DATA COLLECTION TOOLS ON DISEASE & AMU IN AQUACULTURE

NOVEMBER/DECEMBER 2024

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The Fleming Fund

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MASSEY UNIVERSITY TE KUNENGA KI PŪREHUROA UNIVERSITY OF NEW ZEALAND

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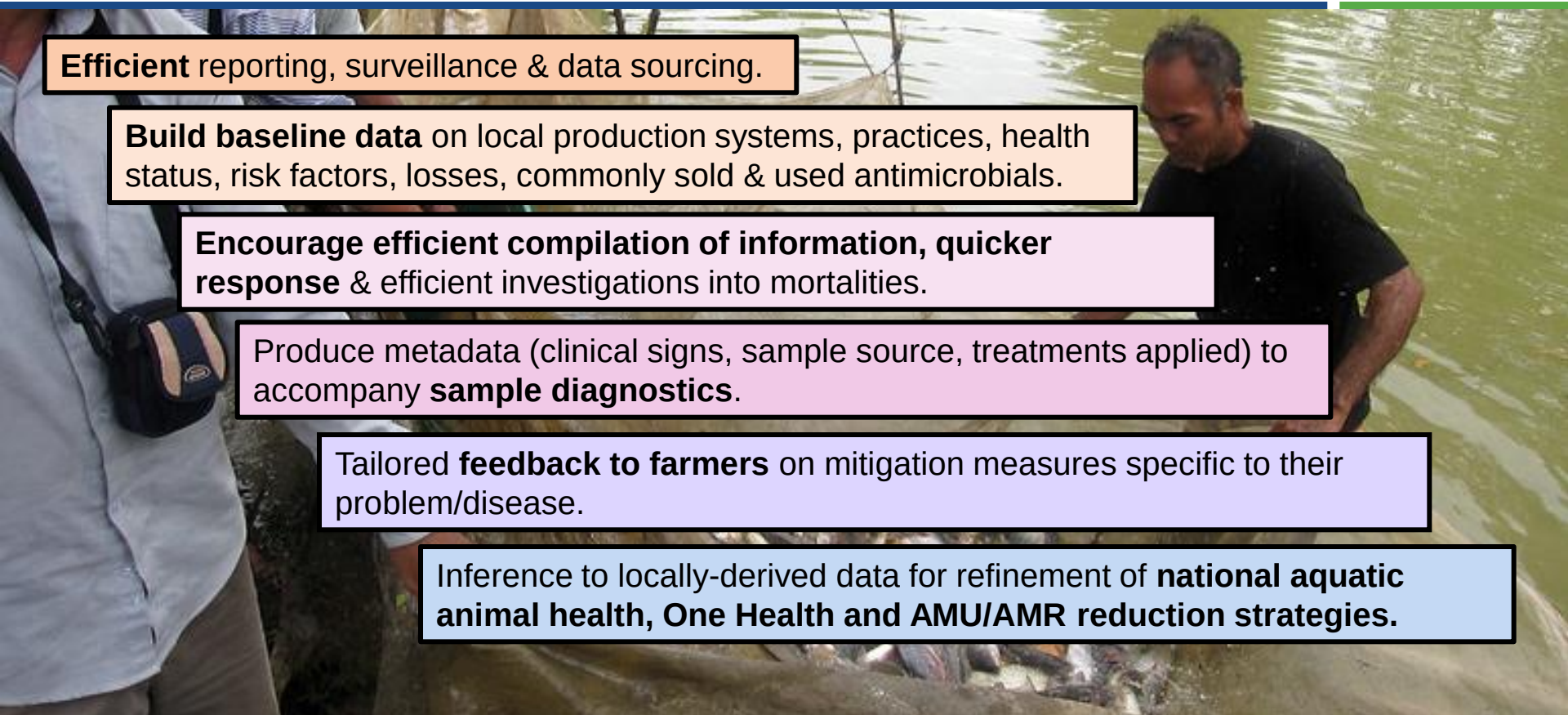
WorldFish

Application of data collection tools in national & regional management of disease and AMU/AMR



Efficient reporting, surveillance & data sourcing.

Build baseline data on local production systems, practices, health status, risk factors, losses, commonly sold & used antimicrobials.

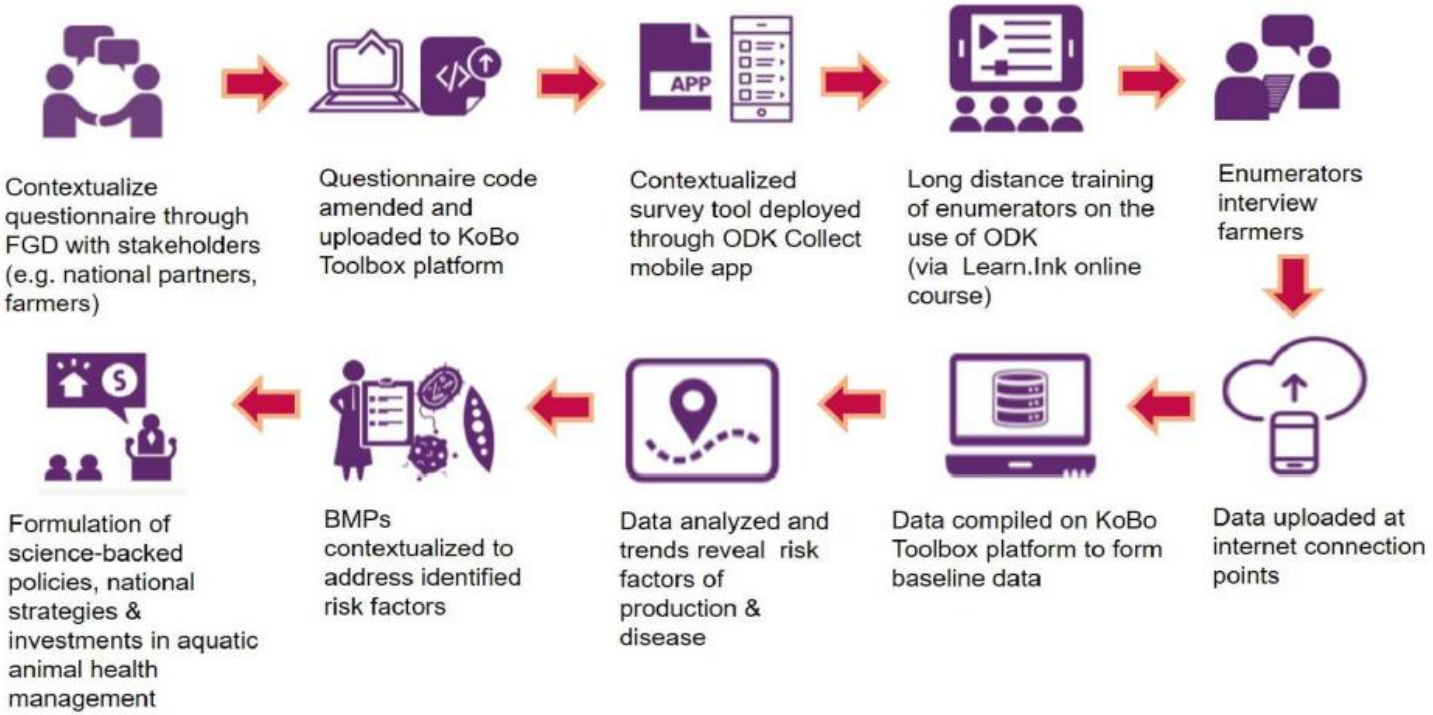
Encourage efficient compilation of information, quicker response & efficient investigations into mortalities.

Produce metadata (clinical signs, sample source, treatments applied) to accompany **sample diagnostics**.

Tailored **feedback to farmers** on mitigation measures specific to their problem/disease.

Inference to locally-derived data for refinement of **national aquatic animal health, One Health and AMU/AMR reduction strategies.**

How field data can inform better farm decisions & national strategies

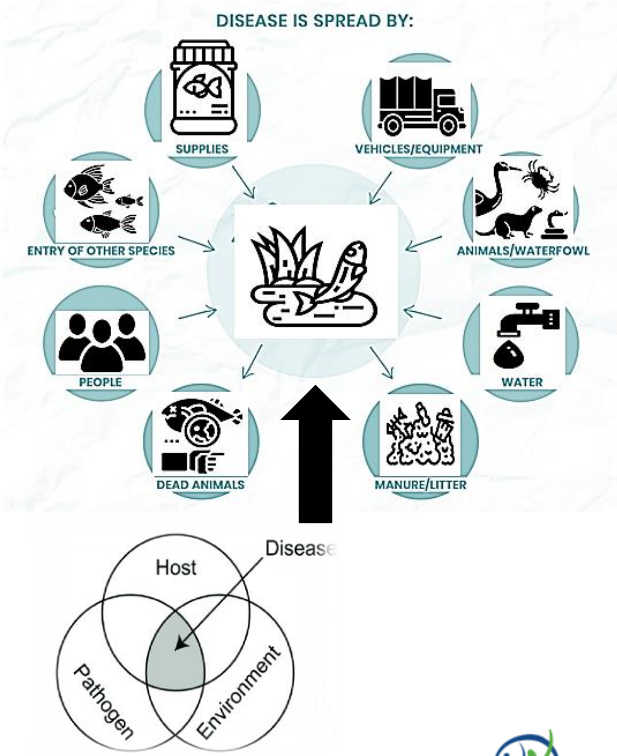


Information gaps in One Health & Antimicrobial Use

- What are the risk factors that trigger disease/mortalities?
- What is the health status of existing production systems?
- What kinds and how much farm input products are applied to manage disease/mortalities?
- What kinds of biosecurity measures are being implemented?

Potential stages and activities for risk reduction along pathways:

Pre-farm entry	At farm entry	Post farm entry	Farm exit
• Broodstock/ Fry source • Feed/input source	• Stocking • Vehicles • Arrival of service providers • Farm visitors • Wild animals	• Fish health monitoring • Management of water quality • Sanitation of shared equipment	• Dead fish disposal • Harvesting • Effluents • Waste



Introduction to the list of digital data collection tools by WorldFish & partners

Data collection tools for:

- Fish Epidemiology & Health Economics
- Fish Disease Outbreak Investigation
- Antimicrobial Use in Aquatic Animal Production Systems
- Agrovet survey

How digital survey tools work

- A digital reporting tool used on mobile devices to collect data offline.
- All data can be stored on mobile devices and uploaded when internet connection is available.
- Submitted data can be viewed, validated, and summarized in online reports by anyone with access to the KoboToolbox account.

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Previous applications of digital survey tools

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Aquaculture
Volume 527, 15 October 2020, 735438

Key risk factors, farming practices and economic losses associated with tilapia mortality in Egypt

Shimaa E. Ali, Mona Dverdal Jansen, Chadag Vishnumurthy Mohan, Jerome Delamare-Debouteville, Harrison Charo-Karisa

Received 20 February 2020, Revised 26 April 2020, Accepted 1 May 2020, Available online 12 May 2020.

Egypt

113 tilapia farms (2018)

Kenya

179 farms (2023)


Aquaculture

journal homepage: www.elsevier.com/locate/aquaculture

Is tilapia mortality a latent concern for the aquaculture sector of Bangladesh? An epidemiology and health economic impact study

Partho Pratim Debnath, Mona Dverdal Jansen, Jérôme Delamare-Debouteville, Chadag Vishnumurthy Mohan, Ha Thanh Dong, Channarong Rodkhum

Bangladesh

550 & 120 tilapia farms,115 agrovets (2017-2019; 2022-2024)

Ghana

99 farms (2023)


Aquaculture
Volume 584, 15 April 2024, 740664

Understanding aquaculture biosecurity to improve catfish disease management in Ogun and Delta states, Nigeria

Laura Khor, Olusola Ayodele Bodunde, Robert Wills, Larry Hanson, Olanike Kudirat Adeyemo, Oluwasanmi Olayinka Ajisa, Selim Adewale Alarape, Jérôme Delamare-Debouteville, Vishnumurthy Mohan Chadag

Nigeria

399 catfish farms (2021)

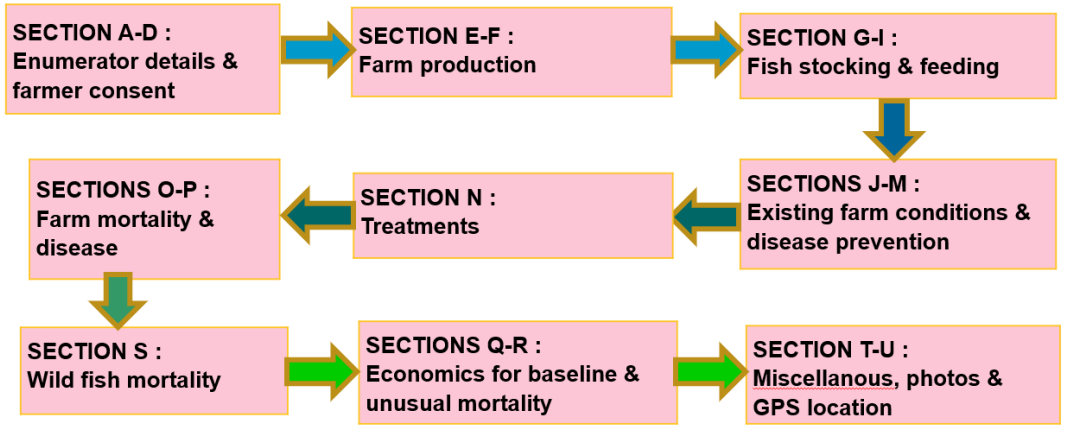
Malawi

…? farms (2024)

WorldFish

Fish Epidemiology & Health Economics (FEHE) Survey tool (Baseline epidemiology data)

- ✓ A comprehensive survey tool to collect & compile data on farm practices, inputs, outputs & epidemiology, addressing biosecurity pathways from stocking to harvest.
- ✓ Product of collaboration between WorldFish / NVI
- ✓ For trained extension agents to collect & compile epidemiology data offline in remote farms.



https://bit.ly/3Azq1eO

Fish Epidemiology & Health Economics (FEHE) Survey tool (Baseline epidemiology data)

F. Water Management and Practices

F01. WATER SOURCE *
- [x] Surface water (municipal town water)
- [ ] Ground water (via bore)
- [ ] Irrigation canal
- [ ] Brackish water
- [ ] Nearby farm
- [ ] River
- [ ] Rain
- [ ] Lake
- [ ] Other (specify)

F02. EXCHANGE OR ADD WATER TO PRODUCTION UNIT E.G. POND, TANKS
- (•) Yes
- ( ) No

F03. HOW MANY DAYS OF WATER EXCHANGE PER CULTURE YEAR

F04. WATER EXCHANGE/ADDITION RATE
% per day

G. Stock Type

G01. CULTURE TYPE *

Definition:

Polyculture is the deliberate culture of more than a single aquatic species within the same water body/farm site (hint: does not include pest species)

Monoculture is the culture of a single species in a single water body/farm site

- ( ) Monoculture
- (•) Polyculture
- ( ) Both monoculture and polyculture

» Antibiotic treatment(s)

(COLLECT DATA FOR THE LAST 12 MONTHS OF COMPLETED PRODUCTION + ADDITIONAL MONTHS UP TO SURVEY DATE)

N24. ANTIBIOTIC(S) TREATMENT *
- (•) Yes
- ( ) No

N25. WHAT ANTIBIOTIC?
If antibiotic(s) used not listed, please see next question
- [ ] Tetracycline - C22H24N2O8
- [ ] Erythromycin - C37H67NO13

L. Biosecurity

L01. BIOSECURITY FOLLOWED AT THE TIME OF BRINGING IN THE STOCK *
- [ ] Vehicle "tyrebath" on entry
- [ ] Fish disinfection
- [ ] Transport water disposal to crops away from pond/cages/tanks
- [ ] None
- [ ] Other (specify)

L02. ANY INTRODUCTION OF FISH ONTO FARM AFTER MAIN STOCKING *
- ( ) Yes
- ( ) No

L03. BIOSECURITY BETWEEN PRODUCTION CYCLES *
- [ ] Drying pond
- [ ] Liming pond
- [ ] Cleaning nets
- [ ] None
- [ ] Other (specify)

L04. FALLOW PERIOD *
- ( ) None
- ( ) 1-7 days
- ( ) 1-2 weeks
- ( ) 3-4 weeks
- ( ) 5-10 weeks
- ( ) > 10 weeks

L05. SHARE EQUIPMENT OR STAFF WITH ANOTHER FARM *
- ( ) No
- ( ) Yes - 1 farm
- ( ) Yes - 2 farms or more

L06. USE OF ON-FARM INTERNAL BIOSECURITY MEASURES *
- [ ] Vehicle disinfection
- [ ] Footbath
- [ ] Hand disinfection
- [ ] Equipment disinfection
- [ ] None
- [ ] Other (specify)

L15. LIST OF SERVICE PROVIDERS VISITING THE FARM *
- [ ] Harvester
- [ ] Pond excavator
- [ ] Feed supplier
- [ ] Veterinarian
- [ ] DoF officer
- [ ] Chemical/drug supplier
- [ ] University students/technical staffs/academics
- [ ] DoF field health officers/others for routine visits, samples collection etc.
- [ ] NGO
- [ ] None
- [ ] Other (specify)

Fish disease outbreak investigation reporting tool (Data on outbreak incidence)

- ✓ A concise reporting tool to collect disease-related information during investigation of farm outbreaks and mortalities
- ✓ For trained extension agents & veterinarians to compile reports of disease incidents.

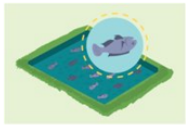
Details of data collector, farmer & production site

Basic info on farm production & practices

Specific info on mortality occurrence (Date, fish type, duration, $, clinical signs & spreading)

Farmer response measures to disease outbreak

Sample collection for disease testing & results



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Fish disease outbreak investigation reporting tool (Data on outbreak incidence)

» **Fish group and species affected**

WHICH FISH GROUP(S)

- ☐ Catfish
- ☐ Tilapia

NUMBER OF YEARS POND(S) USED FOR FISH CULTURE

TYPE OF FARMING SYSTEM WHERE UNUSUAL MORTALITY IS TAKING PLACE

- ☐ Monoculture
- ☐ Polyculture
- ☐ Cage culture
- ☐ Rice-fish culture
- ☐ Homestead pond
- ☐ Commercial farm
- ☐ Hatchery/Nursery
- ☐ Other

ANY INFORMATION OF UNUSUAL MORTALITIES IN THE SURROUNDING AREA?

- ◯ Yes
- ◯ No

WATER SOURCE

- ☐ Surface freshwater (municipal town water)
- ☐ Ground water (via bore)
- ☐ Irrigation canal
- ☐ Brackish water
- ☐ Nearby farm
- ☐ River
- ☐ Rain
- ☐ Lake
- ☐ Seawater
- ☐ Other

ESTIMATED TOTAL LOSS (CONSIDERING ALL COSTS - FEED, LABOUR, LEASE, SEED, ETC)
in

LOCATION OF REPORTED CASE (VILLAGE, DISTRICT, STATE) *

GPS

latitude (x.y °)

longitude (x.y °)

altitude (m)

accuracy (m)

search for place or address

DATE OUTBREAK STARTED? *

yyyy-mm-dd

FARMED/WILD FISH? *

- ◉ Farmed
- ◯ Wild

IF FARMED FISH, POND/FARM AREA
ha

TOTAL PONDS IN THE FARM

NUMBER OF AFFECTED PONDS WITH MORTALITIES

POND/FARM TYPE
(Perennial = Continuous)

- ◯ Perennial
- ◯ Seasonal

Cross-sectional AMU survey tool

(Data on AMU practices from previous production cycle)

- **Respondent information**
- **Perceived AMU benefits & downside**
- **General farm information**
- **Farm biosecurity practices**
- **4 Pond-level production practices (Pond preparation/ Stocking/Feeding/Harvesting)**
- **Signs of disease and health issues**
- **Farmer response to mortalities (reporting/health services/treatments)**
- **Economics of input products**

✓ A cross-sectional survey tool for assessment of farmer perceptions and practices regarding antimicrobial use

✓ For collecting data from the previous production cycle

✓ For extension officers & researchers who want to collect data on AMU and its drivers at the farm and pond level.

Cross-sectional AMU survey tool

(Data on AMU practices from previous production cycle)

» Q. RESPONSE TO MORTALITY : REPORTING

Did you report the mortality incident(s)? *
- ◯ Yes
- ◯ No

Section R. RESPONSE TO MORTALITY: ANIMAL HEALTH SERVICES

» R. RESPONSE TO MORTALITY: ANIMAL HEALTH SERVICES

For the selected pond during the last completed cycle, did you seek professional help following a disease outbreak or for a routine health check? *
- ◯ Yes
- ◯ No

Did you collect any samples to send to any lab? *
- ◯ Yes
- ◯ No

Section S. TREATMENTS (FOR PREVENTION & TREATMENT OF DISEASE)

» S. TREATMENTS (FOR PREVENTION & TREATMENT OF DISEASE)

NOTE TO ENUMERATORS:
TREATMENT = USE OF CHEMICALS OR DRUGS POSSIBLY CONTAINING ANTIMICROBIALS – NOT INCLUSIVE OF FERTILIZERS, PROBIOTICS, LIME)

Did you use any treatments on the selected pond (and fish) during the last completed cycle? *
- ◯ Yes
- ◯ No

Did you use other traditional medicines in the selected pond? *
- ◯ Yes
- ◯ No

Did you use any growth promoters/probiotics/supplements at the selected pond? *
- ☐ Yes, growth promoters
- ☐ Yes, probiotics
- ☐ Yes, supplements
- ☐ No

Section T. ADMINISTERING TREATMENTS

» » Treatments

1

Why did you use this treatment?
- ☐ In response to clinical signs of illness
- ☐ In response to low mortality
- ☐ In response to high mortality
- ☐ To prevent sickness
- ☐ In response to suspected stress of fish, for example extreme environmental conditions (heat, rainfall)
- ☐ For growth promotion (fattening)
- ☐ Other, specify

What is the name of treatment *

Important note:
- *Use the codes provided if treatment product is listed in the photobook e.g. T1 for treatment product 1, T2 for treatment product 2*
- *Only type in the actual name of brand if treatment product is not listed in the photobook*

How many times did you treat the selected pond/ (and fish) using treatment in the last completed cycle? *
- *-97 Don't know*
- *-98 Not applicable*
- *-99 Null*

How much total treatment did you use on the pond/ (and fish) during the last completed cycle? *
- *-97 Don't know*
- *-98 Not applicable*
- *-99 Null*

Unit of treatment quantity *
- ◯ Kg
- ◯ Liter

What was the cost per of treatment [Taka] *
- *-97 Don't know*
- *-98 Not applicable*
- *-99 Null*

Did this cost include any fee for veterinary consultation or service?
- ◯ Yes
- ◯ No

Longitudinal AMU survey tool

(Data on AMU practices from current production cycle)

- **Pond-level practices in each production stage (pond preparation/ stocking/ growout/ harvesting)**
- **Signs of mortality or health issues**
- **Input quantity & costs**

✓ A longitudinal survey tool for repeated use and longer-term compilation of data on farm inputs (including antimicrobials) & practices during each production stage, disease/mortality incidence & economics.

✓ A follow-up tool to the cross sectional survey

✓ For collecting data from the current ongoing production cycle

✓ For extension officers & researchers who want to collect data on AMU and its drivers at the farm and pond level.

Longitudinal AMU survey tool

(Data on AMU practices from current production cycle)

TREATMENTS (FOR PREVENTION & TREATMENT OF DISEASE)

» TREATMENTS (FOR PREVENTION & TREATMENT OF DISEASE)

NOTE TO ENUMERATORS:
TREATMENT = USE OF CHEMICALS OR DRUGS POSSIBLY CONTAINING ANTIMICROBIALS – NOT INCLUSIVE OF FERTILIZERS, PROBIOTICS, LIME)

***Did you use any treatments on the selected pond (and fish) since our last interview?**

- (•) Yes
- ( ) No

***In what situation or situations did you use treatments?**
** Important note:**
Do not read the answer, allow the farmer to answer then mark the response.
****

- [ ] High mortality
- [ ] Low mortality
- [ ] In response to clinical signs of illness
- [ ] In response to suspected stress of fish, for example extreme environmental conditions (heat, rainfall)
- [ ] All the time

» » Treatments

1

***What is the name of treatment**

**name of brand*

***How many times did you treat the selected pond/ (and fish) using treatment since our last interview?**

- *-97 Don't know*
- *-98 Not applicable*
- *-99 Null*

***How much total treatment did you use on the pond/ (and fish) since our last interview?**

- *-97 Don't know*
- *-98 Not applicable*
- *-99 Null*

-1

***Unit of treatment quantity**

- (•) Kg
- ( ) Liter

Agrovet shop survey tool

(Data from shop sales of aquamedicines)

- A survey tool for data collection from Agrovet shops on their practices of medication prescription & sales of treatment products to farmers.
- For extension officers and researchers gathering information on the supply of aquamedication to farmers.

• **Commonly sold antibiotics & aquamedicines** • **Product information: Manufacturer, active ingredients, dosage & price**	• **Reasons for prescribing** • **Antibiotic sale: quantity & price** • **Practitioner's knowledge, attitude & practices**

Agrovet shop survey tool

(Data from shop sales of aquamedicines)

C: PRACTICES

C01.DO YOU ASK FOR A WRITTEN PRESCRIPTION FROM YOUR CLIENTS BEFORE ISSUING THE ANTIBIOTIC?

- ○ No
- ○ Yes
- ○ Sometimes

C02.WHAT GUIDES YOUR SELECTION OF ANTIBIOTIC TO SELL?

- ☐ Written prescription
- ☐ Farmer's demand
- ☐ My own experience
- ☐ Based on advice from pharmaceutical companies
- ☐ Based on advice from feed companies

C04.WHAT INFORMATION DO YOU PROVIDE TO THE BUYER AT THE POINT OF ANTIBIOTIC SALE?

- ☐ Direction of use
- ☐ Withdrawal periods
- ☐ Storage instructions
- ☐ Dosage instructions
- ☐ Route of administration
- ☐ Frequency of treatment
- ☐ Expiry date
- ☐ Potential side effects
- ☐ No information provided
- ☐ Other (Specify)

D: ANTIBIOTIC SALES

D01.DO YOU THINK ANTIBIOTIC ARE WIDELY USED IN AQUACULTURE?

- ○ No
- ○ Yes
- ○ I don't know

D02.HOW MANY PERCENT OF YOUR CLIENTS ARE FISH FARMERS?

in %

D03.PLEASE SELECT COMMONLY SOLD ANTIBIOTIC FOR AQUACULTURE IN THE **LAST YEAR (JAN-DEC 2023)**

The hardcopy photobook will be presented separately while selecting antibiotics

none selected

D07.DO YOU KEEP RECORD OF THE ANTIBIOTIC YOU SOLD? (FOR ANY PURPOSE)

- ○ No
- ○ Yes

D08.PLEASE CAN WE TAKE A COPY OF YOUR SUPPLIER INVOICES (JAN-DEC 2023)?

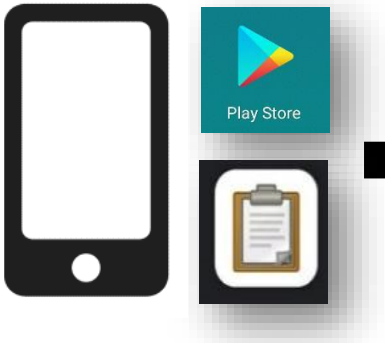
- ○ No
- ○ Yes

D09.PLEASE SELECT COMMONLY SOLD ANTIBIOTIC FOR AQUACULTURE IN THE **LAST MONTH**

The hardcopy photobook will be presented separately while selecting antibiotics

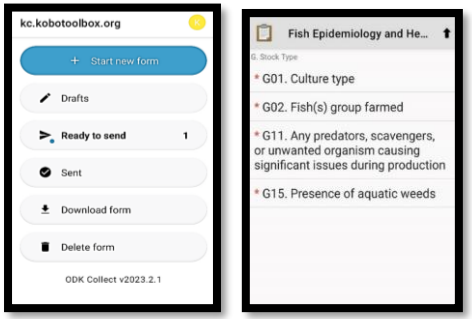
none selected

Setting up the survey tool on mobile devices



Installation of data collection app on mobile devices

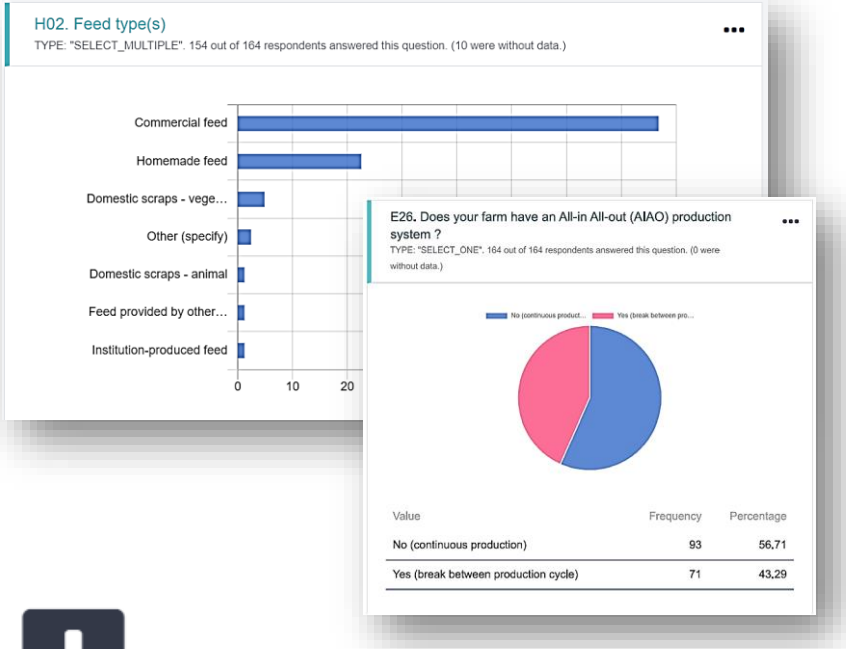
Connect to the project server

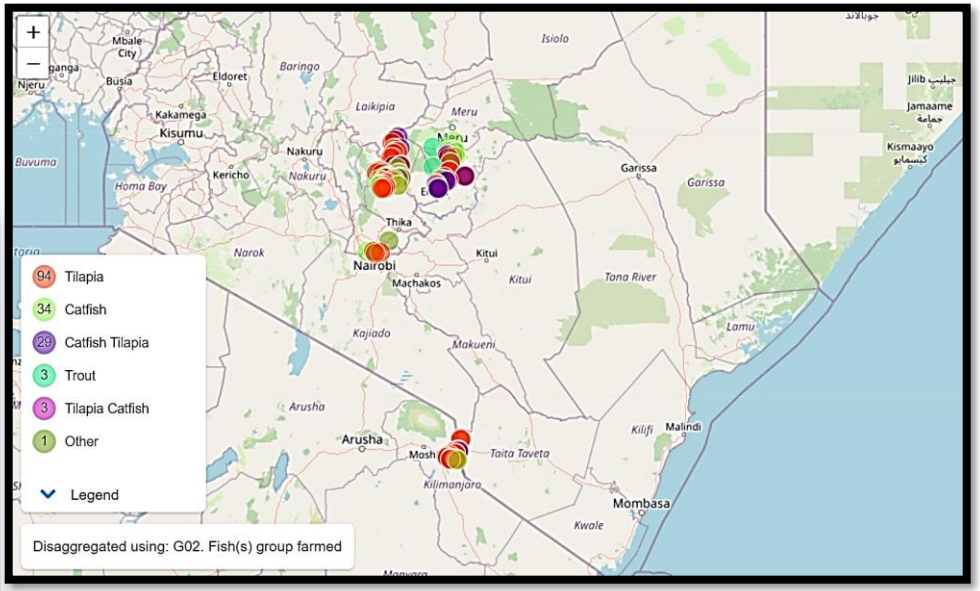


Download the questionnaire tool to mobile devices

Ready to use offline;
Submit data upon availability of internet

Summarize & monitor the overall survey data

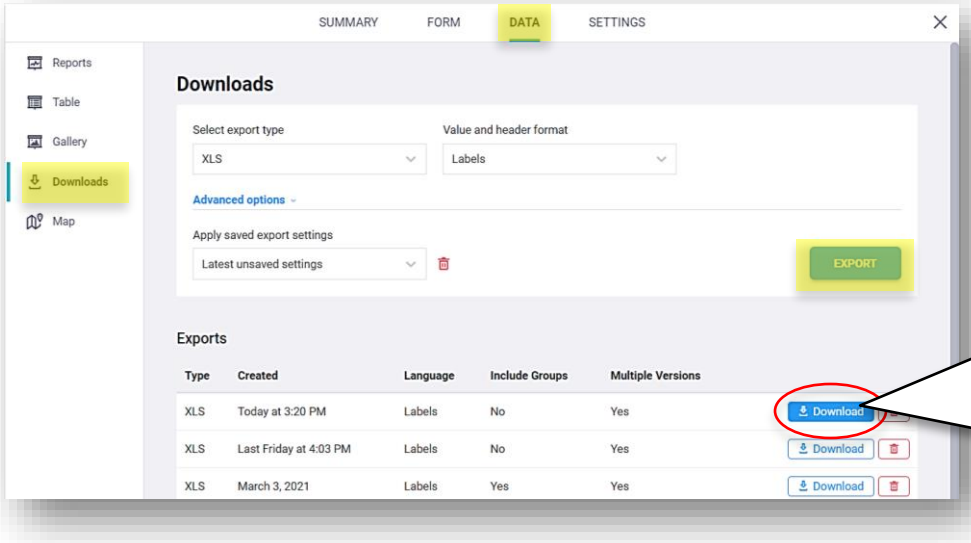


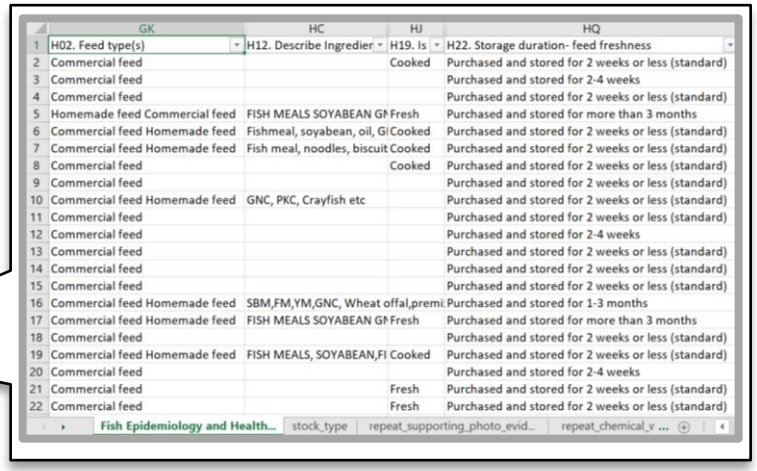


Reports

- View the summary of the survey responses in autogenerated data reports.
- Visualize survey responses in different preferred chart types & map on KoboToolbox

Generate & visualize the information collected across all locations





	GK	HC	HJ	HQ
1	H02. Feed type(s)	H12. Describe Ingredier	H19. Is	H22. Storage duration- feed freshness
2	Commercial feed		Cooked	Purchased and stored for 2 weeks or less (standard)
3	Commercial feed			Purchased and stored for 2-4 weeks
4	Commercial feed			Purchased and stored for 2 weeks or less (standard)
5	Homemade feed Commercial feed	FISH MEALS SOYABEAN GI	Fresh	Purchased and stored for more than 3 months
6	Commercial feed Homemade feed	Fishmeal, soyabean, oil, GI	Cooked	Purchased and stored for 2 weeks or less (standard)
7	Commercial feed Homemade feed	Fish meal, noodles, biscuit	Cooked	Purchased and stored for 2 weeks or less (standard)
8	Commercial feed		Cooked	Purchased and stored for 2 weeks or less (standard)
9	Commercial feed			Purchased and stored for 2 weeks or less (standard)
10	Commercial feed Homemade feed	GNC, PKC, Crayfish etc		Purchased and stored for 2 weeks or less (standard)
11	Commercial feed			Purchased and stored for 2 weeks or less (standard)
12	Commercial feed			Purchased and stored for 2-4 weeks
13	Commercial feed			Purchased and stored for 2 weeks or less (standard)
14	Commercial feed			Purchased and stored for 2 weeks or less (standard)
15	Commercial feed			Purchased and stored for 2 weeks or less (standard)
16	Commercial feed Homemade feed	SBM,FM,YM,GNC, Wheat offal,premi		Purchased and stored for 1-3 months
17	Commercial feed Homemade feed	FISH MEALS SOYABEAN GI	Fresh	Purchased and stored for more than 3 months
18	Commercial feed			Purchased and stored for 2 weeks or less (standard)
19	Commercial feed Homemade feed	FISH MEALS, SOYABEAN,FI	Cooked	Purchased and stored for 2 weeks or less (standard)
20	Commercial feed			Purchased and stored for 2-4 weeks
21	Commercial feed		Fresh	Purchased and stored for 2 weeks or less (standard)
22	Commercial feed		Fresh	Purchased and stored for 2 weeks or less (standard)

Fish Epidemiology and Health... | stock_type | repeat_supporting_photo_evid... | repeat_chemical_v ...

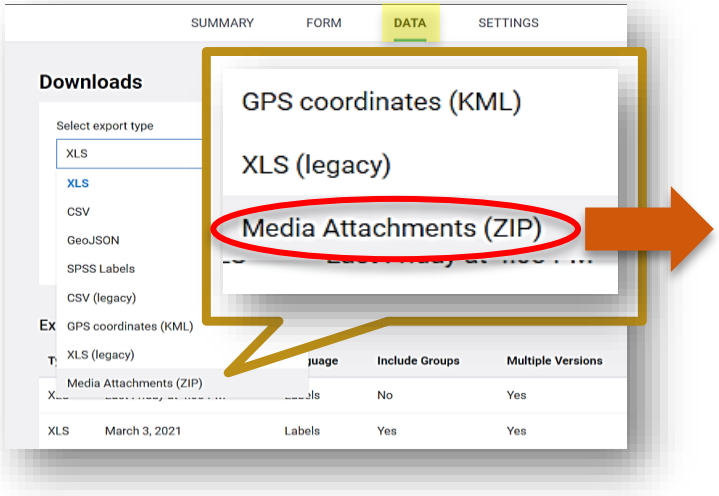
Data auto-compiled and downloaded as:

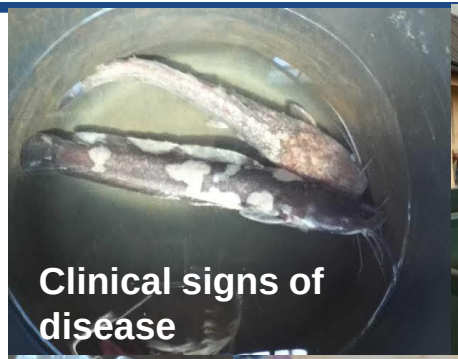
- XLS
- CSV
- GeoJSON

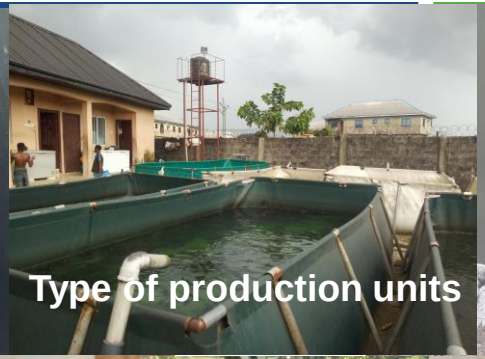
Submit & draw information from photos

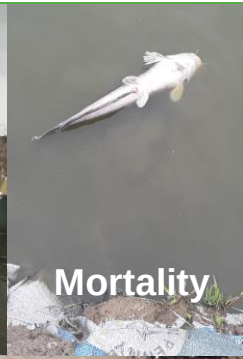
Use the survey tool to submit photos of:

- **Production systems**
- **Biosecurity infrastructure**
- **Fish mortalities**
- **Clinical signs**
- **Input products**

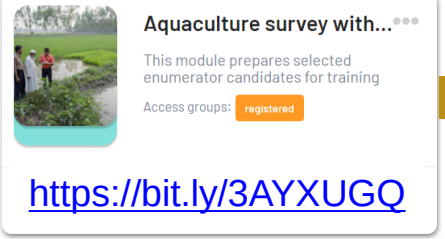


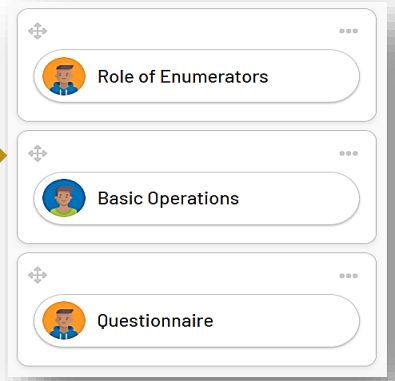


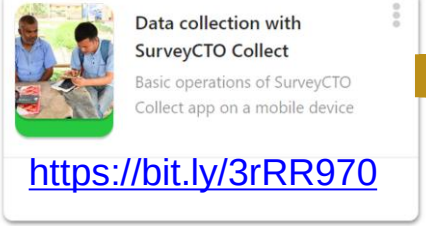


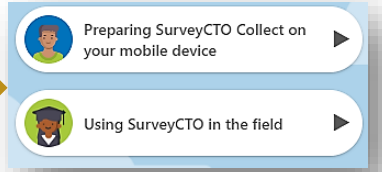


Mobile phone courses on data collection tools









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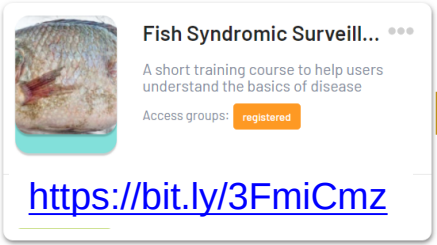
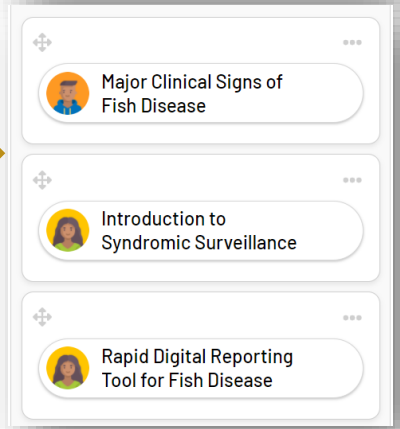
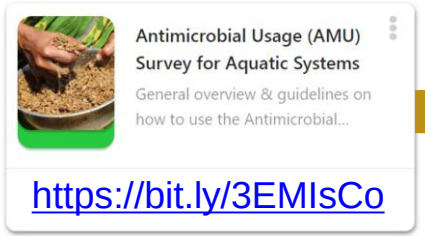
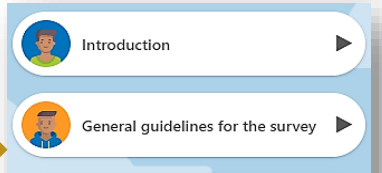


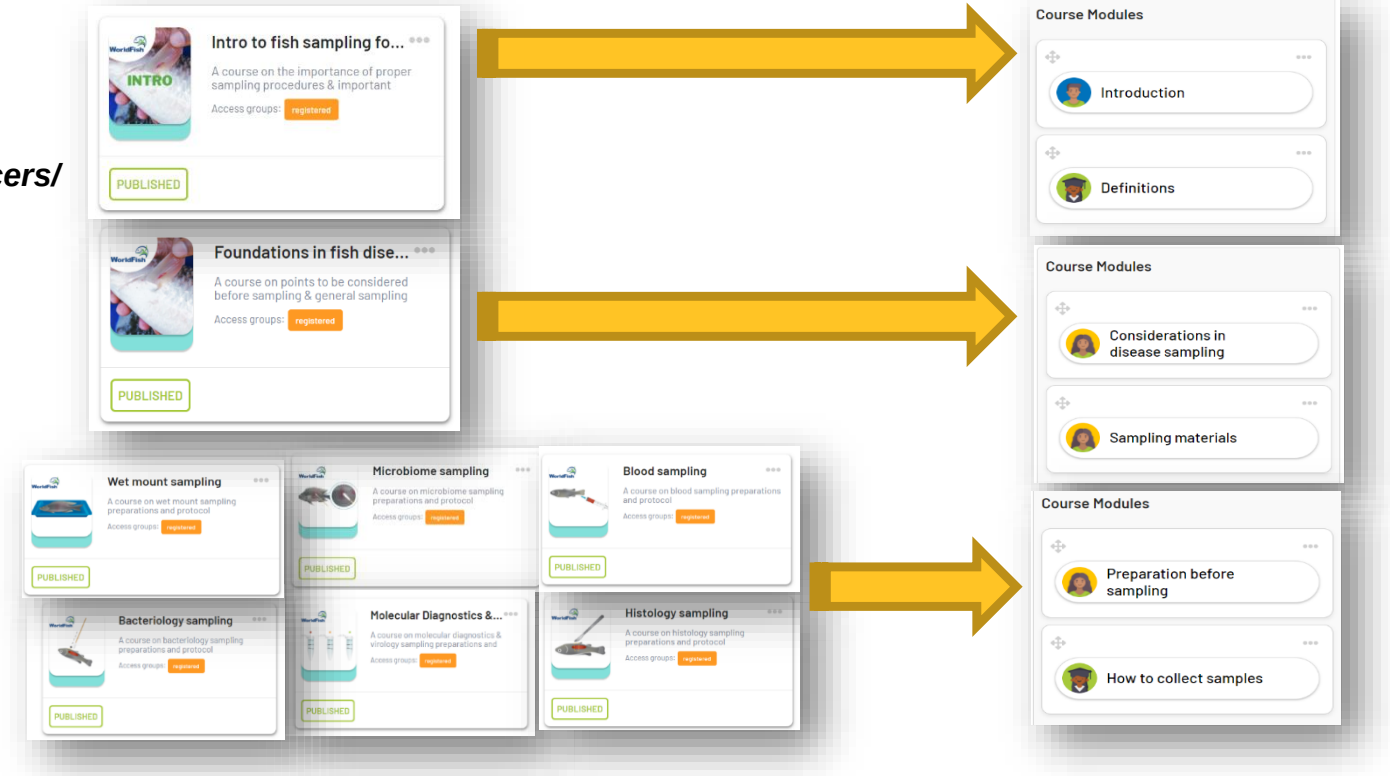




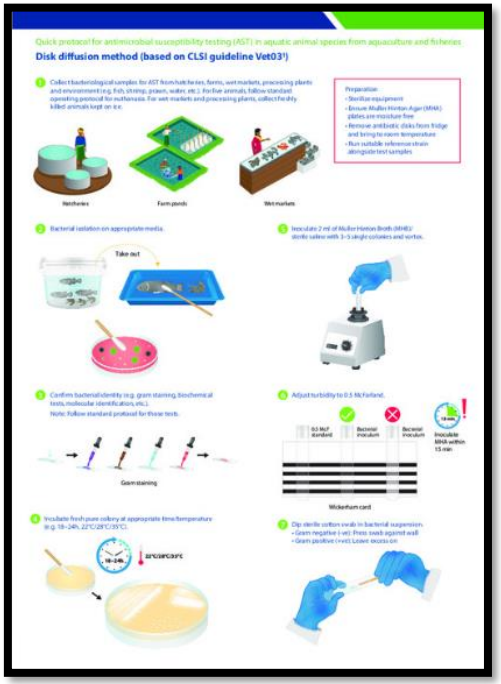


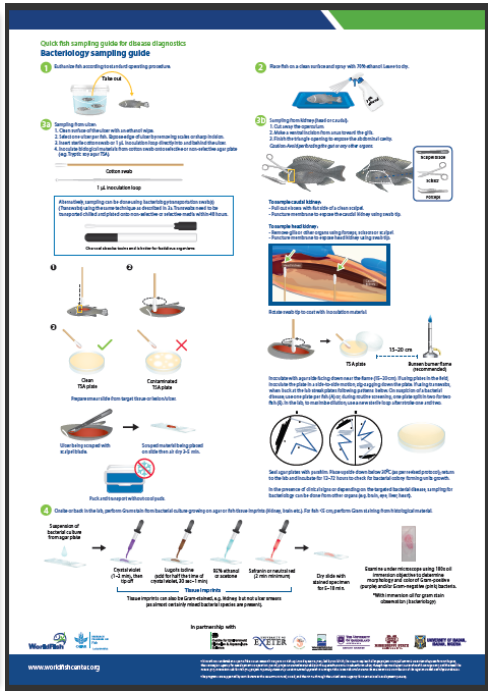
Mobile phone courses on fish sampling for diagnostics

Extension officers/ Students/ Researchers



Field resource:
Quick fish sampling guides for disease diagnostics





Pictorial guides on AST & fish sampling for 6 diagnostic protocols: Wet mount, microbiome, blood, bacteriology, molecular diagnostics/virology & histology

Target users: Vets, AMR & aquatic animal health researchers, sample collectors & students

- Quick protocol on antimicrobial susceptibility testing in aquatic animal species https://hdl.handle.net/20.500.12348/4862
- Sampling materials for fish disease diagnostics https://hdl.handle.net/20.500.12348/4836
- Wet mount sampling guide (for ectoparasites & fungi) https://hdl.handle.net/20.500.12348/4837
- Microbiome sampling guide https://hdl.handle.net/20.500.12348/4838
- Blood sampling guide https://hdl.handle.net/20.500.12348/4839
- Bacteriology sampling guide https://hdl.handle.net/20.500.12348/4840
- Molecular diagnostics sampling guide https://hdl.handle.net/20.500.12348/4841
- Histology sampling guide https://hdl.handle.net/20.500.12348/4842

Thank You

The Fleming Fund