

Indigenous Fishing and Farming Knowledge Systems and their Relevance to Sustainable Food Security among Ogoni/Ikwerre Communities in Rivers State

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Article History	Abstract
Original Research Article	<i>This study examined indigenous fishing and farming knowledge systems and their relevance to sustainable food security among Ogoni/Ikwerre communities in Rivers State. Three objectives, three research questions, and three null hypotheses guided the study. An analytic descriptive survey design was adopted. The population comprised indigenous farmers and fisherfolk resident in selected Ogoni communities (Khana, Gokana, Tai, and Eleme Local Government Areas) and Ikwerre communities (Port Harcourt, Obio/Akpor, Ikwerre, and Emohua Local Government Areas), from which a sample of 380 Indigenous Farmers and Fishers (IFF) was drawn using Taro Yamane's formula and a multi-stage sampling procedure, and 110 Community Development, Fisheries/Agricultural Extension, and Traditional Institution Personnel (CDEP), comprising Ministry of Agriculture and Fisheries extension officers, community development officers, and custodians of culture attached to traditional councils, studied through a census approach given their manageable number. Data were collected using a structured instrument titled "Indigenous Fishing and Farming Knowledge Systems and Sustainable Food Security Questionnaire" (IFFKS-SFSQ), validated by three experts and yielding Cronbach Alpha reliability coefficients ranging from 0.78 to 0.86 for the three clusters, with a cumulative coefficient of 0.82. Research questions were answered using mean and standard deviation, while hypotheses were tested using z-test statistics at the 0.05 level of significance. Findings revealed that indigenous fishing knowledge systems (IFF grand mean = 2.86; CDEP grand mean = 2.69) and indigenous farming knowledge systems (grand means = 3.19 and 2.93 respectively) are both relevant to sustainable food security among Ogoni/Ikwerre communities to a high extent, with no significant difference between the two groups on indigenous fishing knowledge systems but a significant difference favouring Indigenous Farmers and Fishers on indigenous farming knowledge systems. Socio-cultural, environmental, and modernization-related challenges were rated as affecting the sustenance and transmission of these indigenous knowledge systems to a high-to-very-high extent by both groups (grand means = 3.32 and 3.54 respectively), with Community Development and Extension Personnel rating the severity of these challenges significantly higher than Indigenous Farmers and Fishers themselves. The study recommended the deliberate documentation and integration of indigenous fishing and farming knowledge into formal agricultural extension and school curricula, alongside community-based measures to restore customary conservation practices and strengthen intergenerational knowledge transfer among Ogoni/Ikwerre youth in Rivers State.</i> Keywords: Indigenous Knowledge Systems, Fishing, Farming, Sustainable Food Security.
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Copyright © 2026 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited. Citation: Daba Edith Williams (PhD) & Telema Amachree (PhD). (2026). Indigenous fishing and farming knowledge systems and their relevance to sustainable food security among Ogoni/Ikwerre communities in Rivers State. UKR Journal of Arts, Humanities and Social Sciences, 2(9), 136-147.	

Introduction

Food security, understood as the condition in which all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs for an active and healthy life, remains one of the most pressing development challenges confronting Nigeria, and nowhere is the tension between ecological endowment and food insecurity more visible than in the riverine and upland communities of Rivers State, where centuries-old fishing and farming traditions coexist with declining fish catch, degraded farmland, and rising dependence on imported staples (Kpalap & Nwidor, 2025). Globally, indigenous knowledge systems, the accumulated, orally transmitted body of ecological understanding, skills, and practices that communities develop over generations in response to their local environment, are increasingly recognized as a critical, if under-utilized, resource for sustainable food production, with countries that have deliberately integrated indigenous ecological knowledge into modern agricultural and fisheries policy recording measurable gains in resource sustainability and community food resilience (Food and Agriculture Organization [FAO], 2023). Nigeria mirrors this global recognition of indigenous knowledge's importance even as decades of rapid urbanization, environmental degradation, and formal-education-driven cultural change continue to erode the intergenerational transmission of this knowledge, a shortfall that community-based cultural documentation and revitalization programmes are only beginning to address (National Bureau of Statistics [NBS], 2024).

Rivers State, with its riverine, mangrove, and upland farming and fishing communities spread across the Ogoni ethnic nationality, comprising Khana, Gokana, Tai, and Eleme, and the Ikwerre ethnic nationality, comprising Port Harcourt, Obio/Akpor, Ikwerre, and Emohua, presents indigenous communities whose historical livelihoods have long been anchored on artisanal fishing in creeks and estuaries and on smallholder farming of cassava, yam, plantain, and vegetables, even as many of these same communities continue to contend with oil-related environmental degradation, land and coastal erosion, and declining youth interest in traditional livelihoods that limit the continued practice and transmission of these knowledge systems (Wokoma, 2024). Against this backdrop, indigenous fishing knowledge systems, spanning traditional fish-trapping and canoe-building techniques through to ecological indicators for locating productive fishing grounds and customary closed-season conservation practices, and indigenous farming knowledge systems, spanning traditional crop rotation, seed selection, and communal labour arrangements, have emerged as a potentially undervalued resource for strengthening

household and community-level food security in Ogoni/Ikwerre communities (Deekor & Amaewhule, 2025).

Despite this evident relevance, the extent to which indigenous fishing and farming knowledge systems continue to be practised and valued among Ogoni/Ikwerre communities in Rivers State, and the socio-cultural, environmental, and modernization-related challenges that threaten their sustenance and transmission, remain empirically under-examined. This paper responds to that gap by isolating and empirically examining two broad forms of indigenous knowledge, indigenous fishing knowledge systems and indigenous farming knowledge systems, alongside the challenges that threaten their sustenance, for sustainable food security among Ogoni/Ikwerre communities in Rivers State.

Statement of the Problem

Despite the historical centrality of fishing and farming to household livelihoods in Ogoni/Ikwerre communities, food insecurity, declining fish catch, and diminishing farm yields remain persistent concerns across these communities, and reported incidents of environmental degradation, loss of ancestral fishing grounds, and abandonment of traditional farming practices remain common (Kpalap & Nwidor, 2025). Indigenous fishing and farming knowledge systems have been informally credited with sustaining household food supply for generations, yet accounts among Niger Delta riverine communities suggest that this body of knowledge is being lost at a troubling pace, with environmental degradation, rural-urban youth migration, and the displacement of oral apprenticeship by formal schooling intervening between the existence of this knowledge and its continued practice (Wokoma, 2024).

At the same time, it is not clear from the existing literature to what extent indigenous fishing knowledge systems and indigenous farming knowledge systems actually remain relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State, which socio-cultural, environmental, and modernization-related challenges most significantly threaten their sustenance and transmission, or whether Indigenous Farmers and Fishers themselves and the Community Development, Extension, and Traditional Institution Personnel who work alongside them share a common perception of the value of this knowledge and of the challenges that threaten it. It is against this backdrop that the present study interrogated these questions.

Purpose of the Study

The purpose of this study was to examine indigenous fishing and farming knowledge systems and their relevance

to sustainable food security among Ogoni/Ikwerre communities in Rivers State. Specifically, the study sought to:

1. determine the extent to which indigenous fishing knowledge systems are relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State.
2. determine the extent to which indigenous farming knowledge systems are relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State.
3. determine the extent to which socio-cultural, environmental, and modernization-related challenges affect the sustenance and transmission of indigenous fishing and farming knowledge systems among Ogoni/Ikwerre communities in Rivers State.

Research Questions

The following research questions guided the study:

1. To what extent are indigenous fishing knowledge systems relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State?
2. To what extent are indigenous farming knowledge systems relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State?
3. To what extent do socio-cultural, environmental, and modernization-related challenges affect the sustenance and transmission of indigenous fishing and farming knowledge systems among Ogoni/Ikwerre communities in Rivers State?

Hypotheses

The following null hypotheses were tested at the 0.05 level of significance:

1. There is no significant difference in the mean ratings of Indigenous Farmers and Fishers and Community Development and Extension Personnel on the extent to which indigenous fishing knowledge systems are relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State.
2. There is no significant difference in the mean ratings of Indigenous Farmers and Fishers and Community Development and Extension Personnel on the extent to which indigenous farming knowledge systems are relevant to

sustainable food security among Ogoni/Ikwerre communities in Rivers State.

3. There is no significant difference in the mean ratings of Indigenous Farmers and Fishers and Community Development and Extension Personnel on the extent to which socio-cultural, environmental, and modernization-related challenges affect the sustenance and transmission of indigenous fishing and farming knowledge systems among Ogoni/Ikwerre communities in Rivers State.

Literature Review

Concept of Food Security

Food security is conventionally defined along four interlocking dimensions, availability of sufficient food, physical and economic access to that food, appropriate utilization for a healthy life, and the stability of these conditions over time, with a household or community regarded as food secure only when all four dimensions are simultaneously satisfied (FAO, 2023). Applied to Ogoni/Ikwerre communities, food security is shaped not only by market access and household income but by the continued vitality of local fishing and farming systems into which generations of accumulated ecological knowledge feed, making indigenous knowledge, and the customary practices that embody it, a foundational determinant of broader food security outcomes. In Rivers State, where a substantial share of locally consumed staples, fish, cassava, plantain, and vegetables, is produced by smallholder farmers and artisanal fisherfolk operating largely outside formal agricultural input systems, gaps in the sustenance of indigenous knowledge translate fairly directly into gaps in food availability and household food access (NBS, 2024).

Concept of Indigenous Knowledge Systems

Indigenous knowledge systems describe the cumulative body of skills, practices, beliefs, and ecological understanding that a community develops over generations through direct interaction with, and adaptation to, its local environment, transmitted principally through oral instruction, observation, and hands-on apprenticeship rather than through formal or codified curricula. Unlike introduced scientific or industrial approaches to food production, which are often standardized and imported wholesale into local contexts, indigenous knowledge systems are, by definition, finely tuned to local soil, water, weather, and biodiversity conditions, embodying an intimate, place-specific understanding accumulated through sustained trial, observation, and adaptation across generations (Berkes, 1999). In the specific context of Ogoni/Ikwerre communities in Rivers State, indigenous knowledge systems encompass both the fishing-related

knowledge of riverine and coastal Ogoni communities and the farming-related knowledge more prominent among upland Ikwerre communities, alongside a substantial body of knowledge shared and practised across both ethnic nationalities.

Ogoni and Ikwerre Communities in Rivers State

The Ogoni ethnic nationality, comprising the Khana, Gokana, Tai, and Eleme Local Government Areas, occupies a predominantly riverine and coastal ecological zone in which artisanal fishing in creeks, estuaries, and coastal waters has historically constituted a central livelihood alongside subsistence and smallholder farming, while the Ikwerre ethnic nationality, comprising the Port Harcourt, Obio/Akpor, Ikwerre, and Emohua Local Government Areas, occupies a predominantly upland ecological zone in which smallholder farming of cassava, yam, plantain, and vegetables has historically constituted the dominant livelihood, complemented by fishing in freshwater streams and ponds (Deekor & Amaewhule, 2025). Both ethnic nationalities combine a rich, still-practised body of indigenous ecological knowledge with continuing exposure to the same pressures, oil-related environmental degradation, coastal and land erosion, and the displacement of traditional livelihoods by urbanization and wage employment, that threaten the continued practice and intergenerational transmission of this knowledge across the State, creating both an opportunity and a challenge for sustainable food security: an opportunity because a substantial reservoir of locally adapted ecological knowledge still exists in principle to be documented, revitalized, and applied, and a challenge because the erosion of the social structures, elder mentorship, communal labour, customary conservation taboos, through which this knowledge has traditionally been transmitted threatens its continued availability to the next generation (Wokoma, 2024).

Indigenous Fishing Knowledge Systems and Food Security

Indigenous fishing knowledge systems rest on generations of accumulated understanding of local aquatic ecology, tidal and seasonal fish migration patterns, productive fishing grounds, and appropriate gear and technique for particular species and water conditions, knowledge that enables artisanal fisherfolk to sustain fish catch with comparatively low capital investment and without reliance on industrial fishing inputs. A study of riverine fishing communities in the Niger Delta found that traditional ecological indicators, tidal patterns, moon phases, water colour, and customary closed-season practices governing certain creeks and fishing grounds, remained widely relied upon even in communities with growing exposure to commercial fishing methods, though the consistency of

adherence to customary closed seasons varied considerably with the strength of local traditional governance structures (Wokoma, 2024). Elsewhere in the Niger Delta, structured documentation of indigenous fish preservation and smoking techniques has been associated with measurably reduced post-harvest losses among artisanal fisherfolk, lending empirical support to the view that indigenous fishing knowledge, properly sustained and, where appropriate, complemented by modern practice, can meaningfully strengthen the food-security-relevant productivity of communities such as those in Ogoni Rivers State (Nsirim & Gbaranor, 2025).

Indigenous Farming Knowledge Systems and Food Security

Indigenous farming knowledge systems rely on generations of accumulated understanding of local soil types, rainfall and lunar planting calendars, crop rotation and intercropping arrangements, and indigenous seed selection and storage practices, to sustain farm productivity and household food diversity without heavy reliance on purchased chemical inputs. Qualitative and survey work among smallholder farmers in Ikwerre and neighbouring upland Niger Delta communities found that traditional intercropping of cassava, yam, and vegetables, communal cooperative labour arrangements, and elder-led seed selection practices remained actively practised by a substantial share of farming households, with respondents describing these practices as more affordable and better adapted to local soil conditions than imported input-intensive alternatives, though reliance on these practices was gradually declining among younger, more formally educated farmers (Amaewhule, 2024). In Ikwerre communities specifically, indigenous knowledge of soil-fertility indicators and traditional pest-control methods using locally sourced herbs represents a still-active, if unevenly transmitted, body of practice of particular relevance given the rising cost of chemical fertilizers and pesticides among the State's smallholder farming population.

Challenges to the Sustenance of Indigenous Fishing and Farming Knowledge Systems

Even where indigenous fishing and farming knowledge systems continue to be practised, a range of socio-cultural, environmental, and modernization-related challenges continue to threaten their sustenance and intergenerational transmission among Ogoni/Ikwerre communities. Oil-related environmental degradation and pollution of creeks, farmland, and coastal waters in many Rivers State communities, compounded by coastal and land erosion that reduces the availability of ancestral fishing grounds and farmland, represents a foundational environmental constraint that no amount of knowledge documentation can

fully overcome (Gbaranor & Kpalap, 2023). Beyond environmental degradation, rural-urban migration of youth in search of formal employment, the displacement of oral apprenticeship by formal Western-style schooling, the erosion of customary taboo systems and traditional governance structures that once enforced conservation practices, and the near-total absence of documented, codified records of this knowledge have each been documented as constraints capable of preventing indigenous knowledge from being reliably transmitted to, and sustained by, the next generation (Gbaranor & Kpalap, 2023). These challenges matter for food security precisely because they determine whether the ecological and productive knowledge that indigenous fishing and farming systems are capable of sustaining actually survives, and continues to be practised, among the Ogoni/Ikwerre communities whose food security that knowledge is capable of supporting.

Theoretical Framework

This study is anchored on Traditional Ecological Knowledge Theory, associated with the work of Berkes (1999), which holds that indigenous communities develop, through sustained observation and adaptive management over generations, a cumulative body of knowledge, practice, and belief regarding the relationship of living beings, including humans, with one another and with their environment, and that this knowledge constitutes a valid, locally adapted complement to formal scientific approaches to natural resource management. Applied to this study, Traditional Ecological Knowledge Theory helps explain why indigenous fishing and farming practices, tidal and seasonal ecological indicators, customary closed seasons, traditional crop rotation, and locally adapted seed selection, have historically sustained productive, food-security-relevant livelihoods among Ogoni/Ikwerre communities, and why the erosion of the social structures through which this knowledge is transmitted would be expected to weaken its continued contribution to food security.

The study is complemented by Chambers and Conway's (1992) Sustainable Livelihoods Framework, which explains how households draw on a combination of natural, physical, human, social, and financial capital, including accumulated local knowledge and skills as a component of human capital, to construct livelihood strategies capable of withstanding shocks and stresses while sustaining their resource base for future use. Applied to the relevance of indigenous fishing and farming knowledge systems for sustainable food security among Ogoni/Ikwerre communities, the Sustainable Livelihoods Framework illuminates how indigenous knowledge functions as a form of human and social capital that reduces households' dependence on costly external inputs, how environmental

degradation erodes the natural capital, farmland, fishing grounds, and water quality, on which this knowledge is applied, and how the weakening of communal labour and mentorship structures represents an erosion of the social capital through which indigenous knowledge has traditionally been sustained and transmitted across generations.

Methodology

The study adopted an analytic descriptive survey design. According to Nworgu (2015), descriptive survey design is a design in which the researcher collects data from a sample or entire population and describes, as they currently exist, certain features or characteristics of the population under study. This design was considered appropriate because the study was concerned with describing, as they currently exist, the extent to which indigenous fishing and farming knowledge systems are relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State, and the extent to which socio-cultural, environmental, and modernization-related challenges affect the sustenance and transmission of these knowledge systems, as perceived by Indigenous Farmers and Fishers themselves and by the Community Development, Extension, and Traditional Institution Personnel (CDEP) who work alongside them.

The study was conducted in Rivers State, Nigeria, spanning the Ogoni ethnic nationality, comprising Khana, Gokana, Tai, and Eleme Local Government Areas, and the Ikwerre ethnic nationality, comprising Port Harcourt, Obio/Akpor, Ikwerre, and Emohua Local Government Areas. The population of the study comprised all indigenes actively engaged in fishing and/or farming as a primary or significant secondary livelihood across the selected Ogoni and Ikwerre communities, a population running into several tens of thousands based on Rivers State Ministry of Agriculture, Ministry of Fisheries, and community household records, from which it was neither feasible nor necessary to survey every member. Taro Yamane's formula was therefore applied, at a 5% margin of error and 95% confidence level, to determine an appropriate sample size, which, after adjustment for anticipated non-response, yielded a final sample of 380 Indigenous Farmers and Fishers (IFF). A multi-stage sampling procedure was adopted: the two ethnic nationality zones constituting the study area were first stratified, Local Government Areas and communities were then randomly selected within each zone in proportion to registered household population, and simple random sampling was finally used to select individual indigenous farmers and fisherfolk within the selected clusters. In addition, 110 Community Development, Fisheries/Agricultural Extension, and Traditional Institution Personnel (CDEP), comprising Rivers State Ministry of Agriculture and Ministry of

Fisheries extension officers, community development officers, and culture officers attached to Ogoni and Ikwerre traditional councils, were purposively selected and studied through a census approach given their manageable number and the specialized nature of their involvement in community development and cultural preservation activities.

Data were collected using a structured questionnaire titled “Indigenous Fishing and Farming Knowledge Systems and Sustainable Food Security Questionnaire” (IFFKS-SFSQ). Responses were structured on a four-point summated rating scale weighted as follows: Very High Extent (VHE) = 4 points, High Extent (HE) = 3 points, Low Extent (LE) = 2 points, and Very Low Extent (VLE) = 1 point.

The instrument was subjected to face and content validation by three experts, one in Adult and Community Development Education and two in Measurement and Evaluation at a Rivers State university. Their comments and observations were incorporated into the final version of the instrument. The reliability of the instrument was established through a test of internal consistency using the Cronbach Alpha method, administered on 20 Indigenous Farmers and Fishers and Community Development/Extension Personnel in a Rivers State

community outside the sample of the study. Reliability coefficients of 0.78, 0.84, and 0.86 were obtained for the indigenous fishing knowledge, indigenous farming knowledge, and challenges clusters respectively, with a cumulative coefficient of 0.82 for the full instrument, indicating that the instrument was reliable for the purposes of the study.

Data collected were analysed using mean, standard deviation, and z-test statistics. Research questions were answered using mean and standard deviation, based on a criterion mean of 2.50, with the following classification: Very High Extent (3.50 - 4.00), High Extent (2.50 - 3.49), Low Extent (1.50 - 2.49), and Very Low Extent (1.00 - 1.49). Hypotheses were tested using z-test statistics at the 0.05 level of significance. The null hypotheses were rejected, and the alternate hypotheses accepted, where the computed z-value was greater than the critical z-value; otherwise, the null hypotheses were retained.

Results

Research Question One: To what extent are indigenous fishing knowledge systems relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State?

Table 1: Mean Ratings of Indigenous Farmers and Fishers and Community Development/Extension Personnel on the Extent to Which Indigenous Fishing Knowledge Systems are Relevant to Sustainable Food Security among Ogoni/Ikwerre Communities in Rivers State

S/N	Items	IFF (N=380) Mean	SD	Remark	CDEP (N=110) Mean	SD	Remark
1	Traditional fish-trapping and basket-weaving techniques passed down from elders help sustain fish catch among riverine households.	2.95	0.88	High Extent	2.74	0.93	High Extent
2	Knowledge of seasonal fish migration and tidal patterns guides indigenous fishers on the most productive periods for fishing.	2.88	0.90	High Extent	2.70	0.95	High Extent
3	Traditional fish smoking and preservation techniques using local hearths prolong shelf life and reduce post-harvest fish losses.	3.02	0.84	High Extent	2.80	0.90	High Extent
4	Local ecological indicators, such as moon phases, tidal changes, and water colour, guide indigenous fishers to safe and productive fishing grounds.	2.80	0.92	High Extent	2.62	0.96	High Extent
5	Customary closed-season practices on certain creeks and fishing grounds help protect fish stocks for future community harvest.	2.65	0.97	High Extent	2.55	1.00	High Extent

S/N	Items	IFF (N=380) Mean	SD	Remark	CDEP (N=110) Mean	SD	Remark
6	Indigenous knowledge of canoe-building and local fishing-gear construction sustains affordable fishing among riverine households.	2.90	0.87	High Extent	2.68	0.93	High Extent
7	Traditional knowledge of fishpond and brackish-water management, passed across generations, supports small-scale aquaculture among Ikwerre communities.	2.70	0.95	High Extent	2.58	0.98	High Extent
8	Intergenerational mentorship, in which elders train youth in indigenous fishing practices, sustains the local fish food supply.	2.98	0.86	High Extent	2.78	0.91	High Extent
	Grand Mean	2.86	0.90	High Extent	2.68	0.95	High Extent

Table 1 shows that items on indigenous fishing knowledge systems had mean values ranging from 2.65 to 3.02 for Indigenous Farmers and Fishers and from 2.55 to 2.80 for Community Development and Extension Personnel. With grand mean scores of 2.86 and 2.68 respectively, both within the high extent criterion range, the finding is that indigenous fishing knowledge systems are relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State to a high extent, though the lower of the two knowledge systems examined. This finding is consistent with Wokoma (2024), whose

observation that traditional ecological indicators and customary closed-season practices remain widely relied upon in Niger Delta riverine communities implies genuine, if unevenly sustained, relevance of indigenous fishing knowledge among Ogoni/Ikwerre communities.

Research Question Two: To what extent are indigenous farming knowledge systems relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State?

Table 2: Mean Ratings of Indigenous Farmers and Fishers and Community Development/Extension Personnel on the Extent to Which Indigenous Farming Knowledge Systems are Relevant to Sustainable Food Security among Ogoni/Ikwerre Communities in Rivers State

S/N	Items	IFF (N=380) Mean	SD	Remark	CDEP (N=110) Mean	SD	Remark
1	Traditional crop rotation and mixed-cropping practices maintained by Ogoni/Ikwerre farmers improve soil fertility and crop yields.	3.30	0.77	High Extent	3.02	0.85	High Extent
2	Knowledge of local soil types and indigenous soil-fertility indicators guides farmers in selecting suitable crops for particular plots.	3.15	0.82	High Extent	2.90	0.88	High Extent
3	Traditional intercropping of cassava, yam, and vegetables sustains household food diversity across farming seasons.	3.38	0.75	High Extent	3.08	0.83	High Extent

S/N	Items	IFF (N=380) Mean	SD	Remark	CDEP (N=110) Mean	SD	Remark
4	Indigenous seed selection and storage practices preserve crop varieties well adapted to local soil and rainfall conditions.	3.10	0.84	High Extent	2.85	0.90	High Extent
5	The traditional farming calendar, based on rainfall patterns and lunar cycles, guides indigenous farmers on planting and harvesting times.	3.05	0.85	High Extent	2.80	0.91	High Extent
6	Communal cooperative labour arrangements among age-grades and farming groups sustain farm productivity during peak planting and harvesting periods.	3.22	0.80	High Extent	2.95	0.87	High Extent
7	Indigenous pest and disease control methods, using locally sourced herbs and plant extracts, reduce crop losses without reliance on costly agrochemicals.	3.00	0.86	High Extent	2.75	0.93	High Extent
8	Elders' mentorship of young farmers in traditional farming practices sustains the intergenerational transfer of farming knowledge.	3.28	0.79	High Extent	3.00	0.86	High Extent
	Grand Mean	3.18	0.81	High Extent	2.92	0.88	High Extent

Table 2 shows that items on indigenous farming knowledge systems had mean values ranging from 3.00 to 3.38 for Indigenous Farmers and Fishers and from 2.75 to 3.08 for Community Development and Extension Personnel. With grand mean scores of 3.18 and 2.92 respectively, the higher of the two knowledge systems examined, the finding is that indigenous farming knowledge systems are relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State to a high extent, and that these knowledge systems are perceived as more strongly sustained than indigenous fishing knowledge systems by both groups. This finding is consistent with Amaewhule

(2024), whose survey of smallholder farmers in Ikwerre and neighbouring upland communities found traditional intercropping, communal labour, and elder-led seed selection to remain actively practised and positively rated by farming households.

Research Question Three: To what extent do socio-cultural, environmental, and modernization-related challenges affect the sustenance and transmission of indigenous fishing and farming knowledge systems among Ogoni/Ikwerre communities in Rivers State?

Table 3: Mean Ratings of Indigenous Farmers and Fishers and Community Development/Extension Personnel on the Extent to Which Socio-Cultural, Environmental, and Modernization-Related Challenges Affect the Sustenance and Transmission of Indigenous Fishing and Farming Knowledge Systems among Ogoni/Ikwerre Communities in Rivers State

S/N	Items	IFF (N=380) Mean	SD	Remark	CDEP (N=110) Mean	SD	Remark
1	Environmental degradation from oil spillage and industrial pollution has diminished fish stocks and farmland fertility in Ogoni/Ikwerre communities.	3.42	0.72	High Extent	3.60	0.64	Very High Extent

S/N	Items	IFF (N=380) Mean	SD	Remark	CDEP (N=110) Mean	SD	Remark
2	Rural-urban migration of youth in search of formal employment reduces the number of people available to learn indigenous fishing and farming practices.	3.20	0.83	High Extent	3.45	0.74	High Extent
3	Preference for formal Western-style education over traditional apprenticeship weakens intergenerational transmission of indigenous knowledge.	3.35	0.78	High Extent	3.58	0.67	Very High Extent
4	Erosion of customary taboo systems and traditional governance structures reduces adherence to indigenous conservation practices.	3.18	0.84	High Extent	3.40	0.76	High Extent
5	Limited documentation of indigenous fishing and farming knowledge, sustained mainly through oral transmission, risks permanent loss of this knowledge.	3.48	0.71	High Extent	3.68	0.61	Very High Extent
6	Land degradation, coastal erosion, and encroachment limit continued access to ancestral farming plots and fishing grounds.	3.30	0.80	High Extent	3.52	0.70	Very High Extent
7	Low integration of indigenous fishing and farming knowledge into formal school curricula reduces youth exposure to this knowledge.	3.25	0.81	High Extent	3.50	0.71	Very High Extent
8	Weak institutional and policy support for indigenous knowledge systems limits their formal recognition and integration into modern extension services.	3.38	0.77	High Extent	3.62	0.65	Very High Extent
	Grand Mean	3.32	0.78	High Extent	3.54	0.68	Very High Extent

Table 3 shows that items on socio-cultural, environmental, and modernization-related challenges had mean values ranging from 3.18 to 3.48 for Indigenous Farmers and Fishers and from 3.40 to 3.68 for Community Development and Extension Personnel. With grand mean scores of 3.32 and 3.54 respectively, the finding is that socio-cultural, environmental, and modernization-related challenges affect the sustenance and transmission of indigenous fishing and farming knowledge systems among Ogoni/Ikwerre communities in Rivers State to a high, bordering on very high, extent, with Community Development and Extension Personnel rating the severity of these challenges somewhat higher than Indigenous Farmers and Fishers themselves. This finding is consistent with Gbaranor and Kpalap

(2023), whose account of cultural erosion among rural Niger Delta communities identified environmental degradation, youth migration, and weak documentation as the most persistent threats to the survival of indigenous ecological knowledge.

Test of Hypotheses

H₀₁: There is no significant difference in the mean ratings of Indigenous Farmers and Fishers and Community Development and Extension Personnel on the extent to which indigenous fishing knowledge systems are relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State.

Table 4: Z-Test Analysis of Difference in Mean Ratings of Indigenous Farmers and Fishers and Community Development/Extension Personnel on Indigenous Fishing Knowledge Systems

Group	N	Mean	SD	z-cal	z-crit	df	Decision
Indigenous Farmers and Fishers	380	2.86	0.90	1.47	1.96	488	Null Retained
CDEP	110	2.68	0.95				

Table 4 shows that the calculated z-value of 1.47 is less than the critical z-value of 1.96 at the 0.05 level of significance with 488 degrees of freedom. The null hypothesis is accordingly retained. There is no significant difference in the mean ratings of Indigenous Farmers and Fishers and Community Development and Extension Personnel on the extent to which indigenous fishing knowledge systems are relevant to sustainable food security among Ogoni/Ikwerre

communities in Rivers State, indicating a shared perception between the two groups on this knowledge system.

Ho₂: There is no significant difference in the mean ratings of Indigenous Farmers and Fishers and Community Development and Extension Personnel on the extent to which indigenous farming knowledge systems are relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State.

Table 5: Z-Test Analysis of Difference in Mean Ratings of Indigenous Farmers and Fishers and Community Development/Extension Personnel on Indigenous Farming Knowledge Systems

Group	N	Mean	SD	z-cal	z-crit	df	Decision
Indigenous Farmers and Fishers	380	3.18	0.81	2.98	1.96	488	Null Rejected
CDEP	110	2.92	0.88				

Table 5 shows that the calculated z-value of 2.98 is greater than the critical z-value of 1.96 at the 0.05 level of significance with 488 degrees of freedom. The null hypothesis is rejected. There is a significant difference in the mean ratings of Indigenous Farmers and Fishers and Community Development and Extension Personnel on the extent to which indigenous farming knowledge systems are relevant to sustainable food security among Ogoni/Ikwerre communities in Rivers State, with Indigenous Farmers and Fishers rating this knowledge system significantly more

highly than Community Development and Extension Personnel.

Ho₃: There is no significant difference in the mean ratings of Indigenous Farmers and Fishers and Community Development and Extension Personnel on the extent to which socio-cultural, environmental, and modernization-related challenges affect the sustenance and transmission of indigenous fishing and farming knowledge systems among Ogoni/Ikwerre communities in Rivers State.

Table 6: Z-Test Analysis of Difference in Mean Ratings of Indigenous Farmers and Fishers and Community Development/Extension Personnel on Challenges to the Sustenance of Indigenous Fishing and Farming Knowledge Systems

Group	N	Mean	SD	z-cal	z-crit	df	Decision
Indigenous Farmers and Fishers	380	3.32	0.78	2.61	1.96	488	Null Rejected
CDEP	110	3.54	0.68				

Table 6 shows that the calculated z-value of 2.61 is greater than the critical z-value of 1.96 at the 0.05 level of significance with 488 degrees of freedom. The null hypothesis is rejected. There is a significant difference in the mean ratings of Indigenous Farmers and Fishers and Community Development and Extension Personnel on the extent to which socio-cultural, environmental, and modernization-related challenges affect the sustenance and transmission of

indigenous fishing and farming knowledge systems among Ogoni/Ikwerre communities in Rivers State, with Community Development and Extension Personnel rating the severity of these challenges significantly higher than Indigenous Farmers and Fishers themselves.

Discussion of Findings

The finding that indigenous fishing knowledge systems are relevant to sustainable food security among Ogoni/Ikwerre

communities to a high extent (IFF grand mean = 2.86; CDEP grand mean = 2.68), with no significant difference between the two groups, affirms the continued value of traditional fishing techniques, ecological indicators, and preservation practices as a channel of household food provisioning, while the absence of a significant perception gap suggests that both Indigenous Farmers and Fishers and the personnel who work alongside them broadly agree on their moderate, high-extent relevance. This is consistent with Wokoma (2024), who found that traditional ecological indicators and customary closed-season practices remained widely relied upon in Niger Delta riverine communities even where the consistency of adherence to customary conservation practices varied, indicating that the existence of indigenous fishing knowledge and its fully consistent application are related but not identical outcomes.

Indigenous farming knowledge systems recorded the higher grand means of the two knowledge systems examined (IFF grand mean = 3.18; CDEP grand mean = 2.92), and the significant difference between the two groups, with Indigenous Farmers and Fishers rating this knowledge system considerably more highly than Community Development and Extension Personnel, suggests that indigenous farmers themselves place greater practical value on traditional farming practices than extension and development professionals credit them with doing. This is consistent with Amaewhule (2024), who found that traditional intercropping, communal labour, and elder-led seed selection remained actively practised and positively rated among smallholder farmers in Ikwerre and neighbouring communities, and it agrees with Nwoye et al. (2021), who reported that the customs and traditions of rural communities shaped the way households mobilized local resources for development programmes, an indication that practices carried in local custom retained real working value for the people who lived by them. The pattern also lends support to the Sustainable Livelihoods Framework's (Chambers & Conway, 1992) proposition that accumulated local knowledge functions as a form of human capital whose practical value is often most keenly appreciated by the households who depend on it directly, even where broader structural conditions, land availability and institutional recognition in particular, remain imperfect.

The finding on socio-cultural, environmental, and modernization-related challenges, rated at a high, bordering on very high, extent by both groups (IFF grand mean = 3.32; CDEP grand mean = 3.54), with Community Development and Extension Personnel rating the severity of these challenges significantly higher than Indigenous Farmers and Fishers themselves, is broadly consistent with Traditional Ecological Knowledge Theory (Berkes, 1999), in which persistent disruptions to the social and

environmental context within which indigenous knowledge is generated and transmitted, environmental degradation, weakened customary governance, and declining oral apprenticeship, are expected to erode the continued vitality of that knowledge regardless of its underlying practical value. The significant gap between the two groups on this construct, with development and extension personnel perceiving these challenges as more severe than the Indigenous Farmers and Fishers who actually contend with them daily, suggests that development professionals may be somewhat more attuned to the systemic, institutional dimensions of the erosion of indigenous knowledge than individual practitioners, who may experience and normalize these same constraints as an unremarkable feature of daily community life. This reading agrees with Taylor and Alikor (2024), who found that community-based organizations remained central to mobilizing citizens for participation in development activities among the Ikwerre people of Rivers State, so that any weakening of these community structures would be noticed first by the personnel who work through them, even while indigenous farmers and fisherfolk carry on with their practices without necessarily reading that weakening as a threat to the knowledge they hold.

Conclusion

Based on the findings of this study, it is concluded that both indigenous fishing knowledge systems and indigenous farming knowledge systems remain high-extent, empirically meaningful contributors to sustainable food security among Ogoni/Ikwerre communities in Rivers State, with indigenous farming knowledge systems perceived as the more strongly sustained of the two, particularly by Indigenous Farmers and Fishers themselves. At the same time, socio-cultural, environmental, and modernization-related challenges, environmental degradation from oil spillage and pollution, youth rural-urban migration, the displacement of oral apprenticeship by formal schooling, weakened customary governance structures, and limited documentation, affect the sustenance and transmission of these knowledge systems to a high, bordering on very high, extent, with Community Development and Extension Personnel perceiving these challenges as significantly more severe than Indigenous Farmers and Fishers do. Ogoni/Ikwerre communities in Rivers State are therefore already sustaining a rich, food-security-relevant reservoir of indigenous fishing and farming knowledge, but the durability of that knowledge base remains threatened by environmental and social conditions that lie substantially beyond the control of individual practitioners, signalling a need for coordinated documentation, institutional recognition, and community-

based revitalization of indigenous knowledge alongside continued support for the livelihoods it sustains.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. The Rivers State Ministry of Culture and Tourism, in collaboration with traditional councils and community-based organizations, should support the systematic documentation of indigenous fishing and farming knowledge across Ogoni and Ikwerre communities, including audio-visual recording of elder knowledge-holders, before this knowledge is irretrievably lost.
2. Given that indigenous farming knowledge systems recorded the higher grand means and the more favourable ratings by Indigenous Farmers and Fishers themselves, the Rivers State Ministry of Agriculture and partner agricultural extension agencies should deliberately integrate validated indigenous farming practices, intercropping arrangements, indigenous seed selection, and traditional pest control, into formal agricultural extension messaging delivered to farming communities.
3. State and local government authorities, environmental regulatory agencies, and oil-industry operators should prioritize environmental remediation of degraded fishing grounds and farmland, while the Ministry of Education should support the integration of indigenous ecological knowledge into basic and secondary school curricula, given that environmental degradation and weak curricular integration were rated as affecting the sustenance and transmission of indigenous knowledge to a high, bordering on very high, extent by both Indigenous Farmers and Fishers and Community Development and Extension Personnel.

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