1-p and

e= estimate the percent of the true value.

Additionally, ten (10) key informants which included decision markers, fisheries officers, community development officers, financial institution officers and Beach Management Unit leaders were purposively (non-probability sampling technique was used) sampled, because it was believe that these key informants had required information on small scale fisheries which could supplement information obtained from women involved in fishery businesses.

To investigate women's labour force participation in small-scale fisheries, "labour force" was defined as the economically active population aged 14-64, either employed or unemployed in the past seven days. This includes employers, self-employed individuals, employees, salaried workers, wage earners, paid and unpaid family workers, members of producers' co-operatives, and persons unclassifiable by status (Rahman & Islam, 2019).

Primary data was collected through structured questionnaires which were administered by face-to-face interviews with women participating in small scale fishing while the interview guide was used to collect data from key informants as described previously. The questionnaires and interview questions were constructed such that questions were aiming at responses which in the end would reflect the achievement of the research objectives. Secondary data were collected by reviewing different documents, journals and articles. Prior to conducting the actual data collection, a preliminary visit to the study area was done to testing the questionnaire reliability of our data collection tools.

3.2 Data Analysis Techniques

3.2.1 Descriptive Statistics:

Descriptive analysis was used to examine respondents' demographic characteristics, social and economic factors affecting women's participation in small-scale fisheries, and the institutional setup for enhancing women's capacity in this sector. Frequencies and percentages were used to provide an overview and test relationships between variables (Hafeez & Ahmad, 2022).

3.3 Empirical Models

In this study the dependent variable which is “the choice made by women to participate in fishing activities or otherwise” was dichotomy (a dummy variable) or qualitative variable. A dummy variable usually indicates the presence or absence of a “quality” or an attribute, such as choosing to participate or otherwise and such variables are measured as “nominal or categorical” scale variables. One way we could “quantify” such attributes is by constructing artificial variables that take on values of 1 or 0, whereby ‘1’ indicates the presence (or possession) of that attribute and ‘0’ indicates the absence of that attribute (Gujarati, 2004). The female labour force participation is a discrete choice which takes just two possible answers (mutually exclusive and exhaustive) which fall under binary choice model (Hafeez & Ahmad, 2022). Female labour force participation, is a binary choice, which falls under the binary choice model (Hafeez & Ahmad, 2022). In the view of this, a logistic regression model was used to estimate female labour force participation, as shown in equations 1 to 4 below.

$Yi=\beta_0 + \beta_1X_1 + \beta_2X_2 + \ldots\ldots + \beta_{ki}X_{ki} + U_i$ ……..... Eq (1)

Yi=1 if Yi >0, Yi=0 otherwise,

$Yi=\beta_0+ \beta_1X_1+\beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X5 + \beta_6X6 + U_i$ …….. Eq (2)

Whereby,

Y_i is the women labour force participation in small-scale fisheries

β_0 is a constant,

$\beta_1 \ldots \beta_6$. Are coefficients of independent variables.

$X_1, X_2 \ldots\ldots X_6$ are explanatory variables

X_1= women age

X_2= education level

X_3= marital status
X_4= fertility
X_5= family income
X_6= environmental security
U_i is an error term which is normally distributed with zero means.

Logit model was based on cumulative logistic probability function and is specified as

$$\text{Prob}(y=1) = \frac{exi\beta i}{1+exi\beta} \quad \text{..... Eq (3)}$$

$$\text{Prob}(y=0) = 1 - \frac{ex^{i}\beta\text{i}}{1+ex^{i}\beta\text{i}} \quad \text{..... Eq (4)}$$

Logistic regression was used to assess the probability of women to choose to participate in small-scale fisheries whereby, '1' implies women chose to participate and '0' implies women chose otherwise. X_i ranges from $-\infty$ to $+\infty$, *Yi* ranges between 0 and 1 and Y_i is nonlinearly related to X_i (Gujarat, 2004).

Although linear probability, logit and probit models give qualitatively similar results, the Logit model was preferred over other models because the linear probability model has a weakness in that the estimated probabilities are not constrained to lie between 0 and 1. Moreover, the disturbance term in linear probability models was estimated to suffer from heteroscedasticity. Also, the rate of change of the probit model was somewhat complicated. The selection of the logit model was based on the assumption that in evaluating $P_{i,}$ all variables included in the analysis are involved. More importantly, the logit model was selected because of its comparable mathematical simplicity (Gujarat, 2004).

3.4 Estimation Technique

Since the data was at the individual or micro level and cannot be estimated by the standard Ordinary Least Square method (OLS). Female labour force participation in small-scale fisheries data was estimated by employing the maximum-likelihood estimation (MLE) since the number of observations was large (Gujarat, 2004). To test the result of the logistic model the variables of the model will be significant by f considering first the Prob > chi^2 is < 0.05 then the model will be ok. The second is by using the two–tail test P value has to be lower than 0.05 (95%). If this is the case then the variable has a significant influence on the dependent variable. Furthermore, on the Z- test the t- value has to be higher than 1.96 (for a 95% confidence), that case variable has a significant influence on the dependent variable.

Likewise, to find the magnitude of the effect of the independent variable on the dependent variable the marginal effect test was done because in the logit model the slope coefficient of a variable gives the change in the log of the odds associated with a unit change in that variable, holding all other variables constant. But for the logit model the rate of change in the probability of an event happening is given by $\beta j\ Xi\ (1 - Xi)$, where βj is the (partial regression) coefficient of the j^{th} regressor. But in evaluating *Xi*, all the variables included in the analysis are involved (Gujarati, 2004).

IV. FINDINGS & DISCUSSION

4.1.1 Women in Small-Scale Fisheries as their Main Source of Income

This study examined women's participation in small-scale fisheries in Ukerewe District. Since their involvement in fisheries is qualitative, respondents were asked whether working in the fishing sector was their primary occupation and main source of income. The findings are summarized in Table 1 below.

Table 1
Women working in fishing sector as main source of income

Working in fishery as main source of income	No of respondent (f)	Percent (%)
No	21	14
Yes	131	86
Total	**152**	**100**

Table 1 indicates that 131 respondents (86%) identified fishing as their primary occupation and main source of income, while 21 respondents (14%) reported using fishing to supplement other income, likely from agriculture. Furthermore, participants were asked whether small-scale fishery activities were their sole means of livelihood, with the results detailed in Table 2.

Table 2

Women working in fishing sector as main source of livelihoods

Working in fishery as main support to livelihoods	No of respondent (f)	Percent (%)
Not main support to livelihoods	45	30
Main Support to livelihoods	107	70
Total	**152**	**100**

Table 2 indicates that 107 women (70%) working in the fishing industry relied exclusively on fishing for their livelihoods, without alternative income sources. In contrast, 45 women (30%) supplemented their livelihoods through agriculture or their spouses' earnings from small-scale fisheries. Additionally, respondents were asked about their comfort working in the fishing sector despite challenging conditions and low earnings. The findings are summarized in Table 3.

Table 3

Women's comfortability with working in fishing sector

Comfortability working in fishery sector	No of respondent (f)	Percent (%)
Uncomfortable	67	44
Comfortable	83	56
Total	**152**	**100**

Table 3 indicates that 83 women (56%) reported feeling comfortable working in the fishing sector, while 67 women (44%) expressed discomfort due to various challenges, particularly in comparison to men. Despite their reservations, many women continued in the sector due to limited livelihood alternatives in the area.

These findings reveal that while a significant proportion of women in Ukerewe District are uncomfortable participating in fisheries, the sector remains their primary source of income and essential for sustaining their families. This aligns with Medard et al. (2019), who observed that in many Lake Victoria communities and across Africa, women bear the main responsibility for childcare and household needs, making income generation crucial. Additionally, climate variability, such as extended droughts, has pushed women to increase their involvement in fishing due to reduced agricultural yields and incomes. During dry spells, with little or no farming work available, women often rely on fishing to support their households. Consequently, women's participation in fishing in Ukerewe is often driven more by necessity than choice.

4.1.2 Main Activities Conducted by Women in the Small-Scale Fishery

The study aimed to examine the specific activities women engage in within the fisheries sector. Respondents were asked about their primary roles in fishing or along the fisheries value chain, and the responses are summarized in Table 4.

Table 4

Main Activities Conducted along the Fishery Value Chain

Types of activities engaged in	No of respondent (f)	Percent (%)
Fish processing	66	43
Fish trading	12	8
Boat owner	4	3
Service provider	28	18
Others	42	28
Total	**152**	**100**

Results in Table 4 shows that women in small-scale fisheries engage in various activities that reflect their income levels. Specifically, 66 respondents (43%) participated in fish processing tasks such as washing, cleaning, de-scaling, salting, and drying fish. Additionally, 70 respondents (46%) provided services like cooking and selling food, running small restaurants and shops, and selling vegetables and fruits. 12 respondents (8%) were involved in small-scale fish trading, while only four (3%) owned fishing boats. These results indicate that women are marginalized in the fishing industry, with their roles primarily in low-paying, small-scale activities related to fish processing and services.

The findings highlight that women's contributions to the fisheries value chain are focused on related activities rather than direct fishing or trading. Although their roles differ from men's, women's contributions are crucial and should be recognized, as noted by Tuara and Passfield (2018). Respondents indicated that their high

engagement in peripheral fishing activities stemmed from a lack of funds for direct fishing, which requires significant capital investment. Consequently, income from these activities often falls short of meeting their families' basic needs. When asked if their earnings were sufficient, 121 respondents (80%) reported that their income from small-scale fisheries was inadequate, while only 31 (20%) felt it was sufficient.

Despite low pay, women continue to work in small-scale fisheries due to limited alternative income sources and substantial family care responsibilities. This aligns with the "labor supply and demand" theory of the Standard Neoclassical microeconomic model, which suggests that individuals make rational decisions to maximize utility within budget constraints. Participation in the labor force involves choices about how many hours to work and whether to work at all, with decisions influenced by factors affecting both reservation and market wages (Wamuthenya, 2009).

4.1.3 Determinants of Women's Labour Force Participation in Small-Scale Fisheries

Women's participation in the fishing sector was considered a dependent variable influenced by various factors, treated as independent variables in the model. The assumption was that women's decision to participate in the fishing sector depends on factors such as age, education level, fertility (number of children), marital status, family income, and environmental/security factors in fishing areas.

4.1.4 Descriptive Analysis of Factors Determining Women's Participation in Small-Scale Fishing

The analysis results in Table 5 show the factors influencing women's participation in small-scale fishing activities. For instance, the ages of women involved in small-scale fisheries vary, as seen in other economic activities.

Table 5

Determinants of Women's Participation in Small-Scale Fishing

Characteristics	Attributes	No of respondent (f)	Percent (%)
Age	15-24	14	9.2
	25-34	68	44.7
	35-44	38	25.0
	45-54	21	13.8
	55-64	7	4.6
	>65	4	2.6
Total		**152**	**100.0**
Level of education	Never attended	12	7.9
	Primary level	131	86.2
	Secondary level	8	5.3
	Tertiary level	1	0.7
Total		**152**	100.0
Marital status	Never married	15	9.9
	Married	42	27.6
	Divorced	84	55.3
	Widow	11	7.2
Total		**152**	**100.0**

The minimum age of the participating women was 18 years, while the maximum age was 78 years. Table 5 indicates that the largest group of respondents was aged 15 to early 50s, with the smallest group being women above their mid-50s. These findings suggest that women in their active working years, who are capable of engaging in productive activities, are more likely to participate in the fishery sector. This age group is more actively seeking employment, willing to take risks, and burdened with responsibilities, including dependents. As women age advances, their participation decreases due to declining physical activity and energy levels, coupled with an increased aversion to risk, which explains the lower representation of older women in small-scale fisheries.

Regarding education, Table 5 shows that most respondents had either primary education (86%) or no formal schooling (8%). This indicates that women in small-scale fisheries often have low educational attainment. While many may have completed primary education, financial constraints and other barriers likely prevented further education. Government policies such as Universal Primary Education (UPE) and the Musoma Resolution of 1974 improved access to primary education in Tanzania. However, secondary and tertiary education remained less

accessible due to high costs. As a result, many primary school graduates turn to fishing-related activities to sustain their families.

Additionally, Table 5 reveals that 72% of respondents were not married at the time of data collection, including those who were never married, divorced, or widowed. This suggests that unmarried women find it easier to participate in fishing activities compared to married women. Fishing beaches are reported to be challenging environments for married women due to the nature of interactions between men and women. Married women who did participate often had spouses also working at the beaches. In contrast, single women have greater freedom to choose jobs without requiring spousal approval.

Fertility levels, measured by the number of living children a respondent has, also play a role in women's labor force participation. The study examined this factor to better understand its influence on women's involvement in small-scale fishing activities, as detailed in Table 6

Table 6

Fertility Level of Respondents

No. of Children	No. of respondents	Percent (%)
1-3	92	60.5
4-6	44	28.9
>6	16	10.5
Total	**152**	**100**

Table 6 shows that the majority of respondents (61%) have fewer than four children. This correlates with the age data, which indicated most respondents are between 15 and 44 years old, suggesting they are younger mothers with fewer children. It was reported that having fewer children makes it easier for women to participate in fisheries activities. Conversely, more young children increase the burden on women, limiting their ability to engage in economic activities. As children grow older and more independent, their mothers also age and become less active, leading to fewer older women in fisheries.

Environmental security on fishing beaches significantly influences women's participation in fisheries activities. Most respondents (59%) reported a reasonable level of security in the study area. Security levels, however, vary between beaches. Malelema beach was reported to be the safest due to the nearby police posts at Bwisya Centre and community efforts to maintain peace through police jamii groups. In contrast, Bulubi beach was deemed the most unsafe, with frequent reports of rape and gang fights. The high population and lack of a police post at Bulubi contribute to higher crime rates, deterring women from working there, especially at night. Similar security concerns exist at Izinga beach due to the absence of police posts.

4.2 Econometric Analysis and Hypothesis Testing

A logistic regression model was used to assess the probability of women participating in small-scale fisheries (wfshs). The probability of participation was 1 if participate and 0 otherwise. The maximum likelihood estimation technique was used to estimate the value of the model. The final model included six independent variables, namely; age (age), education level (eduw), marital status (mart), fertility level (nchld), family income (income) and environmental security (secur). Table 7 shows the result of the analysis.

Table 7

Results of Logistic Regression and Marginal Effect

Wfshs	Coef.	Std. error	P>|z|	dy/dx
Age	-.00 72344	0322241	0.822	-.000359
Eduw	-.9155991	.8697217	0.292	-.0454339
Mart	-1.155189	.5066534	0.023	-.0573228
Nchld	-.0857155	.1107246	0.439	-.0042534
Incom	-3.485677	.8070448	0.000	-.4433691
Secur	2.667552	.756942	0.000	.1931639
_cons	7.378605	2.844552	0.009	

By considering the methods of testing significant variables in the logit model explained in the estimation technique section (3.8). These results show that on average a change in independent variables of the model (age, education level, marital status, number of children, income and environmental security) the probability of women labour force participation in small-scale fisheries will also change (95%).

The results in Table 7, shows that three variables were statistically insignificant, that is they had no influence to women's decision to participate in small scale fishing activities or otherwise. These were age of woman, with P- value 0.822; education of women (eduw) with P value 0.292 and fertility level (nchld) with P value 0.439. These results indicate that there was no relationship between women labour force participation in small-scale fisheries with age, education and fertility level (number of children). The finding accepts the null hypothesis that there is no relationship between women labour force participation in small-scale fisheries in Ukerewe District with age, education and number of children (fertility level).

These results concur with the work done by Dejene (2019) who found that fishermen did not care about education in the previous years because the fishing activity is just based on their experience, not education. In other words, education has no much effect on women participation in small-scale fishers. Education has an inverse relationship with labour force participation since as education level increases; people tend to leave the fishing sector. Additionally, in countries with traditionally more rigid gender roles, female education has less of an impact on female labour force participation; primary education has no effect or a negative effect on female labour force participation (Kus, 2017). Likewise, the study conducted by Kisusi et al. (2023) found that educational level neither influences community participation nor correlates with fishing aspect. The correlation coefficient of education level and fishing industry was found to be zero (R=0), which means there are no correlations between participation in fishing and education level.

Importantly, three variables of the model namely marital status (mart), family income (incom) and environmental security (secur) shown to be statistically significant.

Marital status (mart) has a P value0.023; this shows that the variable was statistically significant at 5%. These results suggest that a unit increase in marital status is associated with the probability of 0.06 decrease in women labour force participation in small-scale fisheries. In essence, these results suggest that being married decreases the chances of women participating in small-scale fisheries. These results concur with those of Siphambe and Motswapong (2017) who found that marriage impact negatively female labour force participation. That is married women reduce the chance of participating in the labour market when enter marriage and therefore their participation in the labour force decreases. This is because women are expected to spend more time taking care of the family. While single women have a high rate to participate in the labour force since most of them have less commitment, especially to family responsibilities (Siphambe & Motswapong, 2017).

Additionally, family income (income) was found to be statistically significant with a P value of 0.000 which was strong significant at 1%. These results suggest that a unit increase in family income is associated with 0.44 probabilities of decreases in women labour force participation in small-scale fisheries in Ukerewe District. This was actually telling us that, women's family income has a negative relationship with female labour force participation in small-scale fisheries. This means that, an increase in women's family income reduces women participation in small-scale fisheries and low family income increase women labour force participation in small-scale fisheries. This is because the increase in family income facilitates women in accessing all the essential needs. The result concurs with those of a study done by Hafeez and Ahmad (2022) who found that increase in household monthly income reduces the probability of women participation in the labour force market. Thus, the women living in more wealthy families are less likely to participate in the labour force markets and vice versa. Although the women's LFP decision is inversely and strongly influenced by the monthly income of the family, the magnitude of this effect is rather small.

Furthermore, this study found that environmental security (secur) was statistically significant with a P value of 0.000 which is strong significant at 1% as per results in Table 7. These results suggest that a unit increase in environmental security is associated with a 0.19 probability of an increase in women labour force participation in small-scale fisheries in Ukerewe District. These results were actually telling us that, women would prefer to work in an areas or beaches with a calm or secure environment unlike in those with hostile environment.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

This study highlights the significant role of women in small-scale fisheries in Ukerewe District, revealing their contributions, challenges, and factors influencing their participation. A majority of respondents (86%) reported that fishing is their main source of income, with 70% solely depending on it for their livelihoods. However, despite its importance, 44% of women expressed discomfort with working in the sector due to challenges such as low income, marginalization, and environmental insecurities. This finding underscores the paradox faced by these women, where economic necessity compels participation in an industry that offers limited financial and social rewards.

The study also found that women's roles in the fishery value chain are predominantly centered around low-paying tasks like fish processing and service provision, with limited engagement in capital-intensive activities such as fishing or boat ownership. This disparity is primarily attributed to financial constraints and limited access to resources, which prevent women from venturing into higher-earning activities. Consequently, 80% of respondents reported that their income from fisheries was insufficient to meet their basic needs and those of their families.

Several socio-demographic factors, including age, education level, marital status, fertility rate, and environmental security, were found to influence women's participation in small-scale fisheries. Younger, less-educated women, particularly those with fewer children and living in safer environments, are more likely to participate in fishing activities. The logistic regression analysis further confirmed that marital status, family income, and environmental security are significant determinants of women's labor force participation in the sector.

These findings resonate with broader regional and global studies, which point to the socioeconomic and environmental pressures driving women into fisheries as a means of survival rather than choice. They also highlight the need for targeted interventions to address the structural and financial barriers limiting women's empowerment in the fishing industry. Such interventions could include improving access to credit, enhancing security at fishing beaches, and promoting gender-inclusive policies to enable women to take on more prominent and lucrative roles within the fishery value chain.

In conclusion, while women in Ukerewe District play the indispensable yet underappreciated role in sustaining the small-scale fisheries sector, their contributions are often undervalued and constrained by systemic challenges, calling for comprehensive policy and institutional responses to enhance their productivity in order to improve their livelihoods and their families, equity, economic empowerment and ensuring the sustainability of the sector as whole.

5.2 Recommendations

To address the challenges identified and enhance the role of women in small-scale fisheries, the following recommendations are proposed by the study for policymakers:

Improve Access to Capital and Resources

Establish gender-sensitive microfinance schemes to enable women to invest in high-value fishing activities, such as owning fishing boats or engaging in fish trading. Furthermore, the provision of subsidized equipment and inputs for fish processing and preservation could lead to improved productivity and income.

Enhance Security and Working Conditions

Strengthening of security at fishing beaches by increasing police presence and establishing community-based policing initiatives can improve the participation of women in the fishing industry. Likewise, promotion of women-friendly infrastructure at fish landing sites, such as child care facilities, clean sanitation, and safe workspaces could equally increase women participation in the sector.

Invest in Education and Skills Development

Designing and implementing capacity-building programs tailored to women in fisheries, focusing on financial literacy, entrepreneurship, and sustainable fishing practices can undoubtedly uplift the involvement of women in the fishing industry. Additionally, provision of scholarships and incentives for women to pursue secondary and tertiary education, particularly in fisheries and related fields can equally increase the chances of women's involvement in the sector.

Address Socio-Cultural Barriers

Implementation of community sensitization campaigns to challenge gender stereotypes and promotion of the equitable distribution of roles in the fisheries sector can play greater role for women's participation in the fishing sector. Moreover, encouraging the formation of women's cooperatives to amplify their voices and bargaining power in policy discussions and market negotiations can greatly improve their involvement in the sector.

Enhance Livelihood Diversification

Promotion of alternative income-generating activities such as aquaculture, eco-tourism, or agro-processing to reduce overdependence on fishing and increase household resilience can improve women's sources of income and livelihoods thus be able to sustain themselves as well as their families. Additionally, initiatives like supporting women in accessing agricultural extension services to improve productivity in complementary sectors like farming

might be a good way for women's enhancement of their livelihoods diversification which can to improved income levels, both to individual women's and at family level.

Strengthen Policy and Institutional Frameworks

More importantly is the integration of gender-specific provisions in fisheries management policies to ensure equal opportunities and protection for women in the fishery sector. In addition, establishing monitoring and evaluation mechanisms to track progress in empowering women in small-scale fisheries and address emerging challenges might increase the chances of women's participation in the fishing sector.

By implementing these measures, policymakers can not only improve the livelihoods of women in small-scale fisheries but also enhance the overall sustainability and resilience of the sector in Ukerewe District and beyond.

5.3 Areas for further research

This study suggests that, future research could further explore the impact of policy interventions and community-based initiatives in empowering women within the fisheries sector in Tanzania.

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