Contribution of Artisanal Fisheries Potentials on Household Livelihoods in Zanzibar, Tanzania

Subira Muumin Ali[1], Odass Bilame[2] & Deborah Ngusa[3]

Abstract

This paper reports on the contribution of the potentials of artisanal fisheries on household livelihoods in the five fishing villages from Zanzibar, namely, Kizimkazi Dimbani, Chwaka, Unguja Ukuu Kaepwani, Tumbe Mashariki and Michenzani. Cross-sectional research design was employed to generate quantitative data through a questionnaire survey and qualitative data were drawn through Focus Group Discussions (FGDs) and key informant interviews. Data were drawn from a sample of 333 artisanal fishers. Inferential statistics such as chi-square test and binary logistic analysis to assess the association between potentials of artisanal fisheries and household livelihoods. The study results found that, potential of artisanal fisheries has a significant association with household livelihoods and majority of respondents (79%) fall under low household livelihoods outcomes. It was found that high household livelihood was significantly associated with fishers who use fibber boats (p=0.0066), motorised fishing vessel (p=0.0409), acquired formal fishing knowledge and skills (p=0.0277) and those who were members of fisheries cooperatives (p=0.0059). It is therefore recommended that the respective government in collaboration with other fisheries stakeholders should address the impinging factors when designing the intervention for household livelihoods of the artisanal fishers.

Keywords: Artisanal fisheries, fishing villages, household livelihood, potentials of artisanal fisheries and Zanzibar Islands.

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[1]Corresponding author, Institute of Development Studies, the University of Dodoma, Tanzania. Email: mwamusu@yahoo.com
[2]Professor, Institute of Development Studies, the University of Dodoma, Tanzania
[3]Institute of Development Studies, the University of Dodoma, Tanzania.

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1. Introduction

Artisanal fisheries significantly contribute to the livelihoods of millions of households (FAO, 2020b). About half of the global annual marine catches are from artisanal fisheries. More than 120 million people worldwide depend directly on artisanal fisheries and fisheries-related activities (FAO, 2020c). About 47 million of these people reside in developing countries. Artisanal fishers and local coastal communities depend on the ocean and coastal ecosystem for their livelihoods (Cohen *et al*., 2019; Winfield, 2019). Artisanal fishers, who account for more than half of total global fishery output, continue to be among the most marginalised groups (Spencer, 2021).

Furthermore, households of artisanal fishers in developing countries are characterised by persistent poverty and food insecurity (FAO, 2020c). Yet, they are underestimated, uncounted, and lack the required recognition in policies and plans. In some places, they are hidden in national fishery statistics (Zelasney *et al.,* 2020; Teh *et al.,* 2020). As such, in many developing countries, there is inadequate empirical information concerning the position of artisanal fisheries in household livelihoods (Béné & Friend, 2011; Teh *et al.,* 2020). Thus, it is crucial to guarantee artisanal fisheries an equal economic, political and physical involvement in the blue economy. The blue economy will only contribute towards sustainable development goals when the social dimensions and specific characteristics of artisanal fisheries are addressed and considered closely (Ayilu *et al.*, 2022). An obvious expectation is that artisanal fisheries would contribute to fishers' household livelihoods through increased income, social services, housing conditions, savings and access to valuable assets.

In Zanzibar, artisanal fishery plays an important role in the national economy. It provides employment, income, and is a major source of protein (Ochiewo, 2016). Zanzibar, which is a part of the United Republic of Tanzania, has two major islands, Unguja and Pemba, with other small islets (Said & Tanova, 2021). The territorial waters which are the main fishing area is about 4,450 km^2 and 12 miles from the shore (Myers *et al.*, 2021). However, artisanal fishing activities commonly occur within 5 miles from the shore while the fishing vessels used by the artisanal fishers are small (Horsley *et al.*, 2015). The dominant fish species found include large, medium and small pelagic and coral reef fish like emperors, parrotfish, snapper, octopus, lobsters, groupers and squid (Sekadende *et al.*, 2020). Most artisanal fishers in Zanzibar are poor. They use traditional fishing vessels and gears like outriggers canoes and sailing boats with few planked outboard engines (Morales & Horton, 2014).

Many coastal populations have been engaged in artisanal fisheries as their primary occupation for earning their livelihoods (Department of Fisheries Development, 2020). It is documented that artisanal fishers lack alternative employment and source of income for their household livelihoods mainly due to the low level of education (FAO, 2020b). Fishery resources have declined in Zanzibar due to overfishing of marine fisheries resources over the past decades (Rocliffe & Harris, 2016). The annual catch has been declining by 4% each year since 2010 (Hampus *et al.*, 2010). Several studies show that the main factors for declining fisheries and deteriorating conditions of coral reefs are overexploitation of fisheries, destructive fishing gear used, growing population, intensive seaweed

farming, indiscriminate mangrove cutting for tourism development, lack of enforcement of fisheries regulation and environmental degradation (Benansio & Jiddawi, 2016). However, there has been a dearth of empirical literature to ascertain the contribution of artisanal fisheries for the household livelihoods of artisanal fishers in Zanzibar. This article addresses the shortage by informing the contribution of artisanal fisheries to household livelihood outcomes in the five selected fishing villages in Zanzibar.

1.1 Literature Review

In developing countries, artisanal fisheries are low budgeted and of low national priority because they are not considered as a significant part of the country's economy (Chuenoagdee & Jentoft, 2019). Consequently, funds to improve the conditions of the fisheries are not readily available (FAO, 2022). Artisanal fisheries are very crucial in developing countries for livelihoods, socio-economic development and poverty reduction. It was estimated that, artisanal fishery is responsible for about half of the global annual marine catches and more than 120 million people worldwide depend directly on artisanal fisheries and fisheries-related activities like trading and processing (FAO, 2020). The recognition of artisanal fisheries in developing countries has a major concern on livelihoods, food security and creation of wealth (Malorgio *et al.,* 2017). The FAO Advisory Committee on Fisheries Research (ACFR) working group on artisanal fisheries stated that artisanal fisheries make an important contribution to poverty reduction, nutrition, food security, and sustainable livelihoods particularly in developing countries (Sangün *et al*., 2018).

African artisanal fisheries have a great contribution in addressing livelihood challenges (FAO, 2018). Also, artisanal fisheries are important for the food security of more than 200 million people, and for the employment of around 2.3 million fishers contributing 44% of the total catch and 48% of the total landed value to the continent's fisheries production (Onyango & Akintola, 2020). Moreover, it was estimated that 200 million Africans rely on fish as their primary source of protein and important micronutrients for their household livelihoods (AU - IBAR, 2019). For instance in Sierra Leone, fish accounts for 80% of the animal protein intake (Sei, 2011), in Senegal 75% of animal protein consumed is fish and the annual per capita fish consumption is 26kg, compared to the global average of 16kg (Harper & Sumaila, 2019).

The artisanal fisheries of Tanzania comprise the majority of the coastal populations whose survival is entirely dependent on coastal fishery resources (Techera, 2020; Temple *et al*., 2018). The artisanal fisheries provide food, income and livelihood for hundreds of millions of people, especially for the poorest households with limited access to land and other livelihood alternatives (Mills *et al*., 2011; Silas *et al.*, 2022). The United Republic of Tanzania is among of the East African countries which are gifted with water resources, sharing three of the largest inland lakes in Africa namely; Lake Victoria, Lake Tanganyika and Lake Nyasa, diverse river systems, numerous wetlands, and the Indian Ocean (Berachi, 2003). The artisanal fisheries mostly operate in shallow waters within the continental shelf

with coral reefs and seagrass beds, extending to approximately 4km offshore using traditional fishing vessels such as canoes, outrigger canoes, dhow and dinghies (Hamidu, 2014; Jiddawi & Öhman, 2002; Kittinger, 2013). Also, traditional and simple fishing gear such as nets, traps and hooks are applied in artisanal fishing, restricting to depths of 30m (Jiddawi & Öhman, 2002).

In Zanzibar, artisanal fishing is the main economic activity in most coastal villages. It contributes the socio-economic wellbeing of coastal communities through income and food security (Mutayoba & Mbwete, 2013). Artisanal fishing villagers use fisheries for their livelihoods and subsistence like foods, shelter and health services (Nilsson *et al.*, 2019). Fish is not only a key source of protein to Zanzibar diet, but also contribute to livelihoods in households of coastal rural communities (Phelan & Stewart, 2008).

3. Materials and Methods

3.1 Study Location

The study was conducted in Zanzibar. Zanzibar is a part of the United Republic of Tanzania (URT). Zanzibar is a combination of two Islands; Unguja and Pemba. Five fishing villages from Zanzibar Islands were studied include; Kizimkazi Dimbani, Chwaka and Unguja Ukuu Kaepwani from Unguja Island, Tumbe Mashariki and Michenzani from Pemba Island. The total area of Zanzibar Islands is 2,643 km^2 whereby Unguja 1,658 km^2 and Pemba has 985 km^2 (OCGS, 2020). The five fishing villages were purposively selected for the study because they hold the official fish landing sites among 235 landing sites found in Zanzibar and artisanal fishing is the supreme livelihood activity (Department of Fisheries Development, 2020; Stanek, 2015).

3.2 Study Design

This study used a cross-sectional research design and applied both qualitative and quantitative data which were generated at a single point in time (Sekaran & Bougie, 2016). The design provided a comprehensive analysis of the research problem by investigating how the contribution of artisanal fisheries is related to household livelihoods in the study area (Kumar, 2011). The design also allowed a simultaneous investigation of multiple variables in this study (Baryman, 2008).

3.3 Population and Sample Size

With a discussion on study population, a sample of 333 from 1991 artisanal fishers (household heads) of five fishing villages was determined through Yamane's formula of 1967 (as cited in Sarmah*et al.*, 2013). Thereafter, the stratified proportional allocation method was applied to obtain an equal representation of the 333 artisanal fishers from each of the five selected fishing villages (stratum) under study and the proportionated samples were: 30 Kizimkazi Dimbani, 80 Chwaka, 72 Unguja Ukuu Kaepwani, 98 Tumbe Mashariki and 53 Michenzani. This method is widely used to determine a sample

with a higher degree of precision (Fayose & Adebara, 2018). Finally, simple random sampling was applied to select 333 artisanal fishers from each of the five villages by using a lottery method. The artisanal fishers of each village were given numbers drawn from their registration list provided by the beach management unit officers and the pieces with numbers were put in a box and shuffled to mix. Thereafter, the researcher randomly picked numbers from the box to select the required representative proportionated samples of each village under study. This technique was used because it is simple and avoids bias (Cohen *et al.,* 2007). Table 1 presents the summary of the study population and sample size.

Table 1: Summary of the Study Population and Sample Size Distributions

Locations	Category of the Study Locations					Total
	Kizimkazi Dimbani	Chwaka	Unguja Ukuu Kaepwani	Tumbe Mashariki	Michenzani	
Population	180	478	430	587	316	1991
Sample	30	80	72	98	53	333
Percentage	9.1	24.0	21.6	29.4	15.9	100.0

Source: (RoGZ, 2020)**,** modified by authors

3.4 Data Collection

Data were generated through questionnaire survey, focus group discussions, and key informant interviews. The triangulation method created accurate, comprehensive and enriched data. It helped to balance information and distinctly differentiated data regarding the contribution of artisanal fisheries on household livelihoods. It also offered an opportunity to integrate data analysis and interpretation (Almalki, 2016).

3.5 Study Variables

Dependent variable: Household livelihoods

The outcome variable of this study was computed from 17 questions of four domains which are social services, savings, housing conditions, and valuable assets and one question of income. All variables had two responses which codes 1=Yes and 0=No, except the variable of income. The variable income had four categories 1=less than 100000 per work, 2=100000-199999,3=200000-300000 and 4=>3000000. Respondents who had income of 200000+ were coded 1 while those who had income of less than 200000 were coded 0. The composite score of 17 questions and one additional question of income which dichotomized was computed. The composite score had possible minimum score of 0 and possible maximum score of 18. Respondents who scored less than 9 which is 50% were coded 0 and regarded to have low likelihood while those who scored 9 and above were coded 1 and regarded as having high likelihood.

Independent Variables

Potentials of artisanal fisheries were the independent variables of this study that include *financial*; access to loans, *physical;* fishing vessels, gears and technologies, *natural;* fishing grounds, fish species and time in fishing, *human;* fishing knowledge and skills and *social*; markets and cooperatives.

3.6 Data Analysis

The qualitative data were subjected to thematic analysis to generate findings. This involved processing the data collected through key informant interviews and FGDs. In assessing the quantitative data regarding the study subject, basic descriptive statistics such as frequency and percent were used to describe the sample and the characteristics of the respondents. Since the outcome variable had two responses (0=Low household livelihood 1=High household livelihood), Chi square test of association was first employed to test association of categorical predictors and household livelihoods. Binary logistic regression model was then used to determine factors associated with high household livelihood among artisanal fisheries. The general logistic regression model is given as:

$$\log it[\pi(x)] = \log\left(\frac{\pi(x)}{1-\pi(x)}\right) = \beta_0 + \beta_1 x_1 + \ldots\ldots + \beta_p x_p$$

where, $\pi(x)$ is the likelihood of the household to have high livelihood: $x_i's$ are set of independent variables and $\beta_i's$ are their respective parameters. The results of the model are presented in the form of regression parameter estimates and estimated odds ratios (OR). Model Results of both unadjusted and adjusted odds ratio were presented so as to help unpack how the adjustment affects the impact of the outcome variable. The estimated OR, determined by taking the exponent of the regression parameter estimates, shows the increase, or decrease in the likelihood of the household to have high livelihood at a given level of the independent variable compared to those in the reference category. An estimate of OR > 1 indicates that the likelihood of the household to have high livelihood at a given level of the independent variable is greater than that for the reference category. Similarly, an estimate of OR<1 specified that the chance of having high household livelihoods for household at a given level of the independent variable is less than that for the reference category.

4. Results and Discussions

4.1 Demographic Characteristics

Demographic characteristics are vital variables because they described the basis for the interpretation of the study findings. The respondents' demographic characteristics considered for this study include age, sex, levels of education, marital status and household size.

4.1.1 Age of the Respondents

With respect to study finding regarding the age of respondents, Table 2 reveal that out of 333 fishers, 41.44% of the respondents were aged between 18 and 35 years, 185(55.56%) aged between 36 and 60 years; and 10(3.00%) were aged above 60 years. This indicate that all the respondents under study were in productive age group.

4.1.2 Sex of the Respondents

This study reveals that, a majority of the respondents, i.e., 331 equivalents to 99.40% were male and only 2(0.60%) were female (Table 2). The highly noted dominated male artisanal fisheries in all five villages of study have been due to the fact that the work needs energy similarly observed in Tema fishing Accra, Ghana (Sandra, 2021) and Lake Tanganyika fisheries Kigoma, Tanzania (Bilame, 2013).

4.1.3 Respondents' Levels of Education

It was found that out of 333 sampled respondents, 195 (58.56) had acquired secondary education, 110 (33%) had primary education and 28 (8%) were completely illiterate with formal education (Table 2). This finding indicates that there is a significant number of respondents who abandon schools and drop out from secondary school to engage in artisanal fisheries. Supporting, Sundaram *et al.* (2018) reported that fishing is an open access livelihood activity in coastal areas. It does not need high levels of education and specialized skills; therefore, fishers' have their traditional ways of learning and is handled from generation to generation.

4.1.4 Marital Status of the Respondents

Marital status of respondents is very important in understanding respondents' household livelihoods. This is due to the fact that a household is a basic unit and institution which determines the livelihood activities that individuals pursue in order to be self-sufficient. Table 2 reveal that, 93.99% of the respondents were married. Very few respondents 16 (4.8%) were single and these were some young males aged between 18 and 20 years. Respondents who were divorced and widowed are insignificant to total study population.

4.1.5 Household Size of Respondents

The study found that, 115 (34.5%) were households with less than 5 family members, followed by 193 (58%) who had 6-10 members. Only 25 (7.5%) of respondents had family members sized above 10. Thus, the study findings demonstrate that most of the respondents had extended family or large family and a large family is associated with a high dependency ratio to household heads (Bongaarts, 2001).

Table 2 presents the demographic characteristic of the respondents involved in this study.

Table 2: Demographic Characteristics of the Respondents (n = 333)

Variable Description	Frequency (n)	Percent (%)
Age		
18- 35	138	41.44
36- 60	185	55.56
Above 60	10	3.00
Total	**333**	**100.00**
Sex		
Male	331	99.40
Female	2	0.60
Total	**333**	**100.00**
Level of Education		
No formal education	28	8.41
Primary Education	110	33.03
Secondary Education	195	58.56
Total	**333**	**100.00**
Marital Status		
Single	16	4.80
Married	313	93.99
Divorced	3	0.90
Widowed	1	0.30
Total	**333**	**100.00**
Household Size		
Less than 5	115	34.53
5-10	193	57.96
Above 10	25	7.51
Total	**333**	**100.00**

Source: Field Survey, 2022

4.2 Contribution of Financial and Physical Potentials of Artisanal Fisheries on Household Livelihoods

Results of Pearson Chi Square Test

The results of the Chi-Square test presented in Table 3, which examines the association between financial and physical potentials of artisanal fisheries, and household livelihoods revealed that there was a statistically significant association between the type of fishing vessels and household livelihoods (p=0.0029*). Artisanal fishers who use dhow had a highest (41.67%) representation among households with high household livelihoods followed by those who use fibber boat (30.93%). Besides, the number of fishers per fishing vessel showed a statistically significant association with household livelihoods (p = 0.0320*). Fishing vessels with less than 6 fishers were more prevalent among households with high livelihoods.

Table 3: Association between Financial, Physical Potentials of Artisanal Fisheries, and Household Livelihoods (Results of Chi-Square Test), n=333

Variable	Low N(%)	High N(%)	Chis	p-Value
Total	**264(79.28)**	**66(20.72)**		
Access to loans				0.2817
Not accessed	254(79.13)	67(20.87)		
Accessed	10(83.33)	2(16.67)		
Fishing vessels, gears and technologies				
Type of fishing vessels				0.0029*
Canoe	156(85.71)	26(14.29)		

Variable	Low N(%)	High N(%)	Chis	p-Value
Outrigger canoe	34(80.95)	8(19.05)		
Fibber Boat	67(69.07)	30(30.93)		
Dhow	7(58.33)	5(41.67)		
Type of fishing gears				0.2950
Nets	74(77.89)	21(22.11)		
Traps	85(84.16)	16(15.84)		
Lines	71(79.78)	18(20.22)		
Spears	34(70.83)	14(29.17)		
Ownership of fishing vessels			0.3338	0.5634
Not own	170(78.34)	47(21.66)		
Own	94(81.03)	22(18.97)		
Ownership of fishing gears			0.0255	0.8730
Not own	52(80.00)	13(20.00)		
Own	212(79.10)	56(20.90)		
No. of fishers per fishing vessel			4.6010	0.0320*
Less than 6	218(81.65)	49(18.35)		
Above 6	46(69.70)	20(30.30)		
Application of ICT			1.1196	0.2900
Not Applying	193(80.75)	46(19.25)		
Applying	71(75.53)	23(24.47)		
Motorisation of fishing vessels			1.8688	0.1716
Motorised	106(75.71)	34(24.29)		
Non- motorised	158(81.87)	35(18.13)		

Source: Field Survey, 2022

Moreover, Chi-square test was performed to assess the association between the natural, human and social potentials of artisanal fisheries, and household livelihoods. As presented in Table 4, it was observed that, household livelihood outcome has statistically significant with the acquisition of fishing knowledge and skills (p=0.0062) and memberships in fishers' cooperatives (p=0.0005). High household livelihoods were observed with the fishers acquired fishing knowledge and skills from formal institutions (32.84%). Again, high household livelihood was observed among fishers who were members of the fishers' cooperative (35.14%).

Table 4: Association between Natural, Human, Social Potentials of Artisanal Fisheries, and Household Livelihoods (Results of the Chi-square Test), n=333

Variable	Low N(%)	High N(%)	Chis	p-Value
Total	**264(79.28)**	**66(20.72)**		
Fishing grounds, fish size and time consumed in fishing				
Fishing grounds of respondents			1.5294	0.2162
Inshore waters	217(78.06)	61(21.94)		
Offshore waters	47(85.45)	8(14.55)		
Time spent per fishing trip			4.1022	0.1286
Less than 6 hours	75(72.82)	28(27.18)		
7-10 hours	154(81.48)	35(18.52)		
10 hours and above	35(85.37)	6(14.63)		
Fishing knowledge and skills				
Fishing knowledge and skills acquisition			7.4942	0.0062*
Inherited	219(82.33)	47(17.67)		
Formal institutions	45(67.16)	22(32.84)		
Capacity building programs			0.5382	0.4632
Not Attended	241(79.80)	61(20.20)		

Variable	Low N(%)	High N(%)	Chis	p-Value
Attended	23(74.19)	8(25.81)		
Markets and cooperatives				
Market area of fish catch			2.7778	0.4272
Village market	156(79.59)	40(20.41)		
Town market	47(83.93)	9(16.07)		
Both village and town market	9(64.29)	5(35.71)		
At the landing site	52(77.61)	15(22.39)		
Customers of fish catch				0.7458
Home consumers	7(70.00)	3(30.00)		
Fishmongers	183(79.22)	48(20.78)		
Fishmongers and home consumers	71(80.68)	17(19.32)		
Hotels	3(75.00)	1(25.00)		
Terms of selling fish catch				0.1101
Cash basis	263(79.70)	67(20.30)		
Both cash and credits	1(33.33)	2(66.67)		
Members of any fishers' cooperative			12.0339	0.0005*
Non-members	216(83.40)	43(16.60)		
Members	48(64.86)	26(35.14)		

Source: Field Survey, 2022

The Results of Binary Logistic Regression Model

In this analysis, only independent variable with ($p<0.2$) in chi-square test results were included. Based on the results of the Binary Logistic Regression Analysis presented in Table 5, which examines the contribution of artisanal fisheries potentials on household livelihoods, the following were observed.

The type of fishing vessels, specifically the use of fibber boats demonstrated a statistically significant association with household livelihood in both unadjusted (OR = 2.7, p = 0.0012*) and adjusted analyses (AOR = 4.4, p = 0.0066*). fishers utilizing fibber boats had significantly higher odds of having high livelihood compared to households using canoe.

The number of fishers per fishing vessel showed a statistically significant association with household livelihood in the unadjusted analysis (OR = 1.9, p = 0.0339*). However, in the adjusted analysis, the association became non-significant (AOR = 1.9, p = 0.0800).

Besides, the motorisation status of fishing vessels did not show a statistically significant association with household livelihood in the unadjusted analysis. However, in the adjusted analysis, household with motorised fishing vessels had significantly higher odds of high livelihood outcomes (AOR = 3.0, p = 0.0409*).

Acquiring fishing knowledge and skills through formal institutions and from fellow fishers showed a significant positive association with household livelihood in both the unadjusted analysis (OR = 2.3, p = 0.0071*) and the adjusted analysis (AOR = 2.1, p = 0.0277*). This implies that households with formal training and knowledge transfer from experienced fishers are more likely to have high livelihood.

Moreover, membership in fishers' cooperatives exhibited a significant positive association with household livelihood outcomes in both the unadjusted analysis (OR = 2.72, p = 0.0007*) and the

adjusted analysis (AOR = 2.44, p = 0.0059*). This indicates that households belonging to fishers' cooperatives have a higher likelihood of improved livelihood.

Table 5: Results of the Binary Logistic Analysis of the Contribution of Artisanal Fisheries Potentials on Household Livelihoods

Variable	Unadjusted analysis		Adjusted analysis	
	OR [95% CI]	P-value	AOR [95% CI]	p-value
Type of fishing vessels				
Canoe	Ref		Ref	
Outrigger canoe	1.4[0.59,3.39]	0.4398	1.2[0.47,3.14]	0.6863
Fiber boat	2.7[1.48,4.88]	0.0012*	4.4[1.51,12.57]	0.0066*
Dhow	4.3[1.26,14.52]	0.0194	2.9[0.65,12.79]	0.1640
Fishers per vessel				
Less than 6	Ref		Ref	
Above 6	1.9[1.05,3.56]	0.0339*	1.9[0.93,3.79]	0.0800
Motorisation of fishing vessels				
Non-motorised	Ref		Ref	
Motorised	1.4[0.85,2.44]	0.1728	3.0[1.05,8.48]	0.0409*
Time spent per fishing trip				
Less than 6 hours	Ref		Ref	
7-10 hours	0.6[0.35,1.07]	0.0870	0.6[0.31,1.10]	0.0901
10 hours and above	0.5[0.17,1.21]	0.1153	0.6[0.20,1.64]	0.3030
Fishing knowledge and skills Acquisition				
Inherited	Ref		Ref	
Formal institution and from fellow fishers	2.3[1.25,4.15]	0.0071*	2.1[1.09,4.12]	0.0277*
Terms of selling fish catch				
Cash basis	Ref		Ref	
Both cash and credits	7.85[0.70,87.88]	0.0945	2.51[0.18,34.66]	0.4930
Membership in fishers' cooperatives				
Non-members	Ref		Ref	
Members	2.72[1.53,4.86]	0.0007*	2.44[1.29,4.60]	0.0059*

Source: Field Survey, 2022

5. Conclusion and Recommendations

This study has successfully established that a majority of fishers 264(79.28%) had low household livelihoods derived from artisanal fisheries compared to only 66(20.72%) of fishers who had high household livelihoods obtained through their artisanal fisheries. Furthermore, the study has revealed that potentials of artisanal fisheries and household livelihoods were statistically significant associated ($p<0.05$). With this respect, fishers who used fibber boats were significantly more likely to have high household livelihood as compared to those who used canoes (AOR=4.4, p=0.0066). Regarding the motorisation of fishing vessels, fishers whose vessels were motorised seem to be significantly more likely to have high household livelihoods as compared to those who used non-motorised vessels (AOR=3.0, p=0.0409). On fishing knowledge and skills, those fishers who acquired fishing knowledge and skills from formal institution and from fellow fishers were significantly more likely to have high household livelihood (AOR=2.1, p=0.0277) compared with those who acquired inherited fishing knowledge and skills. Regarding membership in fishers' cooperative, fishers who were members in

fishers' cooperatives were significantly more likely to have high household livelihood as compared to their counterparts (AOR=2.44, p=0.0059).

It is therefore suggested that fisheries management decisions are taken these four factors in steps, ultimately for building household livelihoods flexibility and involvement of artisanal fishers in decision making for sustainable artisanal fisheries that will spearheading the ongoing transformation of the Zanzibar blue economy. Thus, the productive and sustainable artisanal fisheries for household livelihoods is inevitable, hence most of the respondents operate in inshore waters while greatest marine resources exist in offshore, deep territorial and internal waters that remain unexploited. This results into low levels of artisanal fishers' household livelihoods and national economy at large.

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