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MULTIDIMENSIONAL POVERTY ASSESSMENT OF SMALL-SCALE FISHERFOLKS IN CROSS RIVER STATE, NIGERIA

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ABSTRACT

This study assessed the multidimensional poverty status of small-scale fisherfolk in Cross River State, Nigeria. Using the Multidimensional Poverty Assessment Tool (MPAT) and data from 175 households. The methodology employed a multi-stage sampling technique, and data were collected through structured and semi-structured questionnaires. The study revealed a high incidence of multidimensional poverty, with 76% of households experiencing deprivation in at least three essential dimensions. The Alkire-Foster method was used to derive the multidimensional poverty index. The results show that the aggregate multidimensional poverty index (MPI) was 0.388 and 0.345 for K=0.3 and K=0.5, indicating that many respondents were multidimensionally poor. The intensity of poverty was 0.510 and 0.538 for K=0.3 and K=0.5, respectively. The study identifies domestic water supply, gender and social equality, housing, clothing, energy, and farm assets as key dimensions of poverty. Pearson's correlation analysis reveals significant relationships between these dimensions and healthcare ($r = 0.377$, $p < 0.05$), education ($r = -0.220$, $p < 0.05$), and non-farm assets ($r = 0.181$, $p < 0.10$). Binary logistic regression analysis identifies age ($Exp(B) = 0.968$, $p < 0.05$), agricultural zone ($Exp(B) = 1.987$, $p < 0.01$), and possession of fishing assets ($Exp(B) = 0.391$, $p < 0.10$) as significant factors influencing multidimensional poverty. Based on the findings, this study recommends that policymakers and development organizations prioritize interventions aimed at improving domestic water supply, promoting gender and social equality, and enhancing access to farm and non-farm assets (fishing assets).

KEYWORDS: Multidimensional Poverty, Small-Scale Fisheries, Sustainable livelihoods, Deprivation, Cross River, Nigeria

INTRODUCTION

Small-scale fisheries (SSF) are a vital part of the global fishing industry, supporting numerous communities' livelihoods and food security worldwide (Food and Agriculture Organisation(FAO) 2022; Tesfaye, 2021; Apresentação & Rangel, 2024). According to FAO, in 2020, an estimated 58.5 million people were engaged in fisheries and aquaculture worldwide. This number includes full-time, part-time, occasional, and unspecified workers. Specifically, about 35% of workers were employed in aquaculture, while 65% were in capture fisheries. Additionally, women accounted for approximately 21% of all people directly engaged in the fisheries and aquaculture primary sector. (FAO,2022)

In Nigeria, the artisanal fisheries sector plays a vital role in meeting the country's fish demand. According to recent findings, artisanal fisheries provide more than 82% of the domestic fish supply, supporting the livelihoods of around one million fishermen and up to 5.8 million people involved in the fishery value chain. (Federal Department of Fisheries, FDF, 2020).

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Overall, the artisanal fisheries sector continues to be a significant player in Nigeria's domestic fish supply, supporting the livelihoods of millions of people.

However, despite its importance, the sector faces challenges such as poverty and food insecurity. This study seeks to assess the poverty situation in Cross River State's small-scale fisheries using the Multidimensional Poverty Assessment Tool (MPAT) developed by IFAD. The MPAT is a comprehensive framework developed by the International Fund for Agricultural Development (IFAD) to measure and analyze multidimensional poverty. MPAT goes beyond traditional income-based poverty measures by assessing multiple deprivations across various dimensions, including health, education, living standards, and income (Cohen, 2009; Cohen, 2010). This tool enables policymakers and practitioners to identify the most vulnerable populations, understand the root causes of poverty, and design targeted interventions to address multidimensional poverty. By examining the relationship between multidimensional poverty and small-scale fisheries, this study aims to identify the root causes of poverty in the sector and suggest effective policies that recognize the sector's peculiarities in supporting local communities. Understanding the interconnectedness of poverty and fishing is essential for promoting long-term sustainability and improving the well-being of those dependent on this sector.

METHODOLOGY

Study area

The study was conducted in Cross River State, which is located between latitudes $4^{0}40^{l}$ and $6^{0}40^{l}$ North of the Equator and longitudes $8^{0}00^{l}$ and $9^{0}20^{l}$ East of the Greenwich Meridian (GIS,2022). Cross River State, is part of the Niger Delta region in Nigeria, recognized as the world's third-largest wetland (Federal Republic of Nigeria (FRN)Report, 2006). It has a river called Cross River which originates in Cameroon's mountains and flows northwest, becoming navigable for shallow-draught boats below the rapids (FRN, 2006). The Cross River Estuary empties into the Gulf of Guinea, with the Calabar River running parallel (FRN, 2006). The state's ecology is characterized by diverse flora and fauna in five main ecological zones (FRN, 2006). According to Cross River State Government (CRSG) Annual Report (2022) and NBS (2016), the state covers 20,050 square kilometers and has a population of 3,866,269 people. Over 80% of the population resides in rural areas, relying on farming and fishing for food and livelihood (National Bureau of Statistics (NBS), 2022). However, the state faces a high food poverty ratio, emphasizing the importance of fisheries resources in supporting the rural population, particularly in riverine communities.

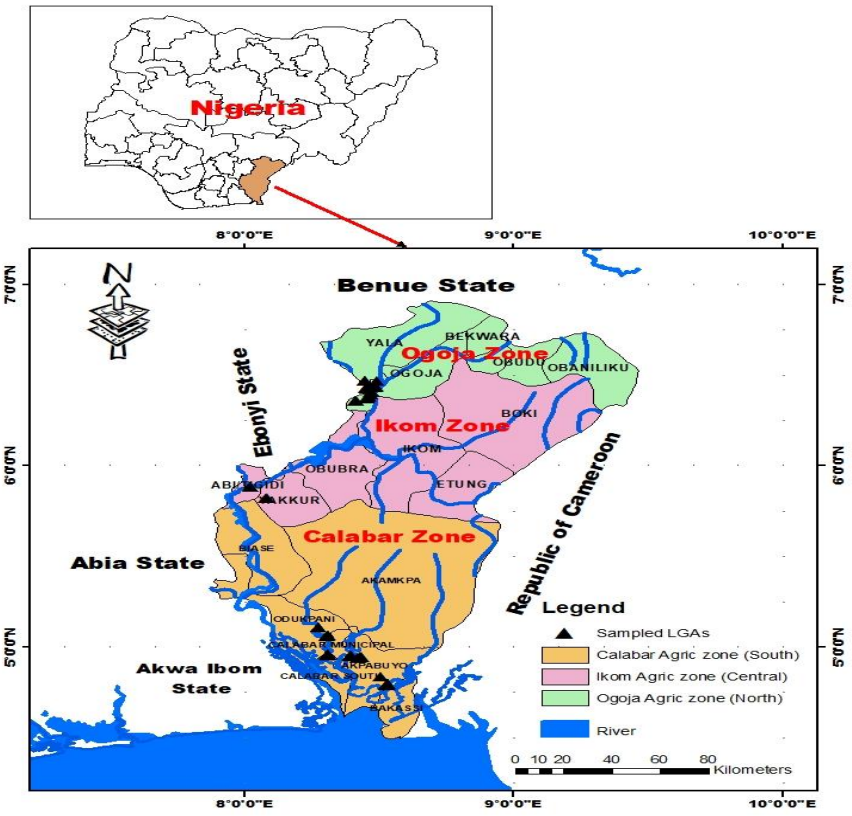

Figure 1: Map of Cross River State showing sampling location.
Source: GIS Unit Geography and Environmental Science Department, University of Calabar, Calabar, Nigeria

Population, sampling procedure and sampling size

This study used a multi-stage sampling technique to select respondents. First, the three agricultural zones of Cross River State were purposively selected to capture the diversity of communities along the Cross River. Next, communities within a 5-kilometer radius of the Cross River were identified, resulting in the selection of 7 communities in the North zone, 3 communities in the Central zone, and 8 communities in the South zone. In stage three, households in these communities were randomly selected using the lottery method without replacement. The study's total sample consisted of 175 respondents, distributed as shown in Table 1 below.

Table 1: Distribution of study respondents

Agricultural Zones	Number of Sampled communities	Sample Size
North	7	53
Central	3	52
South	8	70
Total	18	175

Procedure for data collection

Data were collected through structured and semi-structured questionnaires which were converted to electronic format using the Open Data Kit (ODK) (Brunette et al., 2017). The adapted structured questionnaire surveys consisted of two parts: household and community. Household data were obtained from the selected fisherfolk household heads. Community data was obtained through focus group discussions with respondents, village heads, farmers'/fishers'/traders' group heads, school heads, and primary health care staff.

Multidimensional Poverty Indicators and Dimensions

This study employed IFAD's Multidimensional Poverty Assessment Tool (MPAT) to assess the multidimensional poverty of small-scale fisheries in Cross River State, Nigeria, similar to the approach proposed by Alkire and Foster (2011).The tool uses 11 dimensions and 34 sub-dimensions to measure poverty, including food and nutrition security, domestic water supply, health and healthcare, sanitation and hygiene, housing, clothing, and energy, education, adaptation to climate change, gender and social equity, exposure and resilience to shocks, non-farm assets, and farm assets. The Alkire-Foster method (Alkire & Foster, 2011) was used to derive the multidimensional poverty index, and the Pearson correlation was used to analyze the relationships between and among the dimensions of poverty or well-being. Binary Logistic Regression was used to evaluate the factors affecting multidimensional poverty in small-scale fisheries. The data was analyzed using Stata 17 software (Stata Corp, 2021). Table 2 shows the dimensions, sub-dimensions, weights, and deprivation cut-offs used in the study.

TABLE 2: Dimensions, sub-dimensions, and weights of multidimensional poverty indicators

S/N	DIMENSION&SUB-DIMENSIONS	WEIGHTS	S/N	DIMESION &SUB-DIMENSIONS	WEIGHTS
1	Food & Nutrition Security	1.2	7	Farm assets	1.2
	Consumption	43%		Land tenure	36%
	Access stability	32%		Land quality	24%
	Nutrition quality	25%		Crop inputs	20%
				Livestock/agriculture inputs	20%
2	Domestic water supply	0.8	8	Non-farm assets	0.8
	Quality	29%		Employment &Skills	39%
	Availability	38%		Financial services	33%
	Access	33%		Fixed assets & remittance	28%
3	Health & Healthcare	1.2	9	Exposure & resilience to shock	0.8
	Health status	38%		Degree of exposure	33%
	Access and affordability	34%		Coping ability	34%
	Health care quality	28%		Recovery ability	33%
4	Sanitation & hygiene	0.8	10	Gender & social equity	0.8
	Toilet facility	38%		Access to Education	31%
	Household waste management	26%		Access to healthcare	36%
	Hygiene practices	36%		Social Equity	33%
5	Housing, clothing & Energy	1.2	11	Adaptation to climate change	0.8
	Housing structure quality	38%		Climate-resilient agricultural	25%
	Clothing	33%		practices	25%
	Energy sources	29%		Water for agriculture	25%
				Human capacity	
6	Education	1.2			
	Quality	31%			
	Availability	33%			
	Access	36%			

Source: Field Survey and adaption from Cerio, et al (2019)

Measurement of variables

This study employed the Multidimensional Poverty Index (MPI) to measure poverty in riverine communities, based on the eleven dimensions of rural poverty, as per IFAD MPAT V.6 (IFAD, 2011). The MPI comprises thirty-four indicators, which are shown in Table 2. The study utilized the normative approach to assign weights and computed the MPI using the dual cut-off method based on the counting approach (Maleta, 2006; Olarinde et al., 2020; Adebayo et al., 2020). A household is considered multidimensionally poor if its weighted deprivation score is equal to or greater than 33.33% (or one-third of the total weighted deprivation), as defined by the United Nations Development Programme (UNDP, 1995) and Adebayo et al. (2020). Households above the poverty cut-off are assigned a value of "0," while those below the poverty cut-off are assigned a value of "1."

The MPI, headcount ratio (H), and intensity of poverty (A) were computed using the following equations:

$H = \frac{n}{t}$(Adebayo et al., 2020)

Where (n) is the number of multidimensionally poor households, and (t) is the total population.

$A = \frac{\sum_i^n c}{n}$(Fransman & Du, 2018)

The intensity of poverty (A), or the depth of deprivation, is an indicator of the average weighted count of deprivation experienced by the multidimensionally poor.

The Multidimensional Poverty Index (MPI) is the product of the headcount ratio (H) and the intensity of poverty (A) (Adebayo et al., 2020). It is also called the adjusted headcount ratio.

$MPI = H * A$ (Fransman & Du, 2018)

The MPI was computed by multiplying the proportion of the population that is multidimensionally poor (H) by the average intensity of poverty among the poor (A) (Fransman & Du, 2018). This approach provides a comprehensive measure of poverty, accounting for both incidence and severity (Alkire & Foster, 2011). The MPI offers a holistic understanding of poverty, enabling targeted poverty alleviation strategies.

The factors influencing multidimensional poverty among riverine community dwellers were assessed using binary logistic regression (Hosmer et al., 2013).

This method examines the relationship between independent variables and a binary dependent variable (poor/non-poor). The odds ratio measures the change in risk when moving from the reference modality to another modality within the same variable (Peng et al., 2002). If the probability (p-value) is less than 5%, the risk is significant, highlighting the importance of these factors in understanding and addressing poverty.

RESULTS AND DISCUSSION

Table 3 shows that the majority (81%) of the household heads were male, The average age of household heads was 46 years, indicating that the majority were within the productive age range. The marital status distribution shows that most household heads were married (64%), followed by single (16%), divorced (11%), and widowed (9%).

Table 3: Socioeconomic characteristics of households

General Information		**[min, max]**
Total households surveyed	175	
Average survey duration	49minutes	[0, 99]
The average age of respondents	46 years	[0, 79]
The average age of household heads	46 years	[0, 79]
Gender Statistics		**Percentage of total**
Male respondents	142	81%
Female respondents	33	19%
Male headed households	142	81%
Female-headed households	33	19%
Female &male-headed households	0	0%
Head of Household's Marital Status		
Married	112	64%
Single	28	16%
Divorced	19	11%
Widowed	16	9%

Source: Field Survey, 2023

Multidimensional Poverty Indicators in Small-Scale Fisheries in Cross River State

Table 4 presents the multidimensional poverty indices for small-scale fisheries in Cross River State showing the depth and severity of poverty in the region. The table shows the aggregate multidimensional poverty indices (MPI) headcount (H) with a value of 0.760 and 0.640 the adjusted headcount (Mo) of 0.388 and 0.345 and the intensity (A) of 0.510 and 0.538 for K=0.3 and K=0.5 respectively.

Table 4: Indices of multidimensional poverty among small–scale fisherfolks in Cross River State

		K=0.3			K=0.5		
S/NO	**Variable**	**H**	**A**	**M_o(H*A)**	**H**	**A**	**M_o(H*A)**
1	Aggregate	0.760	0.510	0.388	0.640	0.538	0.345
2	Northern Agric. zone	0.642	0.479	0.307	0.473	0.514	0.243
3	Central Agric zone	0.769	0.484	0.372	0.865	0.366	0.316
4	Southern Agric zone	0.843	0.547	0.461	0.771	0.564	0.435

Source: Field Survey,2023

The results indicate that a significant proportion of respondents were multi-dimensionally poor, with the intensity of poverty increasing as the poverty cut-off (K) increases, consistent with the findings of Olarinde et al. (2020) and Adeoti and Popoola (2012) which indicated that which indicated that the intensity of poverty increases significantly as the poverty cut-off (K) increases from 25% to 50% or more. Specifically, at K=0.3, the intensity of poverty was 0.510,0.479,0.484 and 0.547 for the Northern, Central and Southern Agricultural zones respectively. While at k=0.5,the intensity of poverty was 0.538,0.514,0.366 and 0.564 for Nothern, Central and Southern Agricultural zones respectively.

The decomposition of the MPI by agricultural zone reveals that the central and southern zones have the highest number of deprived households. Poverty intensity increases with K in the northern and southern zones but declines in the central zone.

The zonal distribution provides a nuanced understanding of poverty, aiding targeted alleviation strategies. Notably, the southern zone has the highest number of multidimensionally poor respondents (84%) at K=0.3, and the central zone has the highest number (86.5%) at K=0.5 but the lowest poverty intensity (0.366). The southern zone is characterized by a high concentration of multidimensional poverty, with poor households typically experiencing shortfalls in 3-5 essential dimensions, leading to a more pronounced poverty intensity at both K=0.3 and K=0.5 thresholds.

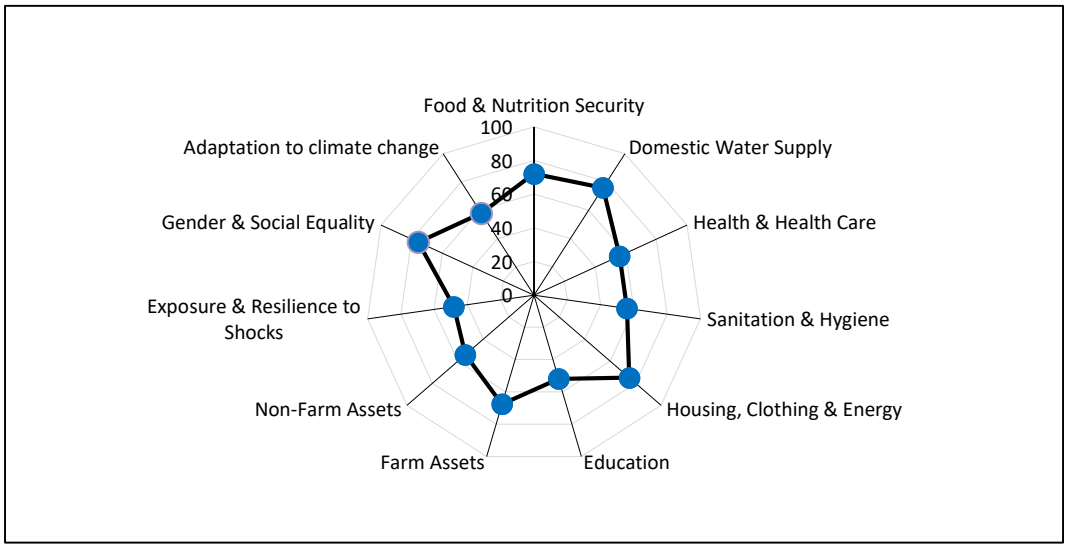

Figure 2: MPI Dimensions for the three Agricultural zones in Cross River State

Figure 2 highlights that four dimensions exhibit high deprivation rates; Domestic water supply (75.9%), Gender and social equality (75.73%), Housing, clothing, and energy (75%), and Farm assets (67.57%)

Severe deprivation in these essential areas poses a significant threat to the livelihood and welfare of households, particularly in fishing communities, where agricultural assets and resources are vital to their economic well-being.Poor nutrition and inadequate access to clean water hinder economic advancement and perpetuate social and gender disparities, echoing the concerns raised in comparable studies (Adeoti &Popoola,2012; Olarinde et.al.,2020). Additionally, the lack of safe drinking water increases the vulnerability of these communities to water-borne diseases, posing a significant threat to their health and well-being.

Table 5: Pearson's correlation coefficient between the eleven dimensions of poverty/well-being in sampled communities

S/N	Poverty/ wellbeing dimensions	Food &Nutrition Security	Domestic water supply	Health &Healthcare	Sanitation & Hygiene	Housing, clothing & Energy	Education	Farm Asset	Non-farm asset	Exposure & Resilience to shock	Gender & social equity	Adaption to climate change
1	Food& Nutrition Security	1.000										
2	Domestic Water Supply	0.043	1.000									
3	Health & healthcare	0.377*	0.266*	1.000								
4	Sanitation &Hygiene	0.059	0.258*	0.175*	1.000							
5	Housing, clothing &energy	0.161*	0416*	0.280	0.301	1.000						
6	Education	-0.083	-0.164*	-0.220*	0.196*	0.133	1.000					
7	Farm Asset	-0.010	-0.125	0.080	0.001	-0.112	-0.104	1.000				
8	None farm Asset	0.191*	0.155*	-0.008	0.081	0.241*	0.139	-0.195*	1.000			
9	Exposure & Resilience to shock	0.179*	0.123	0.236*	0.123	0.065	-0.140	0.007	-0.007	-0.090	1.000	
10	Gender & Social Equality	0.289*	0.140	0.282*	0.055	0.063	-0.303*	0.029	-0.181*	0.108	1.000	
11	Adaption to climate change	-0.045	0.001	0.023	0.023	0.093	-0.209*	0.600	-0.137	0.101	0.067	1.000

Source: FieldSurvey,2023

The Pearson Correlation analysis (Table 4) revealed diverse associations among the eleven dimensions of poverty in fishing communities, ranging from weak (0.1 < |r| < 0.3) to moderate (0.3 < |r| < 0.5) correlations.

Notably, Food and Nutrition Security exhibited a significant moderate positive correlation with Health and Healthcare (r = 0.377), suggesting a strong link between adequate food and nutrition and better healthcare outcomes. However, Food and Nutrition Security showed weaker positive correlations with other dimensions, including Sanitation and Hygiene (r = 0.059), Housing, Clothing, and Energy (r = 0.161), Non-Farm Assets (r = 0.191), Exposure to Resistance and Shock (r = 0.179), and Gender and Social Equity (r = 0.289). This indicates a less robust relationship between food and nutrition security and these dimensions compared to healthcare. The accumulation of non-farm assets also increases with prioritized gender and social equity, aligning with Corio et al.'s (2019) findings.

Domestic Water Supply showed weak significant positive correlations with Health and Healthcare (r = 0.266), Sanitation and Hygiene (r = 0.25), Housing, Clothing, and Energy (r = 0.416), and Non-Farm Assets, indicating a link between quality domestic water supply and improved Water Sanitation and Health (WASH) compliance, health and healthcare, and increased non-farm asset accumulation. Aminu & Udeze (2023) support the relationship between domestic water supply and WASH compliance. This study's findings suggest that enhancing food and nutrition security, domestic water supply, and gender and social equity positively impacts healthcare and WASH compliance in fishing communities.

The study found a negative correlation between Domestic Water Supply and Education (r = -0.164) as well as Health and Healthcare (r = -0.220), indicating that lower educational attainment may lead to inadequate management of domestic water supply, resulting in poor health outcomes. In contrast, Sanitation and Hygiene showed a positive correlation with Education (r = 0.196), suggesting that higher educational attainment is associated with better hygiene practices. Additionally, Health and Healthcare exhibited positive correlations with Sanitation and Hygiene (r = 0.175), Exposure and Resilience to Shock (r = 0.236), and Gender and Social Equity (r = 0.282), implying that improved health outcomes are linked to improved sanitation, increased resilience, and enhanced social equity. However, Education showed a negative correlation with Health and Healthcare (r = -0.220), suggesting that lower educational attainment may exacerbate health and healthcare challenges.

The study found a positive relationship between Sanitation and Hygiene and Education (r = 0.196), suggesting that educational attainment is a key factor in improving household sanitation and hygiene practices. Furthermore, a positive correlation emerged between Housing, Clothing, and Energy and Farm Assets (r = 0.241), indicating that increased income, reflected in improved living standards, enables households to diversify their assets. However, Education showed a negative correlation with Gender and Social Equality (r = -0.303) and Adaptation to Climate Change (r = 0.209), implying that lower educational attainment may hinder progress in gender and social equality and climate change resilience.

The study's findings indicate a negative correlation between Farm Assets and Non-Farm Assets (r = -0.195), indicating that a strong focus on fishing and ecosystem-related activities may restrict a household's ability to explore alternative income sources. Conversely, Non-Farm Assets showed a positive association with Gender and Social Equity (r = 0.181), suggesting that households with multiple income streams tend to place greater emphasis on promoting gender equality and social inclusivity.

Socioeconomic factors influencing multidimensional poverty in small-scale fisheries

The findings in Table 6 highlight the complex relationships between multidimensional poverty and various socioeconomic factors. The statistically significant relationships between multidimensional poverty and the household head's age, agricultural zone, and possession of fishing assets are consistent with previous studies.

Table 6: Binary logistic regression results - socioeconomic factors affecting multidimensional poverty among fisherfolks households

S/N	Variables	Exp(B) odds Ratio	Sig	Lower	Upper
1	Age	.968	.006*	.937	1.001
2	Gender	1.184	0.763	.395	3.549
3	Marital/Status	1.0615	0.779	.699	1.611
4	Agri Zone***	1.987	0.003**	1.260	3.134
5	Asset Ownership	.391	0.063*	.145	1.054
6	Education	4.913	0.265	.902	1.453

*Significant at the 5% level (P>0.05, n=175) **Significant at the 10% level (P>0.10, n=175) ***Effect coding was used to delineate zones.

Source: Field Survey, 2023

A study by Alkire and Santos (2014) found that older household heads tend to have lower poverty rates, which aligns with our findings that the likelihood of experiencing multidimensional poverty decreases by 0.96 times for every additional year of age.The significant association between agricultural zone and multidimensional poverty is also supported by existing literature. A study by Hussain et al. (2018) found that households in urban areas tend to face higher poverty rates due to increased living costs and socioeconomic influences. This could explain why households in the Southern Agricultural zone, with its higher urbanization rate, face a 1.3 times higher risk of multidimensional poverty.The possession of fishing assets as a factor in reducing multidimensional poverty is also consistent with previous research. A study by Bene et al. (2016) found that access to fishing assets can provide a vital source of income and food security for households, thereby reducing poverty rates.The lack of significant association between multidimensional poverty and factors such as gender, marital status, and education level is surprising, given the existing literature highlighting the importance of these factors in determining poverty rates. However, this could be due to the specific context and population being studied.

Overall, the findings in Table 6 contribute to our understanding of the complex relationships between multidimensional poverty and various socioeconomic factors. They highlight the importance of considering factors such as age, agricultural zone, and possession of fishing assets in poverty reduction strategies.

CONCLUSION

This novel study explores multidimensional poverty among fisherfolk and related livelihoods in Cross River State's riverine communities, in Nigeria. Utilizing a mixed-methods approach. The Akire and Foster MPI methodology revealed a decreased adjusted poverty headcount as the poverty cut-off increased. Notably, the central agricultural zone exhibited higher MPI and adjusted headcount poverty levels at a higher cut-off, while the southern agricultural zone showed the highest poverty intensity, with each multidimensionally poor household experiencing deprivation in three to five out of eleven MPI dimensions. The study identified widespread deprivation in domestic water supply, gender and social equality, housing, energy, clothing, and farm assets (fishing & livelihood assets) across zones, threatening respondents' well-being and livelihoods. Significant associations were found between multidimensional poverty and factors such as household head's age, agricultural zone location, and ownership of fishing assets. To address multidimensional poverty, the study recommends prioritizing social intervention programs focusing on water supply, social equity enlightenment, housing, energy, clothing, and asset acquisition options to alleviate deprivation among fisherfolk and related livelihoods.

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