International Journal of Fisheries and Aquatic Research
www.fishjournals.com
ISSN: 2456-7248
Received: 11-01-2026; Accepted: 10-02-2026; Published: 25-02-2026
Volume 11, Issue 1, 2026, Page No. 50-54

Socio-economic assessment of capture fishermen in Jebel Aulia and El Mawrada, Khartoum state, Sudan

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Abstract
Small-scale fisheries play a significant role in food security and livelihood sustainability in Sudan; however, limited information exists regarding the socio-economic conditions of fishermen in Khartoum State. This study aimed to assess the socio-economic characteristics of capture fishermen in Jebel Aulia and El Mawrada areas. A structured questionnaire survey was conducted with 49 fishermen to collect data on demographic characteristics, educational level, marital status, employment type (full-time or part-time), fishing experience, ownership status, seasonal catch and income patterns, training exposure, and technical skills in fishing practices.

The results indicated that fishing is predominantly a male-dominated occupation, with most fishermen falling within the economically active age group. Educational attainment was generally low to moderate, and the majority were married with large household sizes. Most respondents depended on fishing as their primary occupation, with significant seasonal variation in catch volume and income. Limited access to formal training programs and modern fishing technologies was observed. Ownership patterns showed a mixture of self-owned and shared fishing assets. Income instability during off-seasons posed a major socio-economic challenge.

The findings highlight the need for targeted policy interventions, including capacity-building programs, access to credit facilities, improved fishing technologies, and institutional support to enhance productivity and livelihood sustainability. Strengthening the socio-economic resilience of fishermen in Khartoum State is essential for improving fisheries management and contributing to local food security.

Keywords: Socio-economic status, small-scale fisheries, fishermen livelihoods, seasonal income variation, khartoum state, sudan

Introduction

Fish plays a vital role in feeding the world's population and contributing significantly to the dietary protein intake of hundreds of millions of the populace on a global scale. Almost 16 percent of total average intake of animal protein was attributed to fish in 1998 (FAO, 2003) [1].

A socio-economic condition is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Chambers, 1992) [2]. A probabilistic study on the socio-economic status of the fishermen community of the river-side villages of River Churni was conducted during 2012. A total sample of respondents was 240 families and only the main earning member was considered as respondents. A pre-tested interview schedule was used for the collection of information after conducting a preliminary survey to construct a clear idea about the status of fishermen on riverside areas. The result of the study revealed that most of the responded were belonging to the Hindu community (58.75%) besides Muslims (37.91%) and others. About 50.83% of total respondents were found to belong under the age group above 19yrs and below 40 years. About 36.25% were belonging to the Scheduled caste category. Illiteracy was found one of the major problems of the studied area as about 34.16% respondents were found to be illiterate Using of very simple equipment's or gears for fishing were found among the fishermen (Panigrahi *et al*., 2014) [3]. The results of the study revealed some interesting facts and showed that most of the involved fishermen are in 16-30 years age group (45%) whereas the majority of them were Hindu (62%). About 75% of the fishing community was illiterate and 24% was literate (Das *et al*., 2013) [4]. Social data showed that male fishermen group was dominant in both sites (97.6%, 100%) respectively. Age groups of fishermen ranged between 20 and 70 years; where age group 31- 40 years was dominant in Jebel Aulia and age group 41-50 was dominant in El-Mawrada. Six educational categories were recorded where primary education was dominant in the two locations (48.8%, 44.4%) respectively; whereas, secondary education was the second in the two locations (24.4%) and (27.8%) respectively. Part-time fishermen were dominant in both sites (34.1%, 11.1%) whereas full-time fishermen were the lowest (4.9%, 16.7%). Most of the fishermen were married (85%, 94%) in both sites; whereas unmarried fishermen were the lowest (14%, 5.6%). As regards to the fishermen's other activities results showed that most of them were not practicing any other activities (97.6%, 88.9%). Category of the business owner was dominant. Data showed that experience groups of fishermen in Jabel Aulia and El Mawrada fishery ranged between 5 to 40years. Where experience group 6 - 15yr was dominant in Jebel Aulia and group more than 35years was dominant in El- Mawrada Experience group more than 35 years had the highest percentage in both sites. Most of the fishermen in both sites did not get any training course (100%, 100%), except the fishermen of El- Mawrada who obtained some training in fish extinction (5.6%). Concerning fisher's ownership, the results showed that owner list was dominant in both sites (85.4%, 66.7%) whereas, rent ship in both was the second

(21.4%), (16.7%) (Ahmed *et al*., 2015) [5]. The present study was carried out to assess the livelihood status of the traditional fishing community of Meghna Riveadjacent to Narsingdi District from September 2015 to March 2016. Data were collected through the well-structured questionnaire survey from Noyapara, Diaspora, Birpur and Boiddamara char close to Meghna River. A total of 100 fishermen were selected randomly for interview. The findings of the study revealed some interesting facts and showed most of the fishermen was Hindu (63%) belonging to the age of 24-45 years. Almost 71% of the fishermen were illiterate (Bhuyan and Islam, 2016) [6]. A probabilistic study on the socio-economic status of the fisherman community of a village in Dharwad district was conducted during 2007. A total sample of respondents was 57 families and head of the family was considered as respondent for collection of the data in addition to the head of the fisherman co-operative society. The pre-tested interview schedule was used for a collection of the information from the fisherman community. The results of the study revealed that the male population constituted around 52.33 percent indicating the dominance of males in the fisheries sector. Amongst the total fishermen's only13.84 percent were found to be literate. 45.78 percent of the population falls under the age group of fewer than 20 years and the total earning population constituted around 56.60 percent. The dominance of the male population was evident in all the categories indicating that fishing and related activities are the domain of males (Basavakumar *et al*., 2012) [7]. This study was conducted to evaluate the socio-economic analysis of artisanal fisher folks in Ogun Waterside Areas, Ogun State using structured interview guides to collect primary data randomly from eighty respondents in four fishing communities (Béné *et al.,* 2016) [8]. In fishing season. The results reveal that almost average (53.8%) of the fisher-folks were males while 81.2% were in the active age distribution of 20-60 years, no formal education (60.0%) while 37.5% are in the bracket of 11-20 years fishing experiences, married (91.3%) and (68.8%) are not members of any fisher cooperative societies (Osagie, 2012) [9]. The present study was conducted to evaluate the livelihood status of the fishing community of the Kirtonkhola River adjacent to the Barisal town during the period from April to November 2011. The investigation was conducted on Bella, Rasulpur and Amanatganj area of the Barisal town adjacent to the river using a structured questionnaire. It was found that most of the fishermen belonged to the age groups of 31 to 40 years (56.00%), represented by 88% Muslim. The family size of the fishing community usually consists of 5-6 members and medium family is the predominant (70%) among the fishermen but in a joint family (84.00%). Over 80% of the fishermen primary occupation was fishing, 10% was engaged in agriculture and daily labour activities respectively (Swanson and Rajalahti, 2010) [10].

Fish and fisheries is an important sector of most of the developing and developed countries of the World from the standpoint of income and employment generation (Panigrahi *et al.*, 2014) [3]. Like any other countries of the world, rivers, reservoirs and aquaculture are the main sources of inland fisheries in Sudan. The socio-economic cultural environment like consumer behavior, traditional knowledge of fishing techniques, the historical presence of fishing communities all add to productivity. The natural fisheries of Sudan are divided into two main sectors; the inland fisheries (freshwater fisheries) and the marine fisheries of the Red Sea. The inland fisheries are composed of the main Nile and its tributaries which are 6500 km long. There are reservoirs formed due to dam's construction on the rivers; such as Jebel Aulia reservoir on the White Nile, Rosaries and Sennar reservoirs on the Blue Nile, Setat reservoir on Atbara River and Marawe reservoir on River Nile and Nubia Lake, which is the Sudan portion on Nasir Lake. It lies in the northern part of Sudan, and it was formed by the construction of the Egyptian high dam south of Aswan. It is the richest source of fish in the Main Nile inside Sudan, in addition to the Sud region at upper White Nile (Awad Elkarim, 1999) [11].

Khartoum State covers an area of 21000km^2 and the fish storage in it is estimated around 15,000 tons. But the amount exploited is not more than one thousand tons. The fish production is found in the fisheries inside Khartoum State in Jabal Awlia, Kalakla, Fetiah Al-Agaleen, Al-Murada, the island of Al-Fitihab, Al-Sagai, Al-Sabalwaga and Al-Jeriaf area on the Blue Nile (Abdal Mutalib, 2000) [12].

Khartoum State is characterized by being artisanal in general the method and fish gears of fishing did not find their chance to be modernized effectively. Add to that there are not enough means of storing, refrigeration and simple transportation (Ministry of Agriculture, 2004) [13].

Problems of the study

There is insufficient information about the fishermen socio-economic status in Khartoum state.

Significance of the study

Fishermen are part of society and important component in capture fisheries, where they work to provide their sustainability. Therefore, it is necessary to get knowledge about the economic, social and technical aspects of the fishermen community.

Objectives

The main aim of this study was to shed light on the socio economics characteristics of the fishermen in Jebel Aulia and El Mawrada at Khartoum State. Sudan.

Materials and Methods

1. Study area

Jebel Aulia fishery is in Khartoum state and its southern part locates at 32˚27′45.95″ E and 15˚27′19.6″ N with elevation 375m; whereas, its northern part locates at 32˚28′41.65″ E and 15˚30′17.3″ N with elevation 381m. A distance from Al-Kalakla fishery to the capital of the state is 100 km and bearing 29˚.

2. Data Collection

Raw data of this study were gathered through a questionnaire during winter season 2022. The questionnaire was designed to provide essential socio-economic information related to: fishing occupation, fishermen tribes, education levels, owing fishing gear, learning fishing job, ways of fishing used, training programs, time spending in fishing and fishing license. 49 fishermen were questioned 19 from El Mawrada and 30 from Jebel Auila.

3. Data analysis

Descriptive analysis was done for analyzing the raw data of the study by using Excel Microsoft Software 2016 and SPSS v. 16.

Results and Discussion

Total 49 fishermen were interviewed and it was reported that the socio-economic condition of fishermen using the survey indicators like gender, age distribution, educational level, social status, marital status, full or part time work, social activity, job activity, experience in fishers, training programmers, owner, catch by season, income by season, fishing craft and skills and knowledge in fishery Figure 1.

Table 1: Distribution of fishermen according to their age

Age	Jebel Aulia		El Mawrada	
	N	%	N	%
Less than20	2	6.7	1	5.3
21-30	10	33.3	3	15.8
31-40	6	20	4	21.1
41-50	6	20	4	21.1
51-60	1	3.3	4	21.1
More than 60	5	16.7	3	15.8

Table 1. showing the age composition of fishermen in two sites, social data showed that age groups of fishermen in Jebel Aulia fishery ranged less than 20year 7.3%. Age group 21-30year had the lowest percentage as 17.1%; whereas, age group 31-40 year was the dominant.(22%), followed by age group 41-50 year (19.5%) and age group 22 51-60 year (19.5%) and more than 60 year (14.6%), in El Mawrada fishery ranged less than 20yr(5.6%),age group 21-30(0%),age group 31-40 year (22.2%), age group 41-50 year (16.7%) age group 51-60 year (27.8%) and more than 60 year (27.8%) this result is agree with results of (Minar *et al*., 2012) [14]. whose reported that age group of 21- 30 years was the highest (33.3%) in Jebel Aulia while in and El Mawrada 15.8% and 31-40 years was the lowest (20.00%) in Jebel Aulia while is highest in and El Mawrada (21.1%).

Table 2: Distribution of fishermen according to their educational level

Educational level	Jebel Aulia		El Mawrada	
	N	%	N	%
Illiterate	6	20	1	5.3
Khalwa	1	3.3	3	15.8
Primary	11	36.7	7	36.9
Secondary	9	30	8	42.1
University	3	10	0	0
Above university	0	0	0	0

The results showed for educational levels in Table 2. Were, general educational level illiteracy (20%),in Jebel Aulia while was (5.3%) in El Mawrada, Khalwa (3.3%) in Jebel Aulia, while was (15.8%) in Al Mawrada, Primary was (36.7) in Jebel Aulia while was (36.9%) in Al Mawrada, secondary was lower (30%) in Jebel Aulia, while higher (42.1%) in El Mawrada, University education was dominate in Jebel Aulia (10%) while, (0%) in Al Mawrada. This result is disagree with (Minar *et al*., 2012) [14] who's reported that most of the fishermen are illiterate (80%).

Table 3: Distribution of fishermen according to their experience in fishers

Experience	Jebel Aulia		Elmawrada	
	N	%	N	%
Less than 5 year	3	10	3	15.8
6 – 15	11	36.7	6	31.5
16 – 25	9	30	3	15.8
26 – 35	2	6.7	4	21.1
More than 35	5	16.7	3	15.8

From the Table 3. Experience period frequencies of fishermen in the two fishing area, the highest percentage was 6-15 years (36.7%), (31.5%) in Jebel Aulia and El Mawrada respectively and the lowest was 26-35 years 6.7% in Jebel Aulia. These result was disagree with (Ahmed *et al*., 2015)[5]; FAO, 2006)[15] reported that experience group more than 35 year had the highest percentage as 26.8%in Jebel Aulia and 38.9% in El Mawrada; followed by experience group 6-15 year (29.3 %) in Jabel Aulia and in El Mawrada (27.8%).

Table 4: Distribution of fishermen according to their catch by season

Catch by season	Jebel Aulia		ELMawrada	
	N	%	N	%
Less than 5 ton	1	3.3	0	0
5 – 7 ton	0	0	0	0
7 – 9 ton	0	0	0	0
More than 9 ton	29	96.7	19	100
Income (Sudanese pound)				
Less than 1000	1	3.3	0	0
1000 – 1500	0	0	0	0
1501 – 2000	1	3.3	0	0
2001 – 2500	0	0	0	0
More than 2500	28	93.3	19	100

Table 4. Show the distribution of fishermen according to their catch by season in the two sites. More than 9 ton was the highest percentage reported about 100% in El Mawrada and (96.7%) in Jebel Aluia and the lowest (0%) reported in the group ranging 5 – 7 ton and 7 – 9 ton in the two fishing area. This result was disagree with result of (Ahmed *et al*., 2015) [5] whose stated that category of less than 5 kg by season was dominant (100%) but the other categories had (0%). The rate of income of fishermen frequencies in the two sites. Income rate by season. The highest percentage (93.3%) in Jebel Aulia was income in the range more than 2500 and the lowest (0%) was income in the range 1000 – 1500 in the two sites. The income by season was increase in Jebel Aulia and decrease in El Mawrada.

Table 5: Distribution of fishermen according to their fishing craft

Fishing craft	Jebel Aulia		El Mawrada	
	N	%	N	%
Boat	22	73.3	4	21.1
Vessel	4	16.7	14	73.7
Lynch	2	6.7	1	5.2
Other	1	3.3	0	0

The result of distribution of fishermen according to their fishing craft using in fishing in the two fishing area in Table 5. The highest percentage of fishermen using boat 73.3%, Jebel Aulia and vessel 73.7% in El Mawrada. The lowest was lynch (5.2%) in El Mawrada. Most fishermen were using boat and vessel in the two sites.

Table 6: Distribution of fishermen according to their skills and knowledge in fishery

skills and knowledge in fishery	Jebel Aulia				El Mawrada			
	Yes	%	NO	%	Yes	%	NO	%
Fishing gear	25	83.3	5	16.7	17	89.5	2	10.5
Fishing graft	20	90	10	10	0	0	0	0
Fishing time	26	86.7	4	13.3	18	94.8	1	5.3
Fishing season	28	93.3	2	6.7	19	100	0	0
Fish marketing	27	90	3	10	18	94.8	1	5.3
Fishing area	27	90	3	10	19	100	0	0
Fish processing	25	83.3	5	16.7	17	89.5	2	10.5
Commercial species	30	100	0	0	18	94.8	1	5.2

The skills and knowledge in fishery in Table 6. above show the Distribution of fishermen according to their skills and knowledge in fishery in the two sites. The highest percentage of fishermen say yes they wear with commercial species was 100% in Jebel Aulia and 94.8% in El Mawrada. The lowest say No is fishing graft was (0%) in El Mawrada.

The result obtained from this stud clearly indicated that most fishermen in the two sites have knowledge in fishing gear, fishing graft, fishing time, fishing season, fish marketing, fishing area, fish processing and commercial species.

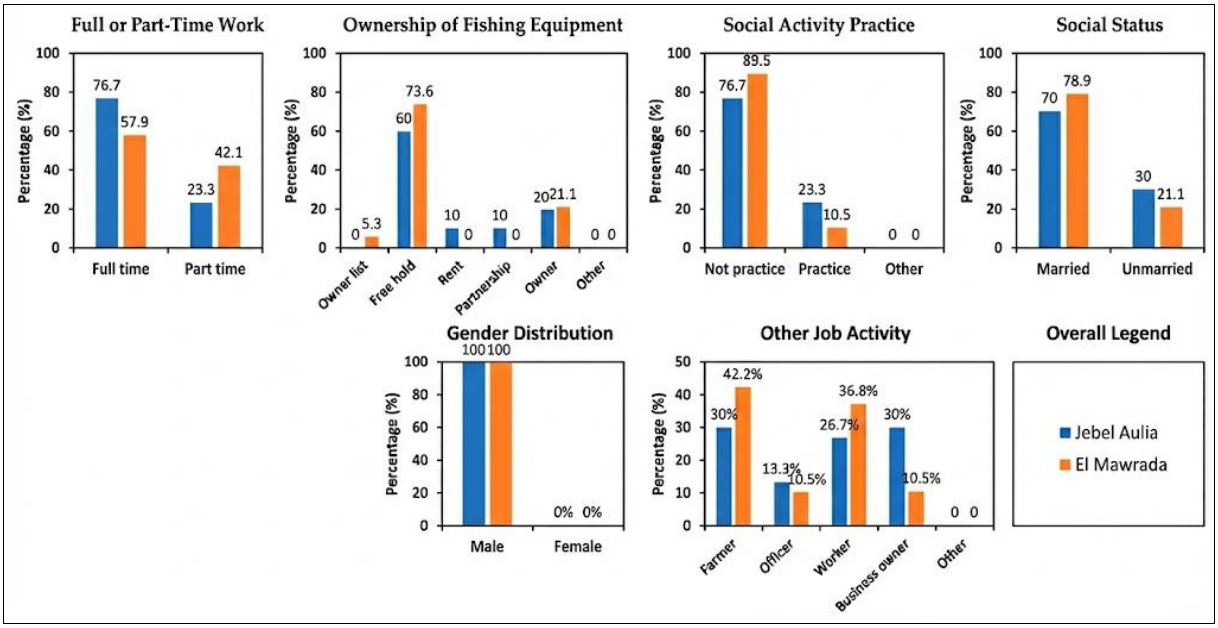

Fig 1: Scio-economic and operational of fishermen in Jebel Aulia and El Mawrada

Conclusion and Recommendations

Conclusion

The present study concluded that the fishermen's community needs more studies, to shed light on them for their importance in the field of fisheries. Most fishermen depend on fishing as basic profession fishermen need training and guidance courses on fisheries. Some fishermen had problems during fishing, such as dust and rain. The educational level of the fishermen is not high and the illiteracy rate is high. Some fishermen work in other jobs because only the fishing profession is not economically sufficient. Most fishermen have knowledge in fishing gear and graft.

Recommendation

Based on the findings during this study, the following recommendations are suggested:

- Future study will be needed for fishermen to introduce new technology to increase efficiency of fishing that it leads to improve the income**.**
- Future study will be needed for annual by catch and fish species abundance in two fishing area**.**

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