

Contribution of Inshore Marine Fisheries and Household Welfare to the Wellbeing of Kilwa District Coastal Communities, Tanzania

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Abstract

Fisheries are vital for nutrition and livelihoods in coastal communities, yet their broader value chain contributions are often overlooked. This study examines how inshore fisheries support income generation along the south-eastern coast of Tanzania, focusing on Kilwa District. A sequential explanatory mixed-methods design was used, combining quantitative and qualitative approaches. Data were collected from 155 households in Masoko, Kivinje, and Somanga through structured questionnaires, along with 9 Key Informant Interviews (KIIs) and 3 Focus Group Discussions (FGDs). Qualitative data were analysed using thematic content analysis, while quantitative data were analysed using descriptive and inferential statistics, including Chi-square tests and binomial logistic regression. The results show that fisheries are a major source of income for most households and provide greater livelihood security than alternatives such as crop farming. However, many fisherfolk still earn insufficient income to support household welfare due to socio-cultural constraints that limit investment in improved livelihoods. The study concludes that strengthening the fisheries value chain is essential. It recommends that the government and stakeholders promote sustainable fisheries through supportive policies, awareness programmes, and improved value chain development.

Keywords: Household income; Fisheries; livelihoods; coastal communities; Income Generation

1.0 Introduction

Marine fisheries play a vital role in global food security, employment, and economic development, particularly in coastal and island nations where alternative livelihood opportunities are limited. According to the study by Muir and Allison (2006), fisheries are among the few sectors that provide reliable sources of income and protein to communities in areas with scarce employment opportunities. According to the 2021 report by the Food and Agriculture Organisation, fisheries contribute approximately 20% of the average per capita animal protein intake for over 3.3 billion people worldwide. Additionally, Fish also provide essential micronutrients for health and development (World Fish, 2022).

Despite their significance, marine fisheries productivity has declined due to overexploitation, habitat degradation, and climate change (Obura & Grimsditch, 2009; Mwaipopo et al., 2011; Thanh et al., 2020; Fathelrahman et al., 2018). Nevertheless, they remain a reliable source of livelihood for millions of poor households and continue to be the backbone of coastal economies (Jiddawi, 2002a; Taylor et al., 2021). Globally, the fisheries sector supports over 260 million people, the majority of whom are small-scale fishers engaged in inshore and nearshore fisheries (Ding et al., 2017).

In Tanzania, the coastal economy largely relies on small-scale marine fisheries, which account for nearly 97% of total fish production. The fisheries sector contributes to over 200,000 direct jobs and approximately 4.5 million indirect jobs in fish processing, marketing, boat building, and gear repair (URT, 2022). The sector contributes about 1.7% to the national GDP and about 25% of total animal

protein intake (FAO, 2021; URT, 2020). Despite these contributions, most studies and policy interventions have focused mainly on sectoral outputs such as total fish catch, resource management, and ecological sustainability, while neglecting analyses of how fisheries incomes are distributed and utilised within households. Consequently, there remains a limited understanding of the contribution of inshore marine fisheries to well-being, income diversification, and economic resilience among fishing-dependent communities.

To address this gap, this study examines the contribution of inshore marine fisheries to household welfare among coastal communities in Kilwa District, Tanzania. The goal is to generate evidence-based insights to guide policies and programmes for sustainable, inclusive fisheries-driven livelihoods in Kilwa District. Specifically, the study aims to investigate the contribution of fisheries-based activities to household incomes; Determine the factors influencing marine fisheries-based incomes at the household and community levels; and assess the influence of fisheries on other socioeconomic activities at household and community levels.

2.0 Literature review

Marine fisheries form a central component of livelihood portfolios in coastal regions, providing both direct and indirect employment opportunities and contributing substantially to income and food security. Chuenpagdee et al. (2006) conducted a comparative analysis of small-scale fisheries across developing countries using a review-based approach. The study established the significant role of small-scale fisheries in employment creation, revenue generation, and supporting household food security. Globally, the average marine capture has reached approximately 1.8 tonnes per fisher in 2019 (FAO, 2019, 2021). The studies stressed the importance of sustainable management of marine resources to improve and sustain household incomes.

In Tanzania, the national fisheries census report postulates that approximately 88% of the fish caught by small-scale fishers was consumed locally, while only 12% was exported. The report further shows that the fisheries sector contributes to more than 4.5 million direct and indirect jobs and accounts for about 25% of the total animal protein consumed nationally. The study report recognises weak fisheries infrastructure and limited market access as obstacles to increasing fishers' incomes.

Jiddawi (2002b) examined the artisanal fisheries sector along the Tanzanian coast through a descriptive survey involving coastal fishing communities in Zanzibar and mainland Tanzania. The study identified over 500 fish species exploited for subsistence and commercial purposes, with more than 95% of catches coming from artisanal fisheries. Additionally, the study found that fisheries support many people involved in processing, marketing, and equipment maintenance.

Robertson et al. (2018a) analysed fishing patterns along the Tanzanian coastline using cross-sectional data from selected fishing villages. The findings revealed significant variations in fishing practices depending on vessel type, gear used, and species targeted. The study concluded that spatial differences in fishing technology and access to resources contribute to income inequality among fishers and suggested that policy interventions should account for these geographic and technological disparities.

Further, Hamidu et al. (2012) conducted a socio-economic assessment of small-scale fisheries in the Lindi and Mtwara regions of Tanzania, using mixed methods, including household surveys and focus group discussions. The study found that fisheries-related activities, including fish trading and processing, are sources of income for women and youth. The study noted limitations in gender inclusiveness and in post-harvest handling facilities designed to reduce losses and increase earnings.

Josephraj et al. (2022) conducted a study on coastal livelihoods in South Asia using a sample of 300 artisanal fishing households. The study applied regression analysis to examine the relationship between resource dependency and household welfare. The results indicated that despite high engagement in fisheries, poverty remained prevalent due to overexploitation, limited access to capital, and exposure to climate-related shocks. The authors recommended financial inclusion programs and adaptive livelihood strategies to strengthen community resilience.

Similarly, Pradhan and Nayak (2023) analysed small-scale fisheries across selected Indian coastal districts using a household survey of 250 respondents and econometric modelling. Their findings

revealed that fisheries income positively influences household welfare but is highly sensitive to market volatility and environmental degradation. They recommended integrating fisheries management with social protection and livelihood diversification programs to enhance long-term welfare impacts.

Cinner et al. (2010) investigated differences between fishers and non-fishers in marine conservation areas of East Africa using household-level survey data from 450 respondents. The study found that artisanal fishers possess more extensive ecological knowledge than non-fishers but are generally poorer and more vulnerable to resource depletion. The authors concluded that knowledge alone does not guarantee improved welfare outcomes and recommended that conservation and development programs target household-level economic empowerment rather than focusing solely on resource management.

Mung'ong'o and Moshy (2019) examined coastal livelihoods in Tanzania through qualitative case studies conducted in selected coastal villages. The study found that while fisheries are vital for daily income and food security, there is limited evidence of fisheries income translating into improved household welfare due to unstable markets and a lack of financial literacy. The authors recommended that future studies focus on household-level welfare assessments and income utilisation patterns to understand the real impact of fisheries on livelihoods.

The studies reviewed thus far signify that marine fisheries play a critical role in sustaining livelihoods and household welfare across coastal regions. However, most of the existing literature in Tanzania and East Africa focuses on institutional and sectoral-level analyses, with limited attention to how fisheries income translates into improved household welfare. This study, therefore, fills that gap by assessing the contribution of inshore marine fisheries to both household and community-level welfare in Kilwa District, Tanzania.

2.1 Theoretical and Conceptual Background

This study is grounded in theories of household welfare and fisheries economics, which together provide a lens for understanding how inshore fisheries contribute to the well-being of coastal communities. The household welfare theory (Deaton & Muellbauer, 1980; Sen, 1985) stipulates that household well-being is determined by access to income-generating activities, resource endowments, and the capacity to allocate these resources efficiently to meet consumption and investment needs. In the context of coastal communities, fisheries serve as both a source of income and a safety net, shaping the economic resilience and overall welfare of households (Béné, 2003; Allison & Ellis, 2001).

From the perspective of fisheries economics, the contribution of fisheries to household welfare depends on factors such as fish stock availability, input-use, market access, and institutional arrangements that regulate resource extraction (Gordon, 1954; Schaefer, 1957; Anderson, 1977). These economic dynamics emphasise that household welfare depends on access to natural, physical, human, financial, and social capital (Carney, 1998; Allison & Horemans, 2006).

Building on these theoretical foundations, this study adapted and extended the framework proposed by Bladon et al. (2022) for factors affecting the income of offshore fishing households. While the original framework emphasised determinants of offshore fishing income, including characteristics of locality, fishery, demographics, socioeconomics, and sectoral stimulation, this study modifies it to reflect the inshore fisheries context of Kilwa District. Specifically, the revised framework (Figure 1) incorporates:

- i. Fisheries-based activities, including fish capture, processing, trading, and transportation, which jointly determine fisheries-derived income (Chen et al., 2020; Etongo & Arrisol, 2021; Pradhan & Nayak, 2023a). These activities are influenced by technological, environmental, and locational factors, including fishing gear diversity, vessel type (motorised or non-motorised), and proximity to landing sites.
- ii. Alternative livelihood sources, representing household diversification into non-fishing activities that buffer against income volatility and resource seasonality (Ellis, 2000; Cinner et al., 2010).
- iii. Policy, institutional, and ecological drivers, which shape the enabling or constraining

environment for fisheries livelihoods. Regulatory frameworks, resource management regimes, and climate variability influence both the productivity and sustainability of inshore fisheries (Fidelman et al., 2017; Ding et al., 2017; Silas et al., 2020).

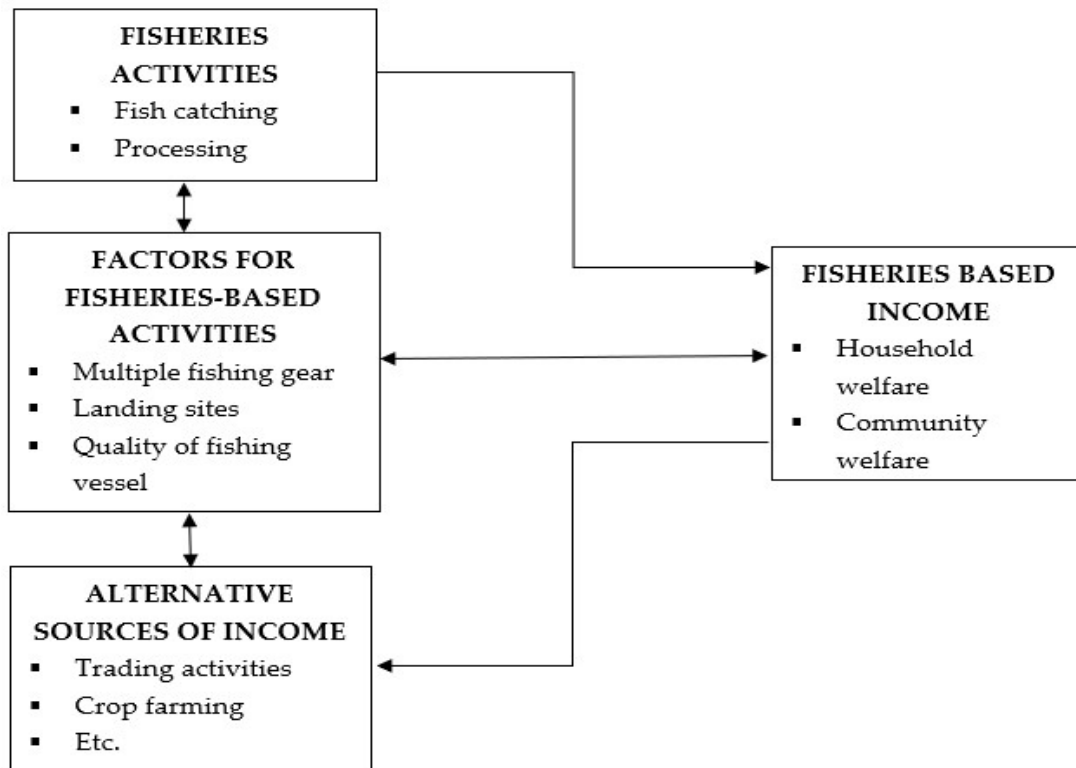


Figure 1: Conceptual framework for marine fisheries' role in household welfare. Adopted and modified from Hoang and Vu (2019)

3.0 Research Methodology

This study employs a simulation-based experimental design to assess the performance of cost-aware and predictive adaptive channel allocation techniques to mitigate interference in highly dense 802.11ax (Wi-Fi 6) networks. This process includes essential elements such as data collection, scenario sampling, data analysis, and methods for assessing the validity and reliability of the results.

3.1 Study Area

The study was conducted in Kilwa District, located in the Lindi Region of southeastern Tanzania. The region has a coastline of approximately 285 km and is rich in aquatic resources, including fish, crabs, shrimp, oysters, and seaweed. Kilwa's economy is dominated by artisanal fisheries, which serve as the primary source of food and income for local communities. The district hosts key fish landing sites, namely Kilwa Kivinje and Somanga, where fishers and traders engage in various fisheries-based activities.

3.2 Study Design

A mixed-methods cross-sectional design was employed to capture both quantitative measures of income and qualitative insights into livelihood dynamics. Quantitative data were collected through household surveys, while qualitative data were obtained through focus group discussions (FGDs), key informant interviews (KIIs), and direct observations. The mixed approach was used to enable triangulation and a deeper interpretation of results.

3.3 Sampling and Data Collection

The study population consisted of households engaged in inshore fisheries and related activities in three selected villages, namely Kivinje Singine, Somanga, and Masoko, located at varying distances from fish landing sites. The spatial selection aligned with the method designed to capture variations in fishing opportunities and market access stipulated by Cinner et al. (2010).

A total of 155 households were selected through simple random sampling from a population of 3,040 households (4.1%), an adequate sample for inferential analysis using confidence-based estimation (95% confidence level). Each household was represented by one adult member, preferably the head of household or an active fisher.

Three FGDs (one per village) and four KIIs (two at the district level, two at the community level) were conducted. To ensure diverse perspectives, participants were purposively selected based on experience, gender balance, and engagement in fisheries activities. To minimise selection bias, the inclusion criteria required participants to have at least three years of engagement in fisheries or related activities. FGD participants (4-12 members per group) included fishers, processors, traders, and local leaders.

3.4 Data Measurement of Variables

Key variables were operationalised as follows:

- i. *Household income*
Total income from all sources (fisheries and non-fisheries) reported in Tanzanian shillings (TZS) per month.
- ii. *Environmental awareness*
Measured through a composite index of five Likert-scale items assessing knowledge of climate effects, marine ecosystem conservation, and resource sustainability practices.
- iii. *Fishing education and experience*
Assessed through respondents' years of fishing experience and participation in fisheries-related activities.
- iv. *Fishing assets*
Evaluated through ownership of gear, vessel type, and motorisation status.

3.5 Data Analysis

Data analysis for this study combined qualitative and quantitative methods. Qualitative data were used to contextualise statistical findings, explaining observed income structure and livelihood behaviours.

Quantitative data were analysed using SPSS Version 26. Descriptive statistics summarised demographic and socioeconomic characteristics, while inferential tests examined relationships between variables.

A one-way ANOVA was conducted to test for differences in income across groups. Assumptions of normality and homogeneity of variance were tested using the Shapiro–Wilk and Levene's tests, respectively. Multiple linear regression was used to assess predictors of income-related variables. Model diagnostics were conducted to check for multicollinearity, heteroscedasticity, and residual normality. Qualitative data from FGDs and KIIs were analysed through thematic content analysis. The data were used to explain the observed quantitative relationships.

3.6 Data Validity and Reliability Considerations

Questionnaire pretesting was conducted with 10 households in a nearby unsampled village, and the findings were used to refine the clarity and relevance of the questions. Data reliability was ensured through enumerator training, daily field debriefs, and double-entry verification.

4.0 Findings and discussion

Of the respondents interviewed, 75.5% (N=117) were men and 24.5% (N=38) were women. The average age of the household head was 36.92 years, indicating a young population, with a standard deviation of

10.11 years. The average household size was 4.68 persons. 14.4% were born within the wards, whereas 85.6% migrated to the area for various reasons, including marriages (16%), following relatives (23%), and securing sources of income (61%), which is seemingly the leading cause among these. 13.5% had a membership in Beach Management Units (BMUs). These BMUs are responsible for the management and conservation of coastal and marine resources.

The households in the sample were mainly small-scale fisherfolk, whose fishing activities do not produce enough yield to sustain a household for a week. The majority use small, crude vessels and must go out to fish more often. About 11.6% of surveyed households experienced the sickness of a productive household member in the past 12 months. The households in the area have been experiencing climate shocks, including sea-level rise, frequent storm surges, high-temperature events, prolonged droughts, and coastal erosion. Sea-level rise, in particular, has reduced land area and led to household relocation.

About 1.1% of respondents engage in animal husbandry to some degree. 21.2% conduct trading-related activities, including kiosks, fish, and petty businesses, related to coastal and marine resources such as viamata and simbi. However, fisheries-related activities constitute the major part, which are well observed along the fish value chain, which comprises a wide range of actors. It is further noted that the major livelihood sources are climate-dependent, which exacerbates the impacts of climate variability and change.

4.1 Contribution of Fisheries to Household Incomes

The fish chain comprises a wide range of actors: fisher folks, carriers, auctioneers, processors and traders, among others (Table 1). The activities they perform support household livelihoods, including those engaged in the cold chain, those in the supply chain (such as petrol and gear suppliers), and boat owners. In our sample, about 57.3% (57.3%) were fisher folks, 4.3% (5) carriers, 1.7% (2) packagers 9.4% (11) frying driers, 0.9% (1) cold chain, 16.2% (19), consumers, 16.2% (19) retail 12% (14) whole traders and 0.9% (1) boat repairers. There was an inadequate cold chain, a situation that often leads to spoilage-related losses, particularly when the available infrastructure cannot meet demand.

Table 1: Proportion of respondents in the fish value chain

Fish value chain activities	Ward			Total
	Kivinje Singino	Masoko	Somanga	
Fisher folks	28 (23.9%)	28 (24%)	12 (1.2%)	67 (57.3%)
Fish carrying	4 (3.4%)	1 (0.9%)	0 (0.0%)	5 (4.3%)
Packaging	1 (0.9%)	1 (0.9%)	0 (0.0%)	2 (1.7%)
Drying (sun and frying)	3 (2.6%)	6 (5.2%)	3 (2.6%)	12 (10.3%)
Freezing (cold chain)	1 (0.9%)	0 (0.0%)	0 (0.0%)	1 (0.9%)
Consumers	8 (6.8%)	6 (5.1%)	5 (4.3%)	19 (16.2%)
Retail traders	5 (4.3%)	5 (4.3%)	9 (7.7%)	19 (16.7%)
Whole traders	2 (1.8%)	11 (9.4%)	3 (2.6%)	16 (13.7%)
Gear repairer	1 (0.9%)	1 (0.9%)	0 (0.0)	2 (1.7%)
Boat repairer	0 (0.0%)	1 (0.9%)	0 (0.0%)	1 (0.9%)
Total	47 (40.2%)	45 (38.5%)	25 (21.4%)	117 (100%)

Source: Field Data (2022)

When engagement in the fish value chain was determined by gender, males were observed to dominate the process as fisher folks, at 55.3%, 60%, and 48% in Kivinje Singino, Masoko, and Somanga, respectively (Figure 2). Some females also engaged in fishing at Kivinja Singino (4.3%). Women are observed to participate further at the subsequent stages post-fish catching in Kivinja Singino,

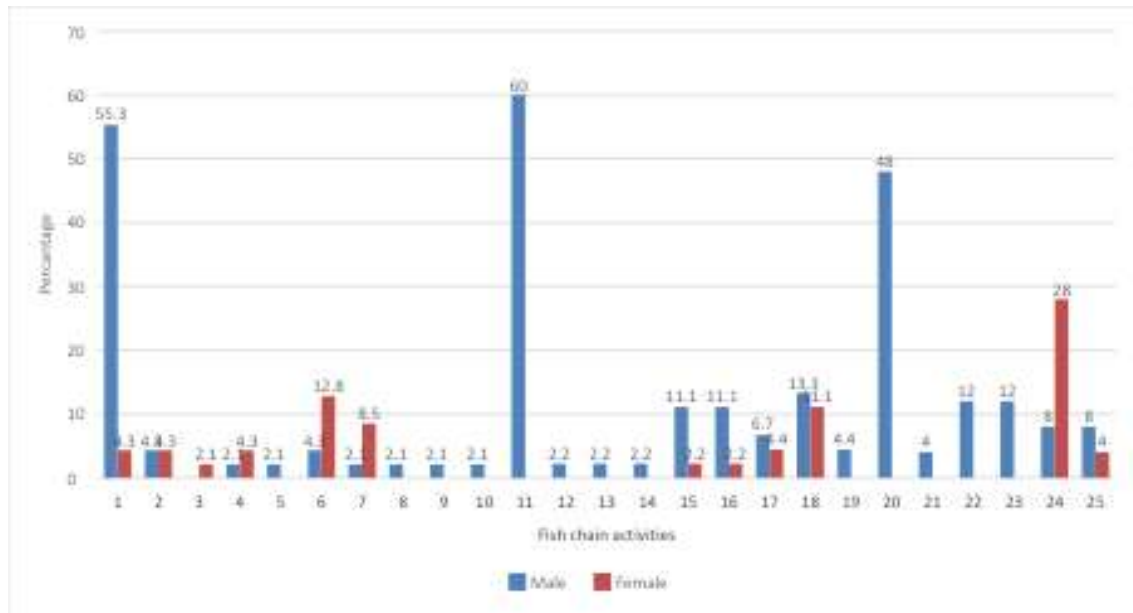


Figure 1 Proportion of respondents reporting engagement in FVC according to sex.

The focus group discussions revealed that auctioneers are an important link among different actors along the fish value chain. The Kilwa district council recognises their role. However, the key obstacle to auctions is bid callers' failure to adhere to auction guidelines. The lack of transparency can cause this inadequacy, leading to poor governance.

4.1.1. Engagement of fisheries and age

Figure 2 shows engagement in fisheries with age. The majority start fishing at ages 25-54 years (83.9%, N=130), followed by those aged 18-24 years (9.0%, N=14) across all wards surveyed. The 25-54 age interval is the most productive age range, in which the majority who engage in productive activities have completed various educational qualifications. Given the high levels of unemployment, support for this activity can address livelihood insecurity for many people, particularly in rural areas, and help alleviate unemployment. Nonetheless, people under 18 are also observed to engage in fishing activities to a lesser degree (1.3%, N=2). Chi-square test results show that there is no significant difference, however, in engagement in fish value chain activities among age groups ($P=0.878>0.05$). This result implies that all people in the villages can engage in fish value chain activities.

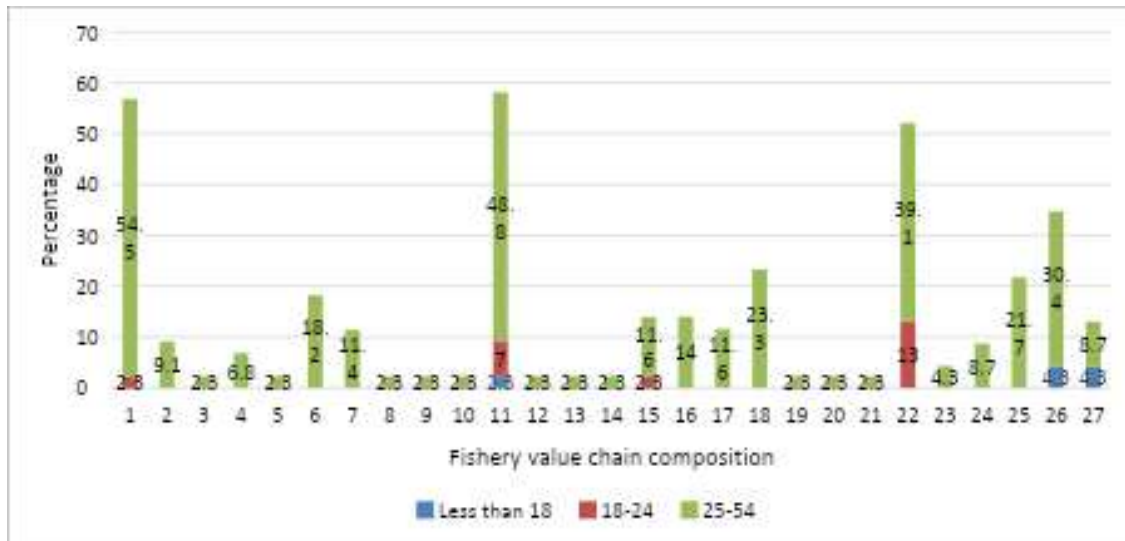


Figure 2 Proportion of respondents engaging in the FVC according to age

One-way ANOVA was used to compare fish incomes among actors in the fish value chain (Table 2). As expected, fisher folks earned about TZS 269,471.49 per capita, which appears to be the highest income among all actors in the fish value chain. However, this figure included the vessel owner who earns half of the revenues the boat generates. Note also that the single vessel can accommodate 12-15 fisher folks at a time. The rest of the chain earns as follows: suppliers of services and equipment (TZS 50750.00), processors (TZS 47875.00), traders (TZS 88000) and transporters (TZS 34400), among others.

Table 2 Fish incomes along the fish value chain actors

	Average income per fishing trip							
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Fisher folk	87	269471.49	831653.50	89162.61	92222.08	446720.91	0	5000000
Suppliers	4	50750.00	99510.05	49755.03	-107592.70	209092.70	0	200000
Processor	24	47875.00	58157.44	11871.34	23317.27	72432.73	0	200000
Trader	35	88000.00	251569.66	42523.03	1582.80	174417.20	0	1500000
Transporter	5	34400.00	64670.70	28921.62	-45899.29	114699.29	2000	150000
Total	155	180954.97	641335.96	51513.34	79190.97	282718.96	0	5000000

Source: Field Survey, 2022

4.2 Factors Influencing Marine Fisheries-Based Incomes

Binary logistic regression was used to explore factors influencing household-level fish income. The regression analysis indicated that fishing gear, markets, and environmental awareness are factors influencing engagement in fisheries value chain activities, with the overall motive being to increase income generation at the household and community levels (Table 3). According to discussions, environmental awareness can inform decisions to switch from a relevant activity, such as agriculture. The fishing community believes that it is riskier to engage in agriculture than in fisheries because

agriculture provides a more assured home income. Thus, fishing is a more lasting option than agriculture due to the seasonality of its income. Fishing gear has an odds ratio of 3.452, market constraints 0.441, and environmental education 1.888.

Table 3 Factors influencing fisheries incomes

Variables in the Equation	B	S.E.	Wald	Df	Sig.	Exp(B)
Membership in the coastal resource utilisation group	-.785	1.060	.548	1	.459	.456
Change of livelihood activity	-.275	.960	.082	1	.775	.760
Quality of fishing gear	3.452	1.757	3.861	1	.049	31.564
Marketing constraints	.441	1.516	.085	1	.771	1.554
Fishing education	-17.693	15086.4	.000	1	.999	.000
Environmental awareness	1.888	.954	3.913	1	.048	6.603
Accessibility of fish markets	-.135	1.228	.012	1	.913	.874
Climate change	-20.931	14617.0	.000	1	.999	.000
Constant	-2.526	3.235	.610	1	.435	.080

Source: Field Survey, 2022

The use of poor fishing gear is likely to influence the variations 31.564 times as much as modern equipment. The P value for adding inadequate fishing gear to the model is 0.049, which is less than 0.05, indicating that the variable is statistically significant. This value explains significant variation in the use of poor fishing gear in fishing activities and in fish incomes. Likewise, marketing constraints are likely to influence variations in fish value income by a factor of 1.554. However, since the P value for adding marketing constraints to the model is 0.771, which is > 0.05, this variable does not explain these variations. Nonetheless, the same applies to adding environmental education to the model, which yields an odds ratio of 1.888, indicating a 6.603-fold increase in the likelihood of influencing variations. A P value of 0.048 < 0.05 indicates that adding environmental education to our model has a significant effect.

Results from interviews and discussions further revealed other aspects, such as the lack of fishing gear, as a setback to the fisheries sector's breakthrough, as mentioned by respondents. This goes alongside high petrol prices, a lack of fishing gadgets, a lack of access to friendly and affordable financial services, and reliable markets. Respondents thought that the new harbour construction at Kilwa Masoko is likely to open new avenues for the transportation of fish products. Nonetheless, and in the same vein, for this to be meaningful, capacity building for the fishing community was deemed necessary. Accordingly, the presence of good and responsible governance, mediated by adequate institutional and policy frameworks, is imperative for the realisation of the fishing community's concerns.

4.2.1. Fishing vessel vs fish incomes

One-way ANOVA was used to deduce the number of fish caught by the fishing vessel. Table 4 shows the amount of revenue per fishing vessel. An engine-powered boat generated TZS 295,953.85 per fisherfolk, followed by small, engine-powered boats at a lower level (TZS 208,041.67). Apparently, the engine-powered boats seem to generate higher incomes than some other crude vessels,

Table 4 Fish revenues per fishing vessel

	N	Mean (TZS)	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimu m (TZS)	Maxim um (TZS)
					Lower	Upper		
					Bound	Bound		
Boat engine	65	295953.8	845445.3	104864.6	86462.74	505444.9	0	5000000
Small boat	24	208041.6	809513.6	165241.2	-	549869.2	0	4000000
Dhow	9	43111.11	61180.97	20393.66	-3916.75	90138.97	0	200000
Canoe	24	68000.83	122863.5	25079.41	16120.11	119881.5	0	530000
Dinghy	5	136000.0	206440.0	92322.80	-	392329.2	15000	500000
N/A	28	39928.57	45145.80	8531.75	22422.86	57434.28	2000	200000
Total	155	180954.9	641335.9	51513.34	79190.97	282718.9	0	5000000

Source: Field Survey, 2022

4.2.2. Multiple fishing gear vs fish catches

To explore catch diversity among fishing vessels, a cross-tabulation was conducted using multiple response analysis. There were mixed results, both suggesting no significant difference between the diversity of fishing vessels and that of the fish species caught. In Figure 3, both vessel diversity and the quality of a vessel determine the diversity of fish species caught per fishing trip, depending on the zones where fishing activities are conducted. This is due to the concept of overfishing, which is inherent in the majority of fisher folks, as perceived by respondents. Nonetheless, engine-powered boats also had a high chance of catching a wide variety of species because they could reach the deep sea, where many fish species are found.

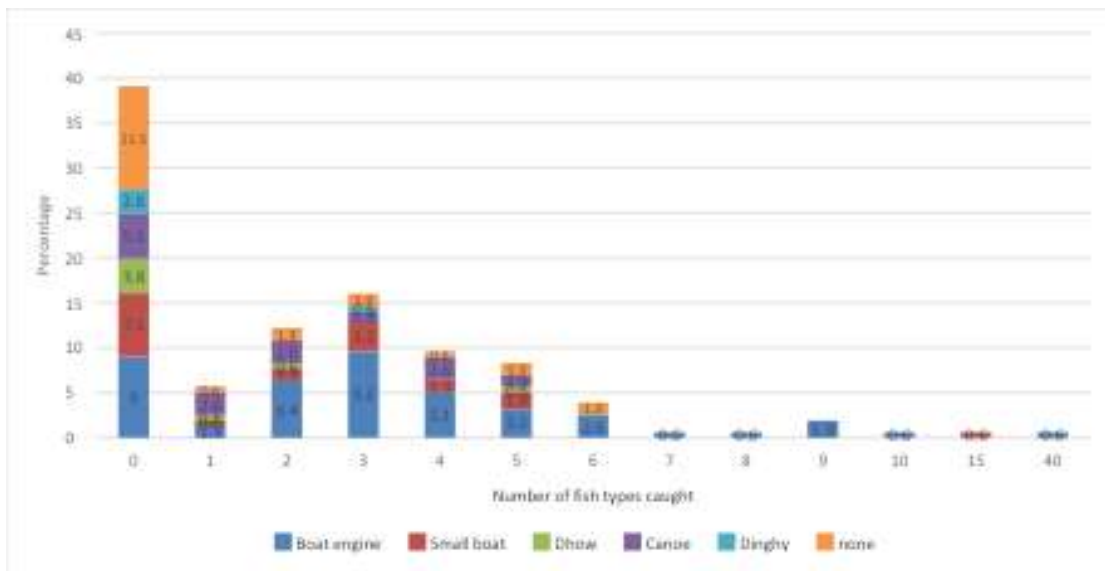


Figure 3 Diversity of fish species against the diversity of vessels

Role of Fishing in Influencing Other Socioeconomic Activities at the Household Level

4.3.1. Fish incomes vs investments: alternative livelihood sources

Respondents were asked about the sources of capital for investing in alternative livelihood sources. The fisheries-based incomes were used to establish trading activities, provide medical treatment, and meet basic household needs. On the other hand, income from trading activities is also used to cover medical expenses, building construction, and the purchase of fishing gear (Figure 4). Apparently, fish income drives monetary circulation in the area, with primary capital for community-scale investments sourced from fisheries-based activities. This result is consistent with the results from discussions and interviews in the area.

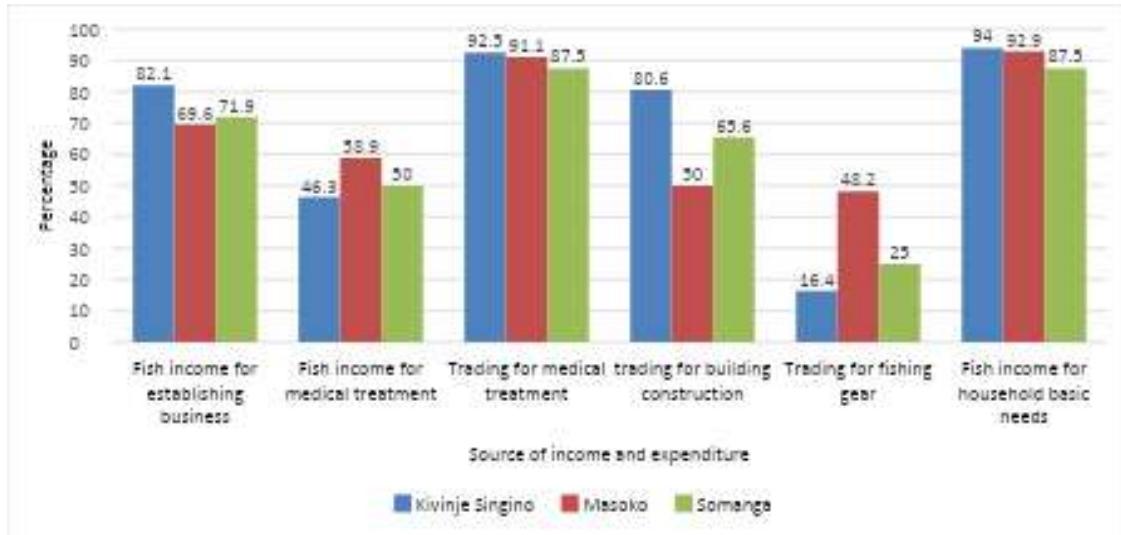


Figure 4 Sources of revenues for different investments. Source: Field Survey, 2022

4.3.2. Remoteness of fish landing sites vs fish income

To assess the effect of remoteness on fish revenues, a one-way ANOVA was used to compare the three sites based on their distance from the main transport infrastructure and the fish revenues collected (Table 5). Results show that Kivinje Singino had relatively higher revenues per vessel, with the highest at TZS 5,000,000, while Somanga had the lowest, with the highest at TZS 2,000,000. Note that Somanga was more remote from the main road, whereas Kivinje Singino was proximal to the main road and the cold chain in particular. However, the F value for the test was 0.751, with a corresponding P value of 0.473, which is > 0.05, implying that the difference is not statistically significant.

Table 5 Effect of remoteness on fish revenues

Average income per fishing trip								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Kivinje Singino	67	255000.30	806711.97	98555.55	58227.79	451772.81	0	5000000
Masoko	56	180375.00	590953.39	78969.47	22116.65	338633.35	0	4000000
Somanga	32	26937.50	42650.82	7539.67	11560.24	42314.76	0	2000000
Total	155	180954.97	641335.96	51513.34	79190.97	282718.96	0	5000000

Source: Field Survey, 2022

Apparently, fisheries in the area have been vital in creating direct and indirect jobs, but in the current state of affairs, this is compounded by a lack of recognition of their vital role. However, remoteness has

implications for investment decisions, particularly where to locate capital. According to FGD results, people tend to invest their money in locations where they are guaranteed to optimise returns and where monetary circulation is high. Financial services, in particular, are not sufficiently supportive to prevent the fishing community from falling further into poverty or to pull them out of poverty. More often, fisher folks are subjected to informal financial services that enslave them to the poverty cycle. A respondent was quoted as saying the following words:

“This lady lent me TZS 400,000/= with an agreement that I have to pay TZS 10,000 daily as long as I stay with that money until I take it back to her TZS 400,000. So, I have to ensure the money generates an adequate profit margin so I can settle the amount as per the agreement. I am forced to do this because I have no option”. Recorded on 21/10.2021.

Despite the nature of the loan itself, as noted in this quotation above, this implies that women can have higher incomes than men, which refutes the previous perceptions that tend to view women as having a lower income status than men. Nonetheless, respondents had different opinions about the improvement of the fish value chain, including increasing accessibility to markets, including necessary equipment and cold chains, high-quality vessels for deep fish fishing, as well as the construction of social services infrastructures around the market area and improving emergency rescue operations for managing emergent disasters and risks. Accordingly, reducing the distance between the landing sites and the market area was deemed necessary to reduce the likelihood of losses and transportation costs. This also entails bringing transport services closer to the fish landing sites.

5. Discussion

5.1. *Fisheries Contribution to Household Income*

The findings of this study reveal that fisheries play a crucial role in sustaining household incomes in Kilwa District, but the benefits are unevenly distributed along the value chain. Fishers earn the highest income per trip among processors, traders, and service providers, a pattern consistent with findings from Jeppesen (2014) and Fathelrahman et al. (2018). However, despite relatively high earnings, welfare gains remain limited due to poor financial management, a lack of a savings culture, and high daily expenditures. This aligns with Cinner et al. (2010), who characterised artisanal fishers as one of the most economically vulnerable social groups despite their active engagement in income-generating activities.

The study shows that income stability is not the only determinant of welfare improvement; the behavioural and institutional factors are also very critical. The findings also suggest that financial literacy and access to capital are key constraints to transforming fisheries income into sustainable welfare outcomes. This is due to the persistence of subsistence-oriented fishing practices and low investment in productive assets. These findings align with those of Yanda et al. (2019), which highlighted the growing importance of fisheries in local economies under environmental stress.

5.2. *Factors Influencing Fisheries Income*

Consistent with previous studies (Malakar et al., 2018; Robertson et al., 2018b), the quality of fishing gear, vessel type, and market access emerged as significant determinants of fisheries income. The findings show that, in Kilwa, both motorised and non-motorised vessels coexist even in semi-urban settings, suggesting that local socioeconomic conditions shape fishing capacity differently from the national or global patterns observed elsewhere. Such heterogeneity calls for place-specific policy responses rather than uniform national interventions.

The results further support Cinner et al. (2009), who argue that technological adaptation in resource-dependent societies can mitigate environmental constraints but may also introduce new sustainability challenges. The limited adoption of modern fishing vessels in Kilwa constrains productivity and deep-sea access, aligning with the findings of Fathelrahman et al. (2018) that technological advancement, such as vessel modernisation, is a significant driver of income growth in small-scale fisheries. However, the study also highlights a critical knowledge gap: fishers' awareness of climate change impacts on resource availability remains low, implying that fishery resource-use decisions are reactive rather than adaptive, leaving them vulnerable to ecosystem changes.

Market dynamics also shape fisheries income outcomes. Similar to findings by Etongo and Arrisol (2021) and Pradhan and Nayak (2023b), this study shows that limited cold storage, poor transport networks, and weak value chain linkages constrain local market conditions in Kilwa. As a result, fishers are compelled to sell at lower prices in local markets rather than accessing more lucrative urban or export markets. The implications are clear: strengthening market infrastructure and logistics systems would not only improve earnings but also reduce post-harvest losses.

5.3. *Influence of Fisheries on Alternative Livelihood Activities*

The study's findings affirm that inshore fisheries stimulate diversification into alternative livelihood activities such as trading, transport, and food vending, an observation consistent with Obura et al. (2017), Yanda et al. (2018), and Fischer (2018). These interlinked activities enhance livelihood security and reduce dependence on a single income source, supporting Ellis's (2000) argument that diversification is a key strategy for stable livelihood warfare.

However, the findings also point to spatial inequalities: households in remote landing sites face limited access to profitable markets, poor infrastructure, and higher transaction costs, all of which limit welfare gains. These findings align with Woller's (2011) observation that remoteness and high transport costs contribute to economic marginalisation in coastal economies. Improving rural transport and communication infrastructure, therefore, emerges as a vital policy priority to enhance the value of fisheries and promote equitable welfare outcomes across communities.

5.4. *Broader Implications*

Overall, this study contributes to the growing body of literature linking fisheries economics with household welfare by emphasising the micro-level mechanisms through which fisheries affect well-being. The findings suggest that income from inshore fisheries, while substantial, does not automatically translate into improved welfare without enabling institutional and behavioural conditions. Policymakers should thus integrate fisheries development with financial inclusion, capacity-building, and infrastructure investment to ensure that fisheries-based livelihoods contribute effectively to poverty reduction and local economic transformation.

From a broader perspective, this study highlights the need to reposition small-scale fisheries within national development frameworks, not merely as a food security sector but as a viable driver of coastal economic resilience. Future research should explore longitudinal impacts of fisheries income on household welfare, gender-specific livelihood pathways, and the role of adaptive governance in promoting sustainable marine resource use under climate stress.

6. Study Limitations

The study's cross-sectional design limits causal inference; findings reflect associations rather than cause-and-effect relationships. Seasonal variations in fishing yields were not captured due to time constraints. Reliance on self-reported income introduces possible recall bias. Additionally, purposive selection of participants for FGDs and KIIs, while necessary to represent expertise, may introduce subjective bias. Additionally, purposive selection of participants for FGDs and KIIs, while necessary to represent expertise, may introduce subjective bias. The sample size (4.1% of total households) restricts generalizability, though findings remain contextually valuable for understanding household welfare in inshore fisheries communities.

7. Conclusion

This study examined the contribution of inshore marine fisheries to household welfare in coastal communities in Kilwa District, Tanzania. The findings demonstrate that inshore fisheries play an important role in sustaining household livelihoods by providing both direct and indirect income opportunities. Activities across the fish value chain, such as catching, processing, trading, and service provision, collectively enhance household income diversification.

However, the study also revealed structural and behavioural constraints that limit the full welfare benefits of fisheries. Traditional fishing practices, low technological adoption, and inadequate

access to financial and market infrastructure hinder productivity growth. Furthermore, weak financial literacy and limited savings culture among fishers undermine their ability to convert fisheries income into long-term welfare gains.

The results highlight the need for policies that go beyond resource management to address the social and economic dimensions of fisheries development. Strengthening access to financial services, improving fishers' financial management capacity, and promoting technology adoption could enhance productivity and ensure that fisheries income translates into improved welfare outcomes.

Broadly, these findings contribute to the broader discourse on sustainable livelihoods in coastal economies by showing that economic transformation in fishing communities requires an integrated approach that combines resource sustainability, financial inclusion, and household-level empowerment. Future research should build on this work by exploring gender dynamics, intra-household decision-making, and the long-term welfare impacts of fisheries-related interventions across different coastal regions of Tanzania.

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