

SOCIO-DEMOGRAPHIC PROFILE AND PERCEPTION OF CLIMATE VARIABILITY AMONG WOMEN FISH MARKETERS IN YOLA NORTH LOCAL GOVERNMENT AREA, ADAMAWA STATE, NIGERIA

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Abstract

Women dominate the post-harvest segment of Nigeria's fish value chain, yet the socio-demographic characteristics that shape their exposure and perception of climate variability remain poorly documented at the local government level, particularly in the Benue River floodplain of north-eastern Nigeria. This study characterized the socio-demographic profile of women fish marketers in Yola North Local Government Area (LGA), Adamawa State, and assessed their awareness of and exposure to, climate variability. A cross-sectional survey was conducted among 334 women fish marketers drawn from three markets (Jimeta Modern Market, Jambutu Park, and Jimeta Old Market) using structured questionnaires complemented by in-depth interviews. Data were analyzed descriptively using SPSS version 26. Respondents were predominantly aged 31–50 years (71.9%), married (61.3%), and had no formal or only primary education (67.7% combined). Most had 5–15 years of trading experience (64.2%) and dealt mainly in smoked fish (48.2%) sourced from local fishermen (52.3%). Awareness of changing weather patterns was almost universal (91.4%), with irregular rainfall (68.7%), prolonged dry seasons (59.3%) and rising temperature (54.1%) most frequently observed, while flooding (39.6%) was identified as the single most damaging climatic event. Women fish marketers in Yola North constitute a demographically homogeneous but structurally disadvantaged trading population whose low educational attainment and localized supply dependence heighten their exposure to climate variability despite near-universal experiential awareness of it. Gender- and literacy-responsive climate information services are recommended.

Keywords: *climate variability; women fish marketers; socio-demographic profile; climate perception; Adamawa State; Nigeria*

1. Introduction

Fish provides between 40 and 50% of the total animal protein intake of Nigerian households and underpins the livelihoods of more than a million people employed across the country's fisheries value chain, with women constituting the majority of actors in the post-harvest segments of processing, smoking and retail marketing (Federal Ministry of Agriculture and Rural Development, 2008; Audu *et al.*, 2024; Odioko and Becer, 2022). Despite this central economic role, women fish marketers occupy a structurally disadvantaged position within the value chain: they rarely own fishing assets, are frequently excluded from fisheries cooperatives, and operate with limited access to credit, storage infrastructure and formal market protection (FAO, 2021; Olagunju *et al.*, 2023).

Climate variability, expressed through irregular rainfall, prolonged dry seasons, rising temperatures and increasingly erratic flooding, is now a defining feature of livelihood risk for fisheries-dependent communities across sub-Saharan Africa (Ibeun *et al.*, 2025; Oguntuga *et al.*,

2022). In Yola North Local Government Area (LGA) of Adamawa State, women engaged in fish marketing represent a substantial share of the rural and peri-urban poor whose economic activity is directly tied to the hydrology of the Benue River floodplain (UNDP, 2012; World Bank, 2014). Yet the socio-demographic characteristics that condition how this population experiences and perceives climate variability, characteristics such as age structure, marital status, educational attainment, trading experience and supply-chain positioning, remain undocumented for this specific trading population, even though such characteristics are known elsewhere to shape both exposure to, and capacity to respond to, climate-related shocks (Ngcamu and Mantzaris, 2023; Ajani and Igbokwe, 2023).

This paper addresses that gap. It reports the socio-demographic profile of a large, market-representative sample of women fish marketers in Yola North LGA and examines their awareness and perception of climate variability, as a foundation for the more targeted vulnerability and adaptation analyses that this profile subsequently conditions. The specific objectives were to: (i) describe the socio-demographic and occupational characteristics of women fish marketers in the study area; and (ii) assess their awareness of, and perceptions regarding, dimensions and patterns of climate variability affecting their trade.

2. Literature Review

2.1 Women in Fish Marketing Value Chains

The fish value chain comprises harvesting, processing, transportation and marketing, with women disproportionately represented in the post-harvest segments while remaining largely absent from harvesting and decision-making roles (FAO, 2021). In southern Nigerian fishing communities, women account for nearly 70% of those engaged in fish processing and marketing but fewer than 10% of harvesters (Alhassan *et al.*, 2022), an occupational segregation rooted less in physical labour distribution than in patriarchal norms that restrict women's access to boats, fishing grounds and cooperative membership (Williams, 2008). Comparable patterns have been documented in Lagos and Ogun State aquaculture systems, where women are concentrated in lower-capital, lower-return downstream nodes of the value chain (Adam *et al.*, 2025; Adam, Njogu, Ouko, Rajaratnam, Adeleke, Ogunya, Akuwa and Farnworth, 2025).

Educational attainment and trading experience are recurrent correlates of adaptive capacity in this literature. Ngcamu and Mantzaris (2023) identify educational level as one of the strongest predictors of climate-risk awareness and adaptive uptake among informal women traders in sub-Saharan Africa, because climate information, credit applications and training programmes are typically transmitted through literacy-dependent channels. Where formal education is limited, accumulated trading experience functions as a partial substitute, generating indigenous observational knowledge of river levels, rainfall onset and seasonal fish movement that traders use to time purchasing and travel decisions (Ajani and Igbokwe, 2023).

2.2 Age, Marital Status and Livelihood Dependence

Middle-aged women dominate African informal trading networks, a pattern attributed to the intersection of accumulated household responsibility and systemic exclusion from formal-sector employment (Alhassan *et al.*, 2022; Fonjong and Zama, 2023). Widowhood and single motherhood are, in turn, associated with heightened dependence on informal trade as a primary survival strategy rather than a supplementary income source, because female-headed households typically face compounded restrictions on land, credit and inheritance rights relative to married women (Kwena, Bukusi, Ng'ayo and Buffardi, 2023).

2.3 Perception and Experiential Awareness of Climate Variability

A substantial body of evidence indicates that populations whose livelihoods are directly climate-sensitive develop strong experiential awareness of shifting weather patterns even in the absence of

formal education, because they encounter the consequences of climatic disruption directly and repeatedly in daily economic activity (Ayanlade and Oladimeji, 2023; Ogundele, Olatunde and Adejuwon, 2024). Ajani and Igbokwe (2023) argue that such indigenous knowledge systems, though sophisticated, should be formally recognized and integrated into adaptation planning rather than treated as inferior to scientific climate information, particularly as increasing rainfall and flood unpredictability begins to erode the reliability of historically accumulated experience.

3. Materials and Methods

3.1 Study Area

The study was conducted in Yola North LGA, Adamawa State, north-eastern Nigeria (approximately 9.2°N, 12.48°E), which had a projected population of about 307,900 in 2022 (National Population Commission [NPC], 2023). The LGA encompasses Jimeta, the commercial center of Adamawa State, and lies on the Benue River floodplain at elevations of roughly 135–186 m above sea level. The area falls within the tropical wet-and-dry (Aw) climatic zone, with rainfall concentrated between July and September and a pronounced Harmattan-affected dry season from November to March; mean annual rainfall is approximately 870–920 mm and mean annual temperature approximately 28°C (Tarhule and Woo, 2002; Nigerian Meteorological Agency [NiMet], 2022). Three markets served as study sites: Jimeta Modern Market, Jambutu Park, and Jimeta Old Market, which collectively represent the principal nodes of fish trade concentration in the LGA (Adamu and Musa, 2019; Olayide *et al.*, 2016).

3.2 Research Design and Sampling

A cross-sectional, mixed-methods survey design was adopted, combining structured questionnaire administration with in-depth interviews and direct field observation (Creswell and Creswell, 2018). Respondents were women actively engaged in fish retailing, processing or wholesaling on the day of data collection, recruited through on-site purposive and convenience sampling at their trading stalls to ensure voluntary participation (Lew, 2011). Minimum sample size was estimated at 120 using the Taro Yamane (1967) formula at a 95% confidence level (Israel, 1992); a larger achieved sample of 334 respondents was obtained across the three markets to strengthen the precision of subgroup estimates. Illiterate respondents were interviewed orally by trained field assistants in English or Hausa, while literate respondents self-administered the questionnaire; each session lasted approximately 90 minutes (Ahmad, 2012).

3.3 Data Collection and Analysis

The structured questionnaire, pre-tested for clarity and face validity, comprised sections on socio-demographic characteristics, livelihood activities, perception of climate variability, and coping strategies. Data were coded, entered and analyzed using the Statistical Package for the Social Sciences (SPSS), version 26. Descriptive statistics (frequencies and percentages) were computed to characterize the socio-demographic profile of respondents and their reported awareness and perception of climate variability (Field, 2018).

3.4 Ethical Considerations

Ethical approval was obtained from the Institutional Research Ethics Committee of Modibbo Adama University, Yola, prior to fieldwork. Informed consent, confidentiality, voluntary participation and non-maleficence were observed throughout, in accordance with established ethical standards for research involving human participants (American Psychological Association [APA], 2020).

4. Results

4.1 Socio-Demographic and Occupational Characteristics

Table 1 presents the socio-demographic profile of the 334 women sampled. Respondents were concentrated in the economically active middle years; with 43.2% aged 31–40 and 28.7% aged 41–50 years, together accounting for 71.9% of the sample; only 21.0% were below 30 years and 7.1% above 50 years. Married women constituted the majority (61.3%), followed by widows (22.4%), divorced women (10.8%) and single women (5.5%). Educational attainment was low: 38.6% of respondents had no formal education, 29.1% had attained only primary education, 24.3% secondary education, and just 8.0% tertiary education.

Table 1: Socio-Demographic and Occupational Characteristics of Respondents (N = 334)

Variable	Category	Frequency	Percentage (%)
Age (years)	Below 20	7	2.1
	21–30	63	18.9
	31–40	144	43.2
	41–50	96	28.7
	Above 50	24	7.1
Marital status	Single	18	5.5
	Married	205	61.3
	Widowed	75	22.4
	Divorced	36	10.8
Education	No formal education	129	38.6
	Primary	97	29.1
	Secondary	81	24.3
	Tertiary	27	8.0
Trading experience	Less than 5 years	79	23.6
	5–10 years	116	34.7
	11–15 years	99	29.5
	Above 15 years	40	12.2
Fish type marketed	Fresh fish	97	28.9
	Smoked fish	161	48.2
	Both	76	22.9
Fish supply source	Local fishermen	175	52.3
	Wholesalers	106	31.8
	Self-caught	28	8.4
	Others	25	7.5

Most respondents had accumulated moderate-to-extensive trading experience, with 34.7% reporting 5–10 years and 29.5% reporting 11–15 years in the trade. Smoked fish was the dominant product handled (48.2%), followed by fresh fish (28.9%) and dual fresh-and-smoked trading (22.9%). Fish supply was strongly localized: 52.3% of respondents sourced fish from local fishermen and 31.8% from wholesalers, with self-caught fish (8.4%) and other sources (7.5%) comparatively minor.

4.2 Awareness and Perception of Climate Variability

Table 2 shows that awareness of changing weather patterns was almost universal, with 91.4% of respondents reporting awareness compared with 8.6% reporting none. Among specific manifestations observed (multiple responses permitted), irregular rainfall was identified most

frequently (68.7%), followed by prolonged dry season (59.3%), increased temperature (54.1%), flooding (47.8%) and strong winds (32.4%). When asked to identify the single most impactful climatic event, however, flooding was named by the largest proportion of respondents (39.6%), followed by rainfall fluctuation (27.3%), heat (18.9%), drought (10.7%) and other events (3.5%).

Table 2: Awareness and Perception of Climate Variability Among Respondents (N = 334)

Indicator	Category	Frequency	Percentage (%)
Awareness of weather pattern change	Yes	305	91.4
	No	29	8.6
Types of climate variability observed*	Irregular rainfall	229	68.7
	Prolonged dry season	198	59.3
	Increased temperature	181	54.1
	Flooding	160	47.8
	Strong winds	108	32.4
Most impactful climatic event	Flooding	132	39.6
	Rainfall fluctuation	91	27.3
	Heat	63	18.9
	Drought	36	10.7
	Others	12	3.5

*Multiple responses permitted; percentages are based on the 334 respondents and do not sum to 100.

5. Discussion

The demographic concentration of respondents in the 31–50 age bracket (71.9%) and the comparatively thin representation of traders below 30 years (21.0%) mirrors patterns documented among coastal and riverine women traders elsewhere in Nigeria, where accumulated trading capital and supplier networks favour older entrants (Alhassan *et al.*, 2022). This pattern raises an intergenerational sustainability concern consistent with observations that younger women in northern Nigeria increasingly move toward urban wage employment or continued schooling rather than inheriting informal trading livelihoods (Akinbami and Adeoti, 2024; Damte, Negash and Kassie, 2023), a shift that risks eroding the indigenous ecological and market knowledge concentrated among the above-50 cohort over time.

The predominance of married women (61.3%) alongside a substantial widowed sub-group (22.4%) is consistent with fish marketing functioning simultaneously as an extension of household provisioning and, for widows, as a primary survival strategy. Female-headed households and widows in particular, have been shown to suffer disproportionately from climate shocks owing to pre-existing structural deficits in land access, formal credit and inheritance rights (Kwena, Bukusi, Ng'ayo and Buffardi, 2023). The gendered division of labour documented across Nigerian fish value chains, in which men undertake the physically riskier task of travelling to landing sites while women retail the catch, helps explain why this sample is composed overwhelmingly of retailing, processing and market-vending actors rather than direct fishers, concentrating women's climate exposure at the marketing and processing nodes of the value chain (Adam *et al.*, 2025).

The low educational profile recorded, with 38.6% of respondents having no formal education and only 8.0% reaching tertiary level, is a critical vulnerability marker rather than a background statistic, given that climate information, formal credit applications and adaptation training are typically transmitted through literacy-dependent channels (Ngcamu and Mantzaris, 2023). The corresponding finding that most respondents had accumulated five or more years of trading

experience (76.4% combined across the 5–10, 11–15 and above-15-year categories) indicates a partial compensatory mechanism: extensive experiential learning generates the observational knowledge of river levels, rainfall timing and fish movement that Ajani and Igbokwe (2023) identify as a sophisticated, if informal, climate-adaptive resource.

The near-universal awareness of changing weather patterns recorded here (91.4%) decisively counters any assumption that informal market actors lack climate consciousness, and is consistent with continent-wide evidence that livelihood-proximate climate exposure generates strong experiential awareness independent of formal education (Ayanlade and Oladimeji, 2023; Ogundele *et al.*, 2024). The distinction between what respondents observe most frequently, irregular rainfall and prolonged dry seasons, and what they judge most damaging, flooding, is analytically important: it suggests that adaptation programming calibrated only to the most visible hazard risks underserving the chronic, lower-intensity disruptions that erode trading conditions on a more continuous basis. Given Yola North's location on the Benue River floodplain, the prominence of flooding as the most damaging single event is unsurprising and is consistent with the transboundary hydrological risk posed by periodic water releases from the Lagdo Dam in neighboring Cameroon, a risk largely outside the control of individual traders (Tarhule and Woo, 2002).

The heavy reliance on local fishermen for supply (52.3%) indicates highly localized value-chain integration. While direct relationships with local fishermen can reduce transaction costs and provide preferential access during scarcity, dependence on a narrow, geographically concentrated supply base makes women highly vulnerable to localized climate shocks such as drought-induced fish kills or flood-damaged fishing gear, particularly where capital and mobility constraints prevent traders from accessing alternative or more distant suppliers during local scarcity (Aroyehun and Henri-Ukoha, 2024).

6. Conclusion and Recommendations

Women fish marketers in Yola North LGA constitute a demographically concentrated trading population, predominantly middle-aged, married, poorly educated, and moderately to highly experienced, whose occupational profile is built around smoked-fish trading sourced overwhelmingly from local fishermen. Despite this low formal educational attainment, awareness of climate variability is near-universal, generated primarily through direct, repeated livelihood exposure rather than formal climate information services. This combination of high experiential awareness and low formal education represents both a resource, in the form of indigenous ecological knowledge, and vulnerability, in the form of limited access to literacy-dependent adaptation channels.

It is recommended that: (i) climate information services be adapted to non-literate audiences through oral, visual and vernacular-language formats disseminated via market associations; (ii) targeted outreach be designed to retain younger women within fish trading networks so that accumulated indigenous ecological knowledge is transferred rather than lost; and (iii) future vulnerability and adaptation research and programming in the study area explicitly account for the demographic concentration identified here, particularly the disproportionate reliance of widows on fish trading as a primary livelihood.

References

- Adam, R. I., Njogu, L. G., Ouko, K. O., Rajaratnam, S., Adeleke, L., Ogunya, L., Akuwa, E. I., & Farnworth, C. R. (2025). Unveiling gender dynamics and disparities in the aquaculture value chain: Evidence from Ogun and Delta States, Nigeria. *Aquaculture International*, 33, 343.

- Adamu, H., & Musa, I. J. (2019). Spatial analysis of market distribution in Yola metropolis, Adamawa State, Nigeria. *Journal of Geography and Regional Planning*, 12(3), 45–56.
- Ahmad, S. (2012). Questionnaire design and pre-testing in social science research. *International Journal of Research Methods*, 5(2), 44–59.
- Ajani, E. N., & Igbokwe, E. M. (2023). Indigenous climate knowledge systems and adaptation strategies among rural women in Nigeria. *Climate and Development*, 15(8), 712–728.
- Akinbami, O., & Adeoti, A. (2024). Youth migration and the future of informal fisheries trade in Nigeria. *Migration and Development*, 13(2), 234–251.
- Alhassan, I., Adeyemi, M., & Bello, M. (2022). Gender roles and participation in fisheries value chain in southern Nigeria. *Journal of Agricultural Research and Development*, 21(1), 113–127.
- American Psychological Association. (2020). Publication manual of the American Psychological Association (7th ed.). APA Publishing.
- Aroyehun, A. O., & Henri-Ukoha, A. (2024). Climate vulnerability and adaptive capacity among women in Nigeria's fisheries sector. *African Journal of Food, Agriculture, Nutrition and Development*, 24(3), 23789–23807.
- Audu, B. T., Oladele, O. I., & Adesope, O. M. (2024). Sustaining the blue bounty: Fish food and nutrition security in Nigeria's evolving blue economy. *AIMS Agriculture and Food*, 9(2), 521–539.
- Ayanlade, A., & Oladimeji, O. O. (2023). Climate change perception and adaptation strategies among smallholder farmers in Nigeria. *Weather, Climate, and Society*, 15(2), 289–305.
- Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). Sage Publications.
- Damte, B., Negash, M., & Kassie, M. (2023). Gendered livelihood strategies in agrarian economies under changing climate conditions. *Gender, Place & Culture*, 30(1), 49–68.
- FAO. (2021). Women in fisheries and aquaculture value chains: A global synthesis. Food and Agriculture Organization of the United Nations.
- Federal Ministry of Agriculture and Rural Development. (2008). National food security program. FMARD.
- Field, A. (2018). Discovering statistics using IBM SPSS statistics (5th ed.). Sage Publications.
- Fonjong, L., & Zama, C. (2023). Gender, informal trade and resilience in West African urban markets. *Gender & Development*, 31(1), 55–72.
- Ibeun, M. O., Adeola, R. G., & Adewale, B. (2025). Multi-impacts of climate change and mitigation strategies in Nigeria: Agricultural and fisheries perspectives. *Environmental Science and Pollution Research*, 32, 1–19.

- Israel, G. D. (1992). Determining sample size (PEOD-6). University of Florida Cooperative Extension Service.
- Kwena, Z. A., Bukusi, E. A., Ng'ayo, M. O., & Buffardi, A. L. (2023). Sex for fish: Transactional sex and HIV risk in fishing communities. *Culture, Health & Sexuality*, 25(4), 411–427.
- Lew, A. A. (2011). Ethical issues in the conduct of survey research. *Journal of Applied Social Science*, 5(1), 21–30.
- National Population Commission. (2023). Provisional population figures by local government area. NPC.
- Ngcamu, B. S., & Mantzaris, E. (2023). Climate change and vulnerable women traders in sub-Saharan Africa: A review. *Jamba: Journal of Disaster Risk Studies*, 15(1), a1345.
- Nigerian Meteorological Agency (NiMet). (2022). Seasonal rainfall prediction for Adamawa State. NiMet.
- Odioko, F., & Becer, Z. A. (2022). Fisheries governance and food security in Nigeria. *Marine Policy*, 138, 105012.
- Ogundele, O. M., Olatunde, A. F., & Adejuwon, J. O. (2024). Climate variability and inland fisheries in Nigeria: Trends, impacts, and adaptation. *Environmental Development*, 49, 100962.
- Oguntuga, O. O., Ajayi, T. O., & Ibrahim, S. (2022). Climate variability and fisheries productivity in West Africa: A regional review. *Ocean and Coastal Management*, 226, 106239.
- Olagunju, K. O., Olabisi, L. S., & Ibrahim, H. (2023). Empowering women through fisheries cooperatives in Nigeria. *Development in Practice*, 33(2), 210–224.
- Olayide, O. E., Alabi, T., & Ayinde, I. A. (2016). Fish market structure and price dynamics in northeastern Nigeria. *Nigerian Journal of Agricultural Economics*, 6(1), 33–45.
- Tarhule, A., & Woo, M. K. (2002). Towards an interpretation of historical droughts in northern Nigeria. *Climatic Change*, 55(1–2), 187–211.
- UNDP. (2012). Africa human development report: Towards a food secure future. United Nations Development Programme.
- Williams, M. J. (2008). Why look at fisheries through a gender lens? *Development*, 51(2), 180–185.
- World Bank. (2014). Levelling the field: Improving opportunities for women farmers in Africa. World Bank Group.