

AQUACULTURE DISEASE MANAGEMENT SURVEY QUESTIONNAIRE

Predictive Analytics Framework for Aquaculture Disease Management in Delta State, Nigeria

INFORMED CONSENT FORM

Study Title: A Predictive Analytics Framework for Proposed Decision Support System and Market Validation for Aquaculture Disease Management in Delta State, Nigeria

Principal Investigator: Ugegeh Desmond Oghanihun, Department of Marine Science, University of Delta, Agbor

Purpose of the Study: This research aims to assess stakeholder readiness for a predictive analytics-driven early warning system for disease detection in catfish farms across Delta State, Nigeria.

Procedures: You will be asked to complete a questionnaire that takes approximately 15-20 minutes. The questionnaire covers your aquaculture operations, experience with fish mortality, current disease management practices, and willingness to adopt new technologies.

Voluntary Participation: Your participation in this study is entirely voluntary. You may choose not to participate or withdraw at any time without any penalty or loss of benefits.

Confidentiality: All responses will be kept strictly confidential. Data will be anonymized and reported only in aggregate form. No identifying information will be disclosed in any reports or publications.

Risks and Benefits: There are no known risks associated with participation in this study. While there may be no direct benefits to you, your participation will contribute to the development of solutions that could benefit the aquaculture sector in Delta State.

Contact Information: If you have questions about this study, please contact:

- Ugegeh Desmond Oghanihun, Email: desmond.ugegeh@unidel.edu.ng

Consent Statement: I have read and understood the information above. I voluntarily agree to participate in this study.

- Yes, I agree to participate
- No, I do not wish to participate

Signature: _____ **Date:** _____

SECTION A: DEMOGRAPHIC INFORMATION

Instructions: Please tick (✓) or fill in the appropriate response.

A1. Respondent Category (Please select one)

- End User (Small-scale fish farmer)
- Buyer/Payer (Farm owner/Investor)
- Distributor (Cooperative/Ag-tech vendor)
- Supplier (Feed vendor/Sensor vendor/Equipment supplier)
- Regulator (Government Agriculture Official)
- Community Leader/Influencer

A2. Gender

- Male
- Female
- Prefer not to say

A3. Age Range

- 18-25 years
- 26-35 years
- 36-45 years
- 46-55 years
- 56 years and above

A4. Highest Level of Education

- No formal education
- Primary education
- Secondary education
- Diploma/NCE
- Bachelor's degree/HND
- Master's degree or higher

A5. Primary Location / Local Government Area

- Oshimili South (Asaba)
- Uvwie (Ekpan)
- Ughelli North (Ughelli/Afiesere)
- Udu (Ekpan/Uvwie)
- Ika South (Agbor)
- Other (please specify): _____

A6. How long have you been involved in aquaculture/fish farming?

- Less than 1 year
 - 1-3 years
 - 4-6 years
 - 7-10 years
 - More than 10 years
-

SECTION B: AQUACULTURE OPERATIONS

B1. What is the scale of your aquaculture operation? (If applicable)

- Small-scale (1-5 ponds)
- Medium-scale (6-20 ponds)
- Large-scale (21+ ponds)
- Not applicable (I am not a farmer)

B2. What fish species do you primarily farm? (Select all that apply)

- African Catfish (*Clarias gariepinus*)
- Nile Tilapia (*Oreochromis niloticus*)
- Other (please specify): _____

B3. What type of feed do you primarily use?

- Commercial feed only
- Handmade/artisanal feed only
- Combination of commercial and handmade feed
- Other (please specify): _____

B4. Do you currently monitor any water quality parameters in your farm?

- Yes
- No
- Sometimes

B5. If YES to B4, which parameters do you monitor? (Select all that apply)

- Temperature
- Dissolved Oxygen
- pH level
- Ammonia
- Nitrate/Nitrite
- Salinity

- Turbidity
- Other (please specify): _____

B6. How frequently do you monitor water quality?

- Daily
- Weekly
- Monthly
- Only when problems occur
- Never

B7. Do you currently use any technology (mobile apps, sensors, software) to help manage your fish farm?

- Yes
- No
- Planning to adopt

B8. If YES to B7, please specify what technology you use:

SECTION C: FISH MORTALITY AND DISEASE MANAGEMENT

C1. On a scale of 1 to 10, how serious is fish mortality as a problem for your aquaculture operations? (1 = Not serious at all, 10 = Extremely serious/crisis level)

1 2 3 4 5 6 7 8 9 10
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

C2. Have you experienced any unusual fish mortality (death of more than 50 fish in a week) in the past 12 months?

- Yes
- No
- Not sure

C3. If YES to C2, please estimate the number of fish lost:

- Less than 50 fish
- 50-100 fish
- 101-500 fish
- 501-1,000 fish
- More than 1,000 fish

C4. What do you think are the main causes of fish mortality in your farm? (Select all that apply)

- Poor water quality
- Disease/infection
- Poor feed quality
- Overcrowding
- Stress from handling
- Weather/climate factors
- Lack of proper veterinary care
- Other (please specify): _____

C5. How much do you estimate you have lost in financial terms due to fish mortality in the past 12 months?

- ₦0 - ₦50,000
- ₦50,001 - ₦100,000
- ₦100,001 - ₦500,000
- ₦500,001 - ₦1,000,000
- ₦1,000,001 - ₦5,000,000
- More than ₦5,000,000
- Prefer not to say

C6. What is your estimated total financial loss from fish mortality since you started farming? (If applicable)

- ₦0 - ₦100,000
- ₦100,001 - ₦500,000
- ₦500,001 - ₦1,000,000
- ₦1,000,001 - ₦5,000,000
- ₦5,000,001 - ₦10,000,000
- More than ₦10,000,000
- Not applicable

C7. What do you currently spend monthly on reactive disease management (emergency chemicals, salt, antibiotics, other curative interventions)?

Approximately ₦_____ per month

C8. What do you currently spend monthly on preventive disease management (water testing, vaccines, biosecurity measures)?

Approximately ₦_____ per month

C9. Do you currently consult a veterinarian or fisheries expert when you have fish health problems?

- Always
- Sometimes
- Rarely
- Never
- Not applicable

C10. If NO or RARELY to C9, why not? (Select all that apply)

- Too expensive
- Not available in my area
- I don't know where to find one
- I trust my own experience
- Other (please specify): _____

C11. Do you keep records of fish mortality patterns or causes?

- Yes
 - No
 - Sometimes
-

SECTION D: DIGITAL READINESS AND TECHNOLOGY ADOPTION

D1. Do you own a smartphone?

- Yes
- No

D2. Do you have regular access to the internet?

- Yes
- No
- Occasionally

D3. How would you rate your ability to use mobile applications or digital tools?

- Very proficient
- Proficient
- Basic proficiency
- Not proficient at all

D4. Have you ever used any digital tool or mobile application for farming purposes?

- Yes
- No

D5. If YES to D4, please specify:

D6. What challenges have you faced with technology solutions in the past? (Select all that apply)

- Unstable power supply
- Poor internet connectivity
- Difficulty using the technology
- High cost
- Devices not durable (e.g., wet hands/glare issues)
- Lack of local support
- Other (please specify): _____
- Not applicable (never used technology)

D7. How comfortable would you be receiving alerts or recommendations via:

Channel	Very Comfortable	Comfortable	Neutral	Uncomfortable	Very Uncomfortable
SMS (Text message)	☐	☐	☐	☐	☐
Mobile App	☐	☐	☐	☐	☐
USSD Code (*# code)	☐	☐	☐	☐	☐
Email	☐	☐	☐	☐	☐
WhatsApp	☐	☐	☐	☐	☐

SECTION E: PREDICTIVE ANALYTICS SOLUTION - INTEREST AND WILLINGNESS

E1. How interested are you in a predictive system that can forecast disease risk and fish mortality before visible symptoms appear?

- Very interested
- Interested
- Neutral
- Not interested
- Not at all interested

E2. Would you be willing to participate in a pilot trial of such a predictive analytics system on your farm?

- Yes

- No
- Maybe (depending on conditions)

E3. If YES to E2, would you be willing to provide your contact details for follow-up?

- Yes
- No

E4. If YES to E3, please provide contact details:

Name: _____

Phone Number: _____

Email: _____

Location/Pond Address: _____

E5. What would you consider a reasonable monthly subscription fee for a predictive disease management system?

- ₦5,000 - ₦10,000
- ₦10,001 - ₦20,000
- ₦20,001 - ₦30,000
- ₦30,001 - ₦50,000
- More than ₦50,000
- Not willing to pay

E6. What features would you most value in a predictive analytics system? (Select top 3)

- Early disease warning alerts
- Water quality monitoring recommendations
- Economic/financial impact analysis
- Treatment recommendations
- Feed adjustment suggestions
- Aeration recommendations
- Biosecurity protocols
- Veterinary referral services
- Comparison with other farms (benchmarking)
- Government/regulatory reporting
- Other (please specify): _____

E7. What would be the main factors influencing your decision to adopt this system? (Select all that apply)

- Affordability

- Ease of use
 - Proven effectiveness
 - Local technical support
 - Trust in the provider
 - Recommendation from other farmers
 - Government endorsement
 - Other (please specify): _____
-

SECTION F: STAKEHOLDER-SPECIFIC QUESTIONS

For FARMERS / END USERS (Section F1-F6)

F1. How many ponds do you currently operate?

- 1-2
- 3-5
- 6-10
- 11-20
- 21+

F2. What is your average production per cycle?

_____ kg

F3. What is your average mortality rate per production cycle?

- Less than 5%
- 5-10%
- 11-20%
- 21-30%
- More than 30%

F4. Have you ever had to close down or significantly reduce operations due to fish mortality?

- Yes
- No

F5. What sources of information do you currently rely on for fish health management? (Select all that apply)

- Personal experience
- Other farmers
- Agriculture extension officers

- Veterinarians
- Online resources
- Input suppliers
- Cooperatives
- Other (please specify): _____

F6. Would you be willing to share your water quality data with a centralized system to improve disease prediction?

- Yes
- No
- Maybe

For BUYERS/PAYERS (FARM OWNERS/INVESTORS) (Section F7-F10)

F7. How many farms do you own or invest in?

- 1
- 2-3
- 4-5
- 6+

F8. What is your estimated annual investment in aquaculture?

- Less than ₦1,000,000
- ₦1,000,000 - ₦5,000,000
- ₦5,000,001 - ₦10,000,000
- ₦10,000,001 - ₦50,000,000
- More than ₦50,000,000

F9. How much do you spend annually on reactive disease management across all your farms?

Approximately ₦_____ per year

F10. What return on investment (ROI) would you expect from a predictive disease management system?

- 10-20% reduction in mortality
 - 21-40% reduction in mortality
 - 41-60% reduction in mortality
 - 61% or more reduction in mortality
-

For DISTRIBUTORS (COOPERATIVES/AG-TECH VENDORS) (Section F11-F13)

F11. How many farmers are in your cooperative or served by your organization?

- Less than 10
- 10-50
- 51-100
- 101-500
- 501+

F12. Have you observed mortality spikes as a reason for loan defaults in your cooperative?

- Yes, frequently
- Yes, occasionally
- No
- Not applicable

F13. Would you be interested in distributing a predictive analytics solution to your members/customers?

- Yes
 - No
 - Maybe
-

For SUPPLIERS (FEED AND SENSOR VENDORS) (Section F14-F16)

F14. What products do you primarily supply to the aquaculture sector?

- Fish feed
- Water quality sensors/equipment
- Chemicals/treatments
- Fingerlings
- Other (please specify): _____

F15. Do you currently have any technology offerings that complement predictive analytics?

- Yes
- No
- Planning to develop

F16. Would you be interested in integrating your products/services with a predictive analytics system?

- Yes

- No
 - Maybe
-

For REGULATORS (GOVERNMENT AGRICULTURE OFFICIALS) (Section F17-F19)

F17. What is your role in the Ministry of Agriculture or regulatory body?

F18. What data do you currently collect on aquaculture operations and disease outbreaks?

F19. Would a real-time disease surveillance and reporting system be valuable for your regulatory work?

- Very valuable
 - Valuable
 - Neutral
 - Not valuable
 - Not at all valuable
-

For COMMUNITY LEADERS/INFLUENCERS (Section F20-F22)

F20. What is your role in the community? (Chief, religious leader, association president, etc.)

F21. How many fish farmers do you have influence over?

- Less than 10
- 10-50
- 51-100
- 101+

F22. Would you endorse a predictive disease management solution to the farmers in your community?

- Yes
- No
- Only after seeing evidence of effectiveness

SECTION G: ADDITIONAL COMMENTS

G1. What are the biggest challenges you face in managing fish health in Delta State?

G2. What would make a predictive analytics system most valuable to you?

G3. Any other comments or suggestions?

END OF QUESTIONNAIRE

Thank you for taking the time to complete this questionnaire. Your responses are greatly appreciated and will contribute significantly to the development of solutions for aquaculture disease management in Delta State.

For Office Use Only:

Field	Value
Questionnaire ID	
Date Collected	
Data Entry Completed By	
Data Entry Date	
Quality Check By	

SUMMARY OF QUESTIONNAIRE SECTIONS

Section	Title	Number of Questions
A	Demographic Information	6
B	Aquaculture Operations	8
C	Fish Mortality and Disease Management	11
D	Digital Readiness and Technology Adoption	7
E	Predictive Analytics Solution - Interest and Willingness	7
F	Stakeholder-Specific Questions	22
G	Additional Comments	3
Total		64

STAKEHOLDER-SPECIFIC QUESTION GUIDE

Stakeholder Category	Sections to Complete
End Users (Small-scale farmers)	A, B, C, D, E, F1-F6, G
Buyers/Payers (Farm owners/investors)	A, C, D, E, F7-F10, G
Distributors (Cooperatives/Ag-tech vendors)	A, D, E, F11-F13, G
Suppliers (Feed and sensor vendors)	A, D, E, F14-F16, G
Regulators (Government Agriculture Officials)	A, D, E, F17-F19, G
Community Leaders/Influencers	A, D, E, F20-F22, G
