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RESEARCH PAPER

How Livelihood Capitals Influence Occupational Diversification among Rural Households: Evidence from Small-scale Fisher Households in Alappuzha District, Kerala

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ABSTRACT

Small-scale marine fishers in the Alappuzha district of Kerala are increasingly affected by the consistent decline in fish landings, climate change impacts, sea erosion, and rising fishing costs, all of which pose serious threats to their livelihoods. The traditional fishers in the district primarily operate motorised fishing units, and the landings of these fishing units showed a drastic decline from 50,254 t to 13,789 t during 2015 to 2024. In this backdrop, the livelihood capital assets and occupational strategies of small-scale fishing households in the motorised fishing sector in Alappuzha district of Kerala were examined. A multinomial logistic regression was used to analyse how the livelihood capitals impact the fisher household's ability to choose diversified livelihood strategies. The respondent households included both craft owners and fishing crew in the motorised fishing sector. The annual fishery income varied from ₹ 79,942/- for the households of fishing crew to ₹ 3,38,560/- for the craft owners. The analysis indicated that human, financial and physical capitals play a vital role in shaping the occupational diversification among small-scale fisher households. Family size and education index showed a significant influence on households to engage in salaried jobs. Ownership of crafts and higher dependency reduced the chances of fishing households to engage in diversified occupations in the informal sector, as well as salaried jobs. The findings of the study suggest targeted policy interventions to enhance the institutional credit access, strengthening the skill base through appropriate education and specialised training to enhance the well-being of marine fisher households.

HIGHLIGHTS

- Environmental and economic shocks affect the livelihoods of small- scale fishers in the marine sector in Kerala.
- Occupational diversification strengthens the household's capacity to cope with livelihood challenges.
- Human, financial and physical capital assets play a crucial role in shaping the occupational diversification among fisher households.
- Institutional credit access and strengthening the skill base through education and training are essential for improving the well-being of small-scale fisher households.

Keywords: Livelihood capitals, Occupational diversification, Small-scale fishers, Kerala

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Marine fishers of Kerala face increasing vulnerability due to the intensifying impacts of climate change in the recent past, leading to a reduction in fishing days, a decline in catch volumes, directly affecting their incomes, food security, and overall livelihood stability. Coastal erosion, declining fish landings, rising fishing costs, reduced fuel subsidies, and falling fish prices, largely driven by the reduction in the size of targeted resources below the marketable size, collectively threaten the livelihood security of small-scale fisherfolk in Kerala. The warming of coastal waters is also reported to cause a negative impact on coastal fisheries, with severe consequences for motorized and non-motorized sectors along the Kerala coast (Punya *et al.* 2021).

Alappuzha, the smallest district in the state of Kerala, is described as the *Venice of the East* with its extensive network of backwaters, canals, beaches and lagoons. The coastal district has 30 fishing villages spread along the 82 km coastline, inhabited mostly by the traditional fisherfolk. The district has a fisherfolk population of 98,678, the second-highest in the state after Thiruvananthapuram (CMFRI-DoF, 2020). Motorisation of country crafts started in Kollam, Alappuzha and Ernakulam districts of Kerala in the early eighties. In 1985, ringseines and minitrawls were introduced in the motorised fishing sector, leading to a substantial increase in the landings of small pelagics (Ammini *et al.* 2010).

A survey of marine fishers living within 50 m of the High Tide Line indicated that, among the 18,685 fisher folk houses located along the 50-meter coastal line in Kerala, 25% are in Alappuzha district. The survey also indicated that around 11.67 % of the fisherfolk population living within 50 meters of the high tide line and under threat from sea erosion (DoF, Govt of Kerala, 2019).

Occupational shift and diversification among rural households driven by economic and environmental shocks are reported from different parts of the world. Livelihood diversification has emerged as a crucial strategy for enhancing the resilience of marine fisherfolk in the context of climate change impacts and socio-economic vulnerabilities. Sustainable livelihood strategies strengthen households' capacity to cope with the livelihood challenges. Impact of livelihood capital on livelihood strategies is reported by several authors (Zhao *et al.* 2016; Kundu and Das, 2021; Mehta *et al.* 2022; Huang *et al.* 2023; Werdofa *et al.* 2024; Li Q *et al.* 2024, Tien *et al.* 2025). The ability of the fisher households to engage in diversified livelihood activities is determined by multiple factors including access to livelihood capitals and socio-cultural factors of the fishing communities. However very limited studies focused on occupational diversification and livelihood capitals in the marine fisheries sector (Amevenku *et al*. 2019; Nyawade *et al.* 2021). In this context, the livelihood capitals and their influence on occupational diversification among small-scale fisher households in Alappuzha district of Kerala state was examined, with the objective of suggesting suitable policies to promote sustainable livelihoods.

METHODS

Data on socio-demographic characteristics, livelihood capital and livelihood strategies of small-scale marine fisher households in Alappuzha district were collected using a structured interview schedule. Data were collected from a sample of 120 fisherfolk, including 90 workers and 30 owners in the motorised fishing sector, during Jan-March 2025 following proportional quota sampling. Secondary data on annual marine fish landings and fishing effort of motorised units from the National Marine Fisheries Data Centre (NMFDC) of ICAR-CMFRI were used for analysing the trends in landings and fishing effort of outboard fishing units in Alappuzha district.

Multinomial Logistic Regression (MLR) was employed to examine the determinants of occupational diversification. Since the dependent variable consisted of three mutually exclusive categories, such as Fishing only, fishing with other informal sector jobs, and fishing with salaried jobs, MLR was considered appropriate for modelling the probability of membership in each category relative to a reference group. A multinomial logistic regression model was used to analyse the interrelation between livelihood capital and livelihood strategies among the farmers (Amevenku *et al*. 2019; Rana *et al.* 2025; Tien *et al.* 2025).

To construct the logits in the multinomial case with n independent observations with p explanatory variables, and if the qualitative response variable has k categories, one of the categories must be considered the base level and all the logits are constructed relative to it. If π_j denote the

multinomial probability of an observation falling in the j^{th} category, then the relationship between this probability and the p explanatory variables, x_1, x_2,…….x_p, then the multiple logistic regression model could be expressed as—

$$\text{Log}\left[\frac{\pi_j(x_i)}{\pi_k(x_i)}\right] = \propto_{0i} + \beta_{1j}x_{1i} + \beta_{2j}x_{2i} + \cdots + \beta_{pj}x_{pi} \quad \ldots(1)$$

where $j = 1, 2, \ldots, (k–1)$, $i = 1, 2, \ldots, n$.

Since all the π's add to unity, this reduces to—

$$\log(\pi_j(x_i)) = \frac{\exp(\propto_{0i}+\beta_{1j}x_{1i}+\beta_{2j}x_{2i}+\cdots+\beta_{pj}x_{pi})}{1+\sum_{j=1}^{k-1}\exp(\propto_{0i}+\beta_{1j}x_{1i}+\beta_{2j}x_{2i}+\cdots+\beta_{pj}x_{pi})} \quad \ldots(2)$$

In the present analysis, the three multiple response categories were households' probability of falling under the occupational categories of Fishing_Only, Fishing _Others (indicating fishing along with informal jobs including fishing allied activities) and Fishing _Sal (Fishing along with salaried jobs). The explanatory variables were education index, family size, dependency ratio, land owned (in cents), savings, and ownership of craft and institutional credit. The model parameters were estimated using the maximum likelihood estimation (MLE) method.

The education index of the households was developed by assigning scores to the educational level of family members above five years. The category of illiterate was assigned a score of zero, 0.25 for primary, 0.5 for high school, 0.75 for higher secondary / diploma and one for graduation and above. The dependency ratio was calculated as the ratio of the sum of household members below 15 years and above 64 years to the household members between the age of 16 to 64 years, expressed as a percentage.

RESULTS AND DISCUSSION

There has been a consistent decline in both fish catch and fishing effort among motorised fishing units in Alappuzha district, where a sizable proportion of the state's traditional fisherfolk are concentrated. The annual landings of motorised fishing units declined from 50,254 t to 13,789 t during 2015 to 2024, with a considerable reduction in the number of boats operated. Over the past decade, the landings of Indian oil sardine, one of the major resources that played a key role in sustaining the livelihoods of traditional fishers in the state has shown a marked decline. This downturn, coupled with the growing impacts of climate change, including irregular monsoons, extreme weather events, and intensified sea erosion, has significantly undermined the livelihood security of fisher households in the district. The compound annual rate of landings and fishing effort of motorised fishing units in the district during 2015 to 2024 recorded a decline of -0.012% in landings and -9.91% reduction in the number of motorised crafts operated.

Socio-demographic particulars

The fishing allied activities in which the households engaged included workers in shrimp peeling sheds, auctioneers in fish landing centres, fishing labourers and small-scale trading. A substantial number of women in the fisher families are engaged in fishing-related activities, particularly shrimp peeling. Of the 159 peeling sheds identified across the state's marine fishing villages, 70 are concentrated in Alappuzha, highlighting its prominence in post-harvest and value addition activities (CMFRI- DoF, 2020). Apart from the shrimp peeling jobs, the women in the households also worked under the Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) programmes. The salaried jobs were mostly in the private sector, and very few were employed in Government service.

Table 1: Socio-demographic particulars of respondent households

Particulars	Fishing crew n= 90 Mean	Fishing craft owners n=30 Mean
Age of the head	54.28	53.27
Family size	4	4
Dependency ratio (%)	29.80	48.89
Fishery income (₹)	79942	338560
Household income (₹)	202055	471327
Monthly consumption expenditure (₹)	14082	15626
Annual savings (₹)	11940	18240
Indebtedness (₹)	131255	300167
Households with extension support (%)	54.44	66.67
Households receiving social security pension (%)	44.44	43.33

Source: *Authors calculation based on primary data.*

The socio-demographic characteristics of small-scale fisherfolk in Kerala indicated that the majority of respondents were middle-aged, with an average age of over 50 years for both owner and crew categories. More than 60% of the household heads had primary and upper primary levels of education, and 33.33 % in both categories had high school level education. A very few numbers of household heads had higher secondary and above levels of education.

Households of the owner category had higher dependency ratio compared to crew category. The fishery income and household income, monthly consumption expenditure and annual savings were higher in the case of owner category indicating greater access to financial resources. 54% of the households of the crew and 67% of the owner category had access to institutional credit where as more than 40% in both categories had access to social security pensions. The major institutional credit sources included cooperative and commercial banks, fishermen cooperative societies, self -help groups etc. The households were categorised into low, medium and high educational categories based on the education index (<0.3 for low, 0.31 to 0.6 as medium and >0.61 and above as high) More than 70 % of household members in both owner and crew categories had medium educational status whereas 14.61% of households in the crew category and 23.33% in the owner category belonged to the high educational index category (Table 2).

Table 2: Education index of fisher households

Category	Fishing crew	%	Fishing craft owners	%
Low	14	15.56	1	3.33
Medium	62	68.89	22	73.33
High	14	15.56	7	23.33

Source: *Authors calculation based on primary data.*

Determinants of occupational diversification: multinomial logistic regression

Out of the 120 respondent households, 45(37.5%) belonged to fishing _only category, 52(43.3%) under fishing _others, and 23(19.2%) with fishing and salaried jobs. The multinomial logistic regression model provides important insights into the structural and socio-economic factors distinguishing occupational categories among fisher households. The engagement in informal sector jobs, including fishing allied activities, was less in the case of households owning fishing crafts, implying that these households tend to remain in core fishing activity rather than diversifying into supplementary fishing-related activities or other informal sector jobs (Tables 3 & 4).

Table 3: Multinomial logistic regression (Fishing_ Others vs Fishing _Only)

Variable	Coefficient	p-value	Significance	Exp(B)
Intercept	-1.151	.223		
Education index	-0.523	.318		0.593
Family size	0.382	.065	*	1.465
Dependency ratio	-0.011	.044	**	0.989
Ownership of land	-0.006	.920		0.994
Savings	0.000	.764		1.000
No ownership of craft	1.357	.010	**	3.883
No institutional credit access	-1.172	.016	**	0.310

, ** and * denote 10%, 5% and 1% level of significance.*

Table 4: Multinomial logistic regression (Fishing _Sal vs Fishing _Only)

Variable	Coefficient	p-value	Significance	Exp(B)
Intercept	-4.458	.001	***	
Education index	1.140	.067	*	3.126
Family size	.718	.020	**	2.050
Dependency ratio	-.020	.035	**	0.961
Ownership of land	-.014	.858		0.986
Savings	.000	.502		1.000
No ownership of craft	1.568	.021	**	4.798
No institutional credit access	-.182	.759		0.834

, ** and * denote 10%, 5% and 1% level of significance.*

Family size had a significant positive influence, and the education index showed marginal significance for households to engage in salaried jobs. Larger families necessitated more family members to engage in economic activities, and higher educational

attainment encouraged diversification of family members to salaried jobs in the fisher households. The results clearly reveal the influence of human capital in driving the occupational diversification through access to better education and skills. Rana *et al.* (2025) also reported similar findings in the case of tribal people in Tripura where the worker participation of the household and education are directly linked to livelihood diversification. The study on the determinants of income-generating non-farm activities among farm households in India by Kumari and Murty (2024) also revealed the positive impact of improved education on diversification of farming households into non-farm activities.

Institutional credit access influenced the households to engage in informal sector jobs, including employment in fishing allied activities, which points out the impact of financial capital on the diversification of fisher households to fishery-related or non-fishing jobs. The likelihood of diversifying into the informal sector as well as salaried occupations were more in the case of households without ownership of fishing crafts. Households owning fishing crafts showed strong dependence on core fishing activities for income. Substantial time involved in the managerial responsibilities of operating the crafts also might have limited their ability to engage in other income-generating activities. Etuk *et al*. (2018) and Anang *et al.* (2024) also reported the positive influence of credit received on household livelihood diversification. Amevenku *et al*. (2019) based on a multinomial logit regression of livelihood strategies reported that the marital status of household head, number of months of food shortage experienced by a household per year, access to credit, access to extension services, distance to regular markets as well as experience in fishery were the major determinants of livelihood strategies of fishing households in the Volta Basin, Ghana.

A higher dependency ratio, on the other hand, reduced the likelihood of household members engaging in both informal sector and salaried jobs. A higher number of dependent household members reduces the ability of family members to engage in salaried employment or informal sector jobs, as these occupations typically require more regular working hours and greater participation of household members in the workforce. Iram and Butt (2004) and Amevenku *et al*. (2019) also reported similar findings, that the higher dependency ratios tend to restrain the economic activities of household members.

Overall, the findings highlight occupational stratification among the fisher households driven by differences in human, physical capital and financial capital. Livelihood diversification received greater attention as a means for poverty reduction and a key to long-term non-migration of people (Abebe *et al.* 2021; Biswas & Mallick, 2021; Jongur *et al.* 2022). Targeted policy interventions to enhance the credit access and to strengthen the skill-building initiatives to enhance the livelihood diversification and well-being of small-scale-fisher households.

CONCLUSION

Diversification of households is a key adaptation strategy of rural households to cope with the livelihood challenges and is an essential pillar of rural development. The study indicated that the human capital of the fisher households including larger family size and educational attainments had positive influence on the households for occupational diversification. Financial capital in terms of institutional credit access influenced the household livelihood diversification in fishing allied activities and non-fishing jobs. Whereas, the ownership of fishing crafts reduced the probability of occupational diversification among the households. The findings of the study clearly indicated the influence of livelihood capitals in shaping the occupational diversification among fisher households. Targeted policy interventions are essential to enhance the credit access, strengthening the skill base through suitable education and specialised training to enhance occupational diversification and well-being of marine fisher households. As small-scale fisheries generally have low environmental impact, effective resource management and climate mitigation measures are essential for enhancing and stabilising incomes from small -scale fisheries and ensuring their long-term sustainability.

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