

Fish Diseases-Parasite Questionnaire

The role of respondents

The majority of respondents in this study were owners of the fish farmers that were visited for the research. As illustrated in Table 1 72% of the respondents were owners of the establishments, 25% were managers while only one farm was owned by a community group. The owners ran their own farms while only a few contracted managers. The majority of the aquaculture farms were integrated with crop farming but a few were purely fish farms and they included Mwea fish farm, kiama fish.

Table 1: The Role of respondents in the fish farms

Characteristic	N = 36
role	
Farm group	1 (2.8%)
Manager	9 (25%)
Owner	26 (72%)

Experience in fish farming

The experience of respondents was determined through the number of years they practiced fish farming and as illustrated in Table 2, experience averaged 6.7 years. However, there were farmers who had entered the space and others who had been in the field for 24 years.

Table 2: Respondents aquaculture experience

Characteristic	N = 36
Experience	
Mean (SD)	6.6 (6.3)
Minimum	1.0
Maximum	24.0

Size of the fish farm

The study targeted both small scale and large scale fish farms depending on the total size of the ponds calculated also from the number of ponds. Majority of the respondents' land size ranged between 100 and 500 square meters meaning that most were small scale farmers. The illustration of Table 3 showed that only 25% had land sizes above 500 metres squared.

Table 3: Respondents aquaculture Aquaculture Farm Size

Characteristic	N = 36
farm size	
>2000	5 (14%)
100-500	27 (75%)
500-1000	4 (11%)

Encounter with disease and parasites

Table 4 shows that 50% of the respondents had not encountered any diseases or parasites or most probably were not aware of any diseases and parasites while 36% had distinctly encountered parasites and diseases in their farms, however 11% were not sure. The results indicated a lack of knowledge of fish diseases and parasites.

Table 4: Encounter with disease and parasites

Characteristic	N = 36
disease-parasite encounter	
Maybe	4 (11%)
No	19 (53%)
Yes	13 (36%)

Observation of fish behavior

As illustrated by Table 5, most of the respondents were highly observant of the behavior of the fish mainly during feeding.

Table 5: Fish observation

Characteristic	N = 36
fish behaviour observation	
Not Observant at all	2 (5.6%)

Table 5: Fish observation

Characteristic	N = 36
Somewhat Observant	2 (5.6%)
Very Observant	32 (89%)

Ability to identify abnormal fish behavior

According to Table 6, a majority of respondents had the capability of identifying abnormal fish behavior. Some of the abnormal fish behaviors identifiable by the farmers are illustrated in Table 7.

Table 6: Recognition of abnormal fish behavior

Characteristic	N = 36
fish abnormal behaviour identification	
No	9 (25%)
Yes	27 (75%)

Abnormal fish behavior and characteristics

Among the most observed abnormal fish behaviors were lethargy, abnormal erratic swimming behaviors, unusual lumps and growth in the skin, change in coloration and lesions and sores presence on the skin. Fish isolation was only observed among ornamental fishes but not tilapia and catfish.

Table 7: Abnormal fish behaviors

Characteristic	N = 36
Change in coloration	13 (36%)
Lesions or sores	12 (33%)
Abnormal swimming patterns	20 (56%)
Unusual lumps or growths	10 (28%)
Lethargy	17 (47%)
Isolation	9 (25%)

Frequency of monitoring aquaculture water quality

The illustration in Table 8 shows that quality monitoring was done by the farmers at a higher frequency. However, the monitoring was not done using scientific gadgets and equipment but only through observation.

Table 8: Water Quality Monitoring Frequency

Characteristic	N = 36
water quality monitoring	
0	3 (8.3%)
1	7 (19%)
2	6 (17%)
3	9 (25%)
4	1 (2.8%)
5	10 (28%)

The frequency of fish mortalities

According to Table 9, fish mortality were recorded at a lower rate in the fish farms.

Table 9: Mortality Frequency

Characteristic	N = 36
fish mortality frequency	
0	9 (25%)
1	6 (17%)
2	10 (28%)
3	5 (14%)
4	1 (2.8%)
6	2 (5.6%)
7	2 (5.6%)
8	1 (2.8%)

Presence of early warning signs of diseases and parasites

Disease outbreak signs were not identifiable to 44% of the respondents but 56% of the respondents indicated presence of early disease outbreak signs as illustrate in Table 10

Table 10: Signs of Disease outbreak

Characteristic	N = 36
early disease outbreak warning	
No	16 (44%)
Yes	20 (56%)

The early signs of diseases and parasites

Fish mortality and erratic swimming were seen as early signs of disease outbreak. Failure to normal feeding was as well observed as early sign. Then onset of cold diseases also mean outbreak of diseases for some farmers. Table 11 breaks down the early signs of diseases outbreaks.

Table 11: Early Signs of Disease outbreak

Characteristic	N = 36
early warnings	
Cold season	3 (15%)
Erratic swimming	5 (25%)
Fin rot	2 (10%)
Gasping for air	1 (5.0%)
Gill rot	1 (5.0%)
Mortalities	5 (25%)
Not feeding well	3 (15%)
Unknown	16

Disease and pest management

Majority of the respondents isolated the sick fish as a form of management in case of a disease outbreak while recording and reporting. They reviewed and adjusted their feeding practices while only a few consulted veterinarians as a few treated with medication as Table 12 shows.

Table 12: Management of Disease outbreaks

Characteristic	N = 36
Isolate the infected fish	25 (69%)
Consult veterinarian	10 (28%)
Treat with medication	8 (22%)
Review and adjust feeding practices	15 (42%)

Table 12: Management of Disease outbreaks

Characteristic	N = 36
Record and report	27 (75%)

Methods of treatment

The respondents majorly used industrial salts, lime, amoxyl and table salt including aloe Vera to treat their sick fish while only a few used copper II sulfate and Potassium permanganate as Table 13 illustrates.

Table 13: Disease and Parasite treatment

Characteristic	N = 36
Formalin	1 (2.9%)
Potassium permanganate	7 (19%)
Copper II sulphate	2 (5.6%)
Industrial salt	4 (100%)
Aloe vera	1 (100%)
Lime	2 (100%)
Amoxyl	2 (100%)
Table salt	5 (100%)

Possession of fish diseases and parasites knowledge

Fish parasites and disease knowledge is very scarce among fish farmers. However, according to Table 15, 64% of the respondents had been trained on fish diseases through workshops online sources and experts according to Table 16.

Table 14: Disease and Parasite Knowledge

Characteristic	N = 36
disease-parasite knowledge	
0	13 (36%)
1	4 (11%)
2	6 (17%)
3	7 (19%)
4	5 (14%)
5	1 (2.8%)

fish health-disease formal training

Table 15: Disease and Parasite Knowledge Training

Characteristic	N = 36
fish health-disease formal training	
No	13 (36%)
Yes	23 (64%)

Sources of information on fish diseases and parasites

Table 16: Disease and Parasite Knowledge Training Source

Characteristic	N = 36
Workshops	20 (56%)
Online resources	12 (33%)
Experts	24 (67%)
School courses	2 (100%)
Discussions with other farmers	3 (100%)

Management challenges associated with fish diseases and parasites

Predators and lack of medication top the list of challenges faced by fish farmers as illustrated in Table 17.

Table 17: Disease and Parasite Management Challenges

Characteristic	N = 36
Disease identification	27 (75%)
Limited veterinary access	8 (22%)
Financial constraints	13 (36%)
Inadequate training	16 (44%)
Lack of monitoring tools	12 (33%)
Climate-related challenges	7 (19%)
Lack of access to latest research in fish health	10 (28%)
Predators	6 (100%)
No medication	2 (100%)

Interest in fish health management training and the topics of interest

Majority of the respondents would like to trained on disease identification and diagnosis.

Table 18: Training prospects

Characteristic	N = 36
Disease identification and diagnosis	34 (94%)
Water quality management	28 (78%)
Nutrition and feeding practices	20 (56%)
Monitoring and early detection	25 (69%)