

DETERMINANTS OF BACKYARD FISH FARMERS' WILLINGNESS TO PAY FOR EXTENSION SERVICES IN KATSINA STATE, NIGERIA

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ABSTRACT

This study assessed the determinants of backyard fish farmers' willingness to pay for extension services in Katsina state, Nigeria. A two-stage sampling procedure was used to select 100 backyard fish farmers from 10 villages in Katsina Local Government Area. Data were collected with a structured questionnaire administered through the KoboCollect platform and analyzed using descriptive statistics, percentages and mean ranking. The findings showed that the respondents had varied socioeconomic characteristics, including differences in age, education, income, household size, farming experience and exposure to extension services. Most respondents had received extension support, although the frequency of contact varied. A high proportion of the farmers, 89%, expressed willingness to pay for extension services. The main reasons for willingness to pay were access to improved technology (36%), minimization of production losses (24%), increased income (22%) and improved productivity (18%). Reported payment amounts varied considerably, indicating that willingness to pay may not correspond equally to farmers' ability to pay. The study concludes that backyard fish farmers in Katsina State represent a potentially strong market for demand-driven extension services, provided that such services are practical, reliable and financially accessible. It recommends flexible payment arrangements, cooperative-based delivery, regular field contact, mobile advisory channels and extension content focused on production technologies, feed management, disease control, water quality, record keeping and marketing. Future studies should use inferential models to distinguish the determinants of willingness to pay from those influencing the amount farmers are willing and able to contribute.

Keywords: backyard fish farming; willingness to pay; agricultural extension; aquaculture; Katsina State.

1.0 INTRODUCTION

Backyard fish farming is an important small-scale production activity because it can provide food, income and employment while making use of limited household space and resources. In this production system, farmers commonly manage relatively small enterprises alongside other livelihood activities. Their performance depends not only on access to ponds, fingerlings, feed and finance, but also on timely technical advice that helps them make sound decisions about production, disease prevention, water quality, feeding, harvesting and marketing. Evidence from Nigerian fish-farmer studies identifies breeding, credit, feed formulation and farm management as important advisory needs, supporting the view that technical information is

central to aquaculture performance (Abraham et al., 2012). The need for effective fisheries extension is particularly important because aquaculture is technically demanding and production risks can be costly for small operators. Poor feeding practices, inappropriate stocking density, weak biosecurity, poor water management or delayed disease control may reduce growth and survival, thereby undermining profitability. A review of fisheries and aquaculture extension in Nigeria argues that this area has historically received insufficient attention in the implementation of agricultural development programmes and calls for reforms that place fisheries and aquaculture extension within an effective unified extension system (Sanni et al., 2009). Extension should therefore be understood not simply as the delivery of general agricultural information, but as a service whose content, timing, frequency and method must correspond to the practical problems of fish farmers.

Studies from Nigeria provide evidence that demand for paid extension can be substantial, but they also show that payment decisions depend on service relevance and farmer characteristics. A national study of farmers found that most respondents were willing to pay for improved extension when the service remained relevant to their needs, and that willingness was associated with factors including occupation, schooling and sale of farm produce (Ozor et al., 2013). Among small-scale fish and crop producers in Kogi State, farmers reported limited confidence in the existing extension system but were still willing to contribute a modest amount monthly; the amount was associated with education, in-come, farm size, confidence in extension delivery and extension contacts (Onuche et al., 2015). These findings indicate that willingness to pay should not be interpreted as an unconditional acceptance of privatized extension. It is more appropriately understood as a demand signal that depends on perceived value, trust, affordability and the characteristics of the service offered. The quality and accessibility of existing extension services can shape farmers' willingness to pay.

Research on aquaculture extension in Rivers State found that awareness of extension services was incomplete, visits by extension agents were often rare, and respondents differed in how helpful they considered the service. The same study reported preferences for short leadership training programmes and found that education and fish-farming experience were related to perceived extension effectiveness (Olopade et al., 2023). These findings imply that a low willingness to pay may reflect not only inability to afford the service, but also limited awareness, weak service visibility, poor contact history or uncertainty about the benefits that payment would purchase. Katsina State provides an important setting for examining these issues. Backyard fish farmers operate within house-holds that differ in income, education, farming experience, access to extension and production capacity. These differences can shape both the type of advisory service required and the affordability and acceptability of alternative payment arrangements. A location-specific assessment is therefore needed rather than assuming that willingness-to-pay findings from other Nigerian states apply directly to backyard fish farmers in Katsina. Assessing capacity and willingness together can help prevent two common errors in extension policy. Nigerian evidence shows that willingness, payment amount, income, confidence in extension delivery and extension contact are related but not interchangeable dimensions of demand (Onuche et al., 2015).

The first error is to interpret willingness to pay as proof that farmers can afford the proposed price; the second is to interpret limited willingness as evidence that farmers do not value extension. By measuring both constructs, the study can identify farmers who are willing and

able to pay, willing but financially constrained, able but unconvinced of the value, and neither willing nor able under the proposed conditions. This study is therefore designed to assess the determinants willingness and of backyard fish farmers to pay for agricultural extension services in Katsina State, Nigeria. It will begin by describing the socio-economic characteristics of the farmers because Nigerian studies have linked education, income, farm size, occupation, production characteristics and extension contact with willingness or the amount farmers will pay. It will then identify the extension services farmers need, determine their capacity to pay, measure their willingness to pay, examine the determinants of that willingness and establish their preferred payment methods. The study will contribute evidence for designing extension services that are demand-driven, technically relevant, financially feasible and sensitive to differences in farmers' resources.

2.0 METHODOLOGY

The study was carried out in Katsina State North-Western Nigeria, Located between 12°59'26".95N latitude and 7°36'6".37 E longitude (National Population Commission, 2006). It covers an expansive area of approximately 24,192 square kilometers (Katsina State Government, n.d.) The current metro area population of Katsina in 2024 is 544,000, a 3.82% increase from 2023. Katsina is situated about 400 kilometers east of Sokoto, 160 kilometers northwest of Kano, 300 kilometers north of Kaduna, 460 kilometers north of Abuja Federal capital, and approximately 90 kilometers south-east of Maradi in Niger Republic (Katsina State Government, n.d.). The state experiences high temperatures throughout the year, ranging from 21°C to 28°C in winter and 34°C to 40°C in summer (Nigeria Meteorological Agency, n.d.). Katsina has a tropical savanna climate, characterized by a wet season from May to October and a dry season from November to April, with an average annual rainfall of 800 -1000 mm (Nigeria Meteorological Agency, n.d.). The dry winter season spans from November to March, while the hot and wet summer season occurs between April and October. Agriculture is a significant contributor to Katsina's economy, providing employment opportunities, cash income, and a source of animal protein.

2.1 Sampling technique

The population for this study consists of 100 registered backyard fish farmers residing in Katsina Local Government Area of Katsina State. These farmers represent an organized group actively involved in fish cultivation in the state. Their registration ensures accurate identification and inclusion in agricultural programs and research initiatives, making them an ideal target population for this study. A two-stage sampling procedure was employed for this study. In the first stage, 10 villages were randomly selected out of the 17 villages in the local government. In the second stage, a random sample of 100 backyard fish farmers was selected from these 10 villages. The selection was carried out proportionately to the population size of each village to ensure a representative sample distribution. Data was collected using a questionnaire designed with the Kobocollect Open Data Kit (ODK) tool. Descriptive statistics Such as percentage and mean ranking were used.

3.0 RESULTS AND DISCUSSION

Table 1 shows a relatively balanced gender structure, although males constitute a slight majority of the backyard fish farmers (55%), while females account for 45%. This pattern suggests that backyard aquaculture in Katsina is not exclusively male-controlled and that women may constitute an important potential market for extension services. For example, backyard fish farmers studied in southern Nigeria were 84.4% male, while fish farmers in south-western Nigeria were 77.5% male (Gbıgbı & Achoja, 2020). The comparatively higher female participation in the Katsina sample may therefore be an important contextual feature of the study area rather than a general characteristic of Nigerian aquaculture. The age distribution indicates that farmers are spread across the working-age and older groups: 43% are below 40 years, 44% are between 40 and 59 years, and 13% are 60 years or older. This age structure suggests that the enterprise includes both relatively younger operators who may be receptive to new technologies and older farmers with accumulated production experience. The literature does not predict a uniform effect of age on willingness to pay. In Kwara State, age was a significant determinant of fish farmers' willingness to pay. (Abraham et al., 2012). These apparently different results reinforce the need to estimate the age effect directly for backyard fish farmers in Katsina rather than assuming that younger or older farmers will be more willing to pay. Education levels in Table 1 are relatively favorable for extension delivery. Although secondary education is the modal category (39%), 46% of respondents hold a diploma, bachelor's degree, or postgraduate qualification. Only 15% report primary or Islamic education.

This profile may increase farmers' ability to understand technical messages, evaluate service quality, and use digital or written advisory materials. It is consistent with the Kwara study, which identified education as a significant factor influencing fish farmers' willingness to pay ((Abraham et al., 2012)). Similarly, evidence from Kogi State showed that education was positively associated with the amount farmers were willing to contribute to extension, alongside income, farm size, confidence in the extension system, and extension contacts (Onuche et al., 2015). The implication is not that education automatically creates willingness to pay, but that better-educated farmers may be more able to recognize and apply the economic value of advisory information. Household size is concentrated in the 1–10-person range, with 40% of farmers reporting 1–5 household members and 46% reporting 6–10. The remaining 14% have more than 11 members. Larger households may provide labor for routine backyard operations, but they may also place greater pressure on farm income and reduce the funds available for paid services.

The income distribution suggests substantial variation in farmers' capacity to pay. Seventy-three percent report monthly income below ₦1 million, including 33% below ₦500,000 and 40% between ₦500,000 and ₦1 million; only 27% report income above ₦1 million. This dispersion is important because willingness to pay and ability to pay are related but distinct concepts. Nigerian evidence indicates that income and marketed output increase the likelihood of paying for extension, while Oyo State farmers emphasized that payment was acceptable when extension was expected to raise farm income (Ajayi, 2006). For Katsina backyard farmers, a paid service is therefore more likely to be accepted when it is linked to concrete benefits such as improved survival, feed efficiency, disease control, market access, or higher returns. Farming experience is also substantial: 55% have 1–10 years of experience and 45% have 11–20 years. This indicates that the sample contains both developing and established operators. Experience can increase willingness to pay if experienced farmers understand the

cost of production failures and can identify valuable advice. It can also reduce willingness to pay if farmers rely on accumulated personal knowledge or distrust external recommendations. Evidence from Anambra illustrates this ambiguity: aquapreneurs were willing to pay for mobile advisory services because of expected gains in timely information, market linkage, profitability, and technology adoption, but age, education, and experience were not statistically significant determinants in that study (Ifejika et al., 2015).

Extension exposure is relatively high: 80% of respondents report having received extension services, while 20% have not. Among all respondents, quarterly contact is the most common frequency (37%), followed by annual contact (22%), weekly contact (17%), monthly contact (13%), and no contact (11%). This suggests that access exists but may not be sufficiently regular for farmers facing continuous production risks. Studies in other Nigerian aquaculture settings similarly report irregular contact.

In south-western Nigeria, 50.6% of fish farmers received extension information rarely and 24.4% never received it; inadequate extension contact was identified as a major constraint (Apata et al., 2018). In Kogi State, confidences in the extension system and extension contacts were positively associated with contribution levels (Onuche et al., 2015). Thus, the frequency and reliability of service may influence willingness to pay more strongly than nominal access alone. The payment distribution shows that most reported payments fall between ₦5,000 and ₦50,000, with 34% paying ₦10,001–₦20,000, 19% paying ₦20,001–₦50,000, and 21% paying ₦5,000–₦10,000. Five percent report payments above ₦50,000, while 21% report less than ₦5,000. Earlier Nigerian studies reported much lower annual or monthly contributions in different settings, including ₦1,000 annually in one national study and an average of US\$1.80 per month in Kogi State (Ozor et al., 2013).

Table 1: Socio-Economic Characteristics of the Backyard Fish Farmers in Katsina State.

Variables	Category	Frequency	Percentage (%)
Gender	Male	55	55.0
	Female	45	45.00
Age	20-29	19	19.0
	30-39	24	24.0
	40-49	22	22.0
	50-59	22	22.0
	60-69	13	13.0
Education	Secondary	39	39.0
	Diploma	18	18.0
	Bachelor degree	16	16.0
	Postgraduate	12	12.0
	Primary	9	9.0
	Islamic	6	6.0
Household Size	1-5	40	40.0
	6-10	46	46.0
	>11	14	14.0
Monthly Income (₦)	500k-1m	40	40.0

	<500k	33	33.0
	1-2m	21	21.0
	>2m	6	6.0
Years of Farming Experience	1-10	55	55.0
	11-20	45	45.0
Received Extension Services	Yes	80	80.0
	No	20	20.0
Extension service Frequency	Never	11	11.0
	Annual	22	22.0
	Weekly	17	17.0
	Quarterly	37	37.0
	Monthly	13	13.0
Amount paid (₦)	<5000	21	21.0
	>50000	5	5.0
	10001-20000	34	34.0
	20001-50000	19	19.0
	5000-10000	21	21.0

Table 1: Socio-Economic Characteristics of the Backyard Fish Farmers in Katsina State.

Figure 1 shows very high stated willingness to pay for extension services: 89 respondents (89%) answered Yes, while 11 (11%) answered No. The responses therefore suggest strong demand for paid advisory support among the surveyed fish farmers. The result is consistent with a Nigerian study in Kwara State that found willingness to pay was significantly associated with stock size, production type, education, and age (Abraham et al., 2012). In practical terms, the 89% figure may reflect the perceived value of advice that helps farmers solve costly production problems, rather than a general preference for extension services independent of content.

The finding also fits the study of Olaoye et al., (2021) In Ogun State who reported fish farmers preferred field demonstrations, input-marketing information, farm record-keeping, and environmental-management advice, and the availability of extension services was associated with profitability. This suggests that farmers may be willing to pay when extension is practical and linked to measurable farm decisions, especially feed use, stocking, disease or water management, records, and market access. A separate Ogun study found that adoption of improved technologies depended on income, pond-construction cost, profit, secondary occupation, extension quality, and institutional conditions, indicating that willingness to pay should not be confused with ability to pay (Olaoye, 2017).

The 11% who were unwilling to pay are also important. They may face liquidity constraints, receive information from free sources, distrust the quality or regularity of extension, or regard extension as a public service. This is plausible because recent Nigerian evidence shows that fish farmers obtain information through multiple channels: internet sources and fellow farmers may be used more often than extension agents, and education, farm size, and experience influence extension utilization (Ehigie et al., 2026). Thus, a paid service would need to offer

clear additional value rather than simply charge for information that farmers can obtain elsewhere.

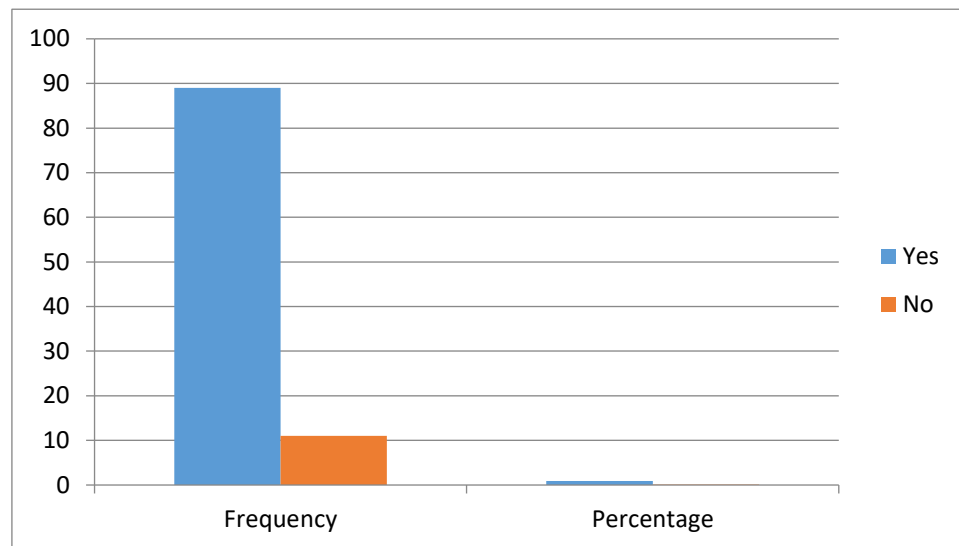


Figure 1: Willingness to pay for extension services

The chart ranks the perceived reasons for paying for extension services among 100 respondents. Access to technology is the leading motivation, reported by 36 farmers (36%), followed by minimizing losses at 24%, increasing income at 22%, and improving productivity at 18%. The ranking suggests that farmers value extension first as a way to obtain usable technical knowledge, not only as a route to higher profits. This is consistent with the Nigerian willingness-to-pay study from Kwara State, which identified fish breeding, formal credit, feed formulation, and feed management as major information needs. In that study, stock size, production type, education, and age were significant predictors of willingness to pay (Abraham et al., 2012).

The prominence of technology access in the present chart may therefore reflect demand for information that farmers cannot easily obtain through their existing networks. The second-ranked motivation minimizing losses is economically important in aquaculture, where mistakes in feed use, stocking, water quality, disease management, or pond construction can generate direct financial losses. Evidence from Ogun State supports this interpretation: adoption of improved fisheries technologies was associated with annual income, pond-construction cost, profit, and secondary occupation, while the authors concluded that adoption depended on farmer characteristics, extension quality, technology benefits, and institutional conditions (Olaoye, 2017). Farmers may be willing to pay when extension is framed as loss prevention rather than as a general information service. Increased income and improved productivity together account for 40% of responses. Their lower ranking does not mean that farmers consider them unimportant; rather, farmers may see technology access and loss reduction as the immediate mechanisms through which productivity and income improve. This interpretation aligns with findings from Ogun State that extension-service availability was associated with profitability and that farmers preferred field demonstrations, input-marketing information, record keeping, and environmental-management advice (Olaoye et al., 2021).

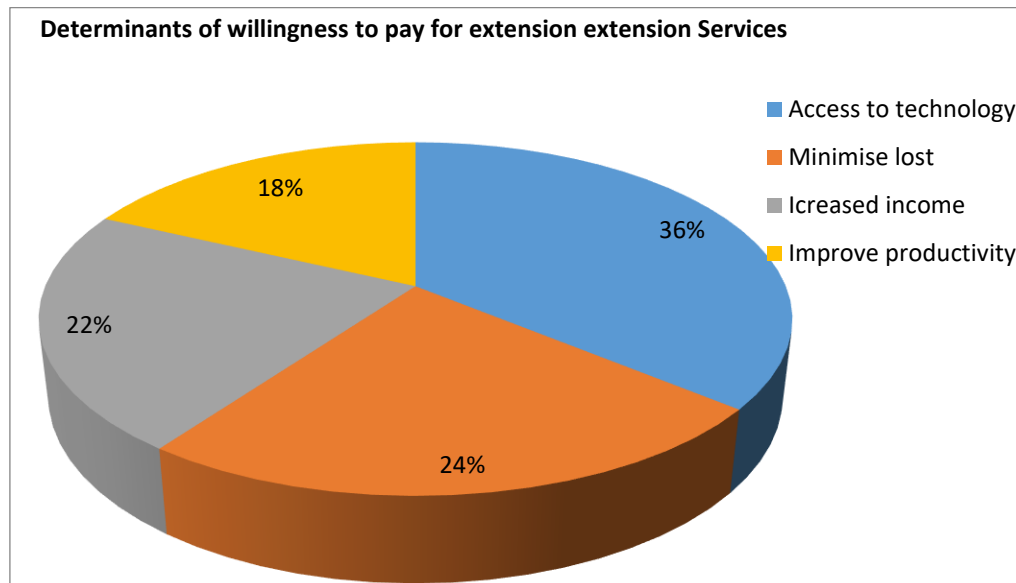


Figure 2: Determinants of willingness to pay for extension extension Services

4.0 CONCLUSION AND RECOMMENDATION

The study shows that backyard fish farmers in Katsina State represent a heterogeneous but potentially receptive market for improved extension services. The farmers differ in gender, age, education, household size, income, farming experience and previous exposure to extension, so a single uniform payment or delivery model is unlikely to serve them equally well. The descriptive results reveal four major characteristics that determine willingness to pay, they show strong stated demand: 89% of the respondents indicated willingness to pay for extension services. This result should be interpreted as demand for useful and credible advisory support, not as evidence that every farmer can afford any proposed fee. The study recommends that extension services for backyard fish farmers in Katsina State should be practical, affordable, regular and responsive to farmers' needs, with emphasis on improved technologies, feed management, stocking, disease prevention, water quality, record keeping and marketing. Flexible payment options including tiered fees, monthly or quarterly subscriptions, pay-per-visit arrangements and cooperative contributions should be adopted because willingness to pay does not necessarily mean that all farmers can afford the same fee. Services should be delivered through farmer groups and cooperatives, supported by regular field visits, mobile-phone communication and digital advisory platforms. Extension programmes should also be inclusive of women and farmers with limited income or time.

REFERENCES

1. Abraham, F., Kayode, B. I., & Omonlumhen, U. P. (2012). Willingness-to-pay for agricultural extension services by fish farmers in Nigeria: A case study of Kwara State, Nigeria. <https://www.cabidigitallibrary.org/doi/full/10.5555/20133163743>
2. Ajayi, A. O. (2006). An Assessment of Farmers' Willingness to Pay for Extension Services Using the Contingent Valuation Method (CVM): The Case of Oyo State,

- Nigeria. *The Journal of Agricultural Education and Extension*, 12(2), 97–108. <https://doi.org/10.1080/13892240600861567>
3. Apata, O. M., Toluwase, S. O. W., & Awoyemi, A. O. (2018). Assessment of extension services delivery to fish farmers in south western Nigeria. *Journal of Social Science Research*, 12(1), 2596–2607.
 4. Ehigie, A. O., Benyeogor, A. O., Iyekekpolor, M. N., & Neyin, F. T. (2026). Socio-economic characteristics and extension service utilization among fish farmers in Oredo local government area, Edo State, Nigeria. *International Journal of Research and Scientific Innovation*, 13(3), 148–159.
 5. Gbigbi, T. M., & Achoja, F. O. (2020). Backyard fish farm features and farmers personal characteristics as correlates of profitability of aquaculture in Nigeria. *Ege Journal of Fisheries & Aquatic Sciences (EgeJFAS)/Su Ürünleri Dergisi*, 37(3), 223.
 6. Ibrahim, H. Y., Dennis, G. O., & Ogezi, E. (2013). Willingness and capacity to pay for extension services by poultry farmers in Nasarawa State, Nigeria. <https://www.cabidigitallibrary.org/doi/full/10.5555/20143393181>
 7. Ifejika, P. I., Oladosu, I. O., Asadu, A. N., Ayanwuyi, E., Sule, A. M., & Tanko, M. (2015). Assessment of aquapreneur willingness to pay for mobile phone advisory services in anambra state, Nigeria. *International Journal of Agriculture and Forestry*, 5(6), 330–338.
 8. Mudashiru, A., Daniel, E., & Musa, J. (n.d.). WILLINGNESS TO PAY FOR EXTENSION SERVICES DELIVERY AMONG CROP FARMERS IN KATSINA STATE, NIGERIA. Retrieved 15 September 2026, from https://www.academia.edu/download/118845004/BMER_2_104.pdf
 9. Olaoye, O. (2017). Adoption of improved fisheries technologies among fish farmers in Ogun State, Nigeria. *Applied Tropical Agriculture*, 22(2), 42–51.
 10. Olaoye, O. J., Ezeani, S. I., & Onifade, O. T. (2014). An investigation into the factors facilitating extension services available to fish farmers in Ijebu-Ode agricultural extension zone, Ogun State, Nigeria. *Nigerian Journal of Animal Production*, 41(2), 206–218.
 11. Olopade, O. A., Dienye, H. E., Aiyeloja, J., & Eghireme, C. (2023). Evaluation of Aquaculture Extension Service in Rivers State, Nigeria. *Journal of Aquaculture*, 63–72.
 12. Onuche, U., Adejoh, S. O., & Adah, O. C. (2015). Analysis of willingness to pay for agricultural extension services by rural small-scale fish and crops producers in Kogi State, North Central Nigeria: Imperative for sustainable agricultural development. *Asian Journal of Agriculture and Food Sciences*, 3(4).
 13. Ozor, N., Garforth, C. J., & Madukwe, M. C. (2013). FARMERS' WILLINGNESS TO PAY FOR AGRICULTURAL EXTENSION SERVICE: EVIDENCE FROM NIGERIA. *Journal of International Development*, 25(3), 382–392. <https://doi.org/10.1002/jid.1849>
 14. Sanni, A. O., Olowosegun, T., Sule, A. M., Muhammed, A., Yemi, I. Y., & Onimisi, H. U. (2009). Capacity Building and Training Requirements for Effective Fisheries and Aquaculture Extension in Nigeria: A Review. *Journal of Nature and Sciences*, 7(4), 66–71. (N.d.).