

KMAP BASELINE SURVEY PROFILE OF THE FISH FARMING ENTERPRISES



OVERVIEW

- Background
- Survey objectives
- Methodology and sample structure
- The survey execution
- Study sites
- Main findings
- Key Action Points

BACKGROUND

The Kenya Market-Led Aquaculture Project (KMAP) is a four-year project funded by the Embassy of the Kingdom of the Netherlands and implemented by Farm Africa as the lead implementing agency together with a collection of partners including EKN (Dutch) and Wageningen University.

KMAP's overall long term impact is a vibrant aquaculture industry that generates sustainable incomes, food security, and employment.

The project has three key result areas:

- **Result area 1:** To sustainably increase production and productivity of medium to large scale fish farmers, hatcheries and fish feed producers
- **Result area 2:** To increase access to markets for medium to large scale fish farmers and input suppliers
- **Results area 3:** To enhance the enabling environment to support aquaculture development.

SURVEY OBJECTIVES

The objectives of undertaking this study were:

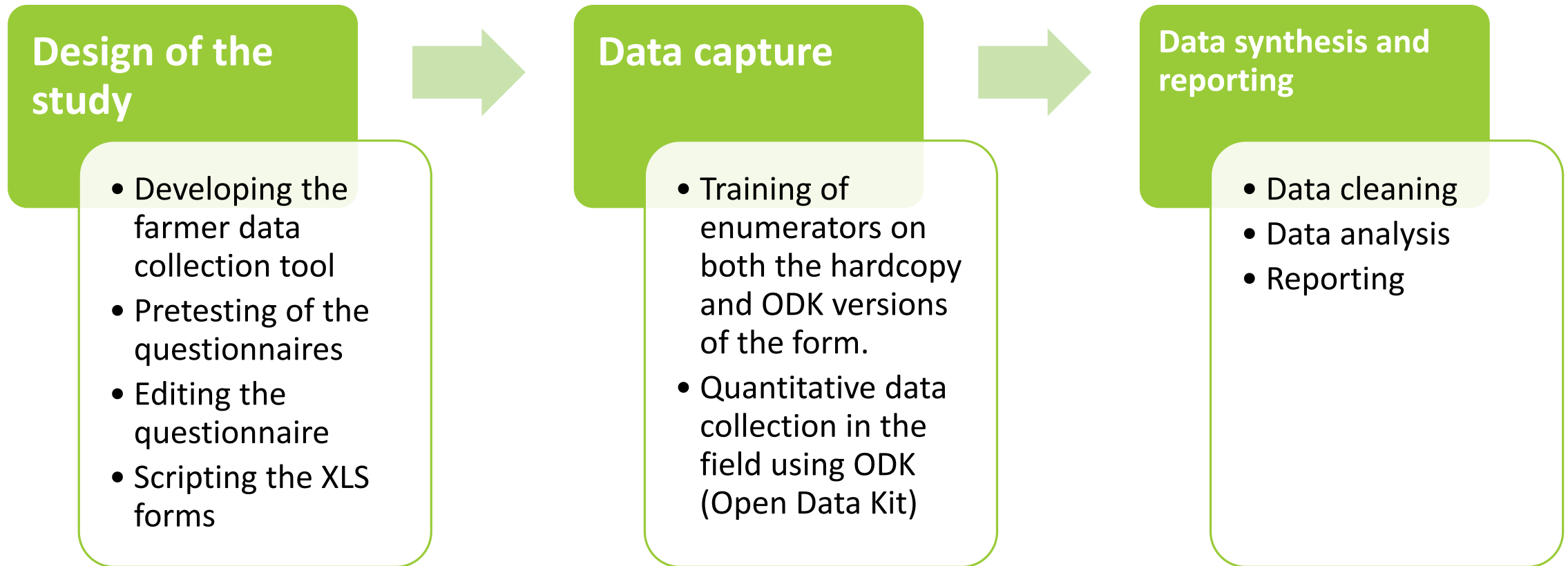
- To generate fish farming baseline & productivity data needed to ensure that project interventions are designed to achieve positive results.
- To establish the level of the project indicators and enable the project set targets that will be attributable impact to the life of the project
- To identify practices and characteristics of aquaculture farmers as well as any existing actors along the value chain that exist and their roles and operations.
- To improve on implementation for better understanding of the farmers and their challenges

Methodology & Sample Structure

- Quantitative data was collected in 221 fish farms across the 14 KMAP counties using ODK for real time data collection and GPS data collection.
- Purposive sampling was used in the identification of farmers. This methodology was selected based on the fact that KMAP is not working with just any fish farmer but those who meet the minimum requirements of owning at least three active ponds, interest and resources available to invest in growing their fish production. Hence, the need to have data for this specific category of entrepreneurs guided the sampling methodology for use.
- As the farmers were being recruited on an ongoing basis, a rolling baseline was also conducted (between June and October 2016) in line with the recruitment rate.
- Once at the enterprises, questionnaires that had been pre-tested were administered to the farmers. Respondents at the farms were majorly the farm owners. However, in their absence and with their approval, farm managers/ relatives who were aware and involved in the daily operations of the fish farm were interviewed.
- The survey achieved an overall 221 respondents. Since KMAP's target beneficiaries is 1,100 farmers, this sample at 90% confidence level gives a margin of error of $\pm 4.9\%$.

The Survey Execution

The assignment was conducted in three major phases:

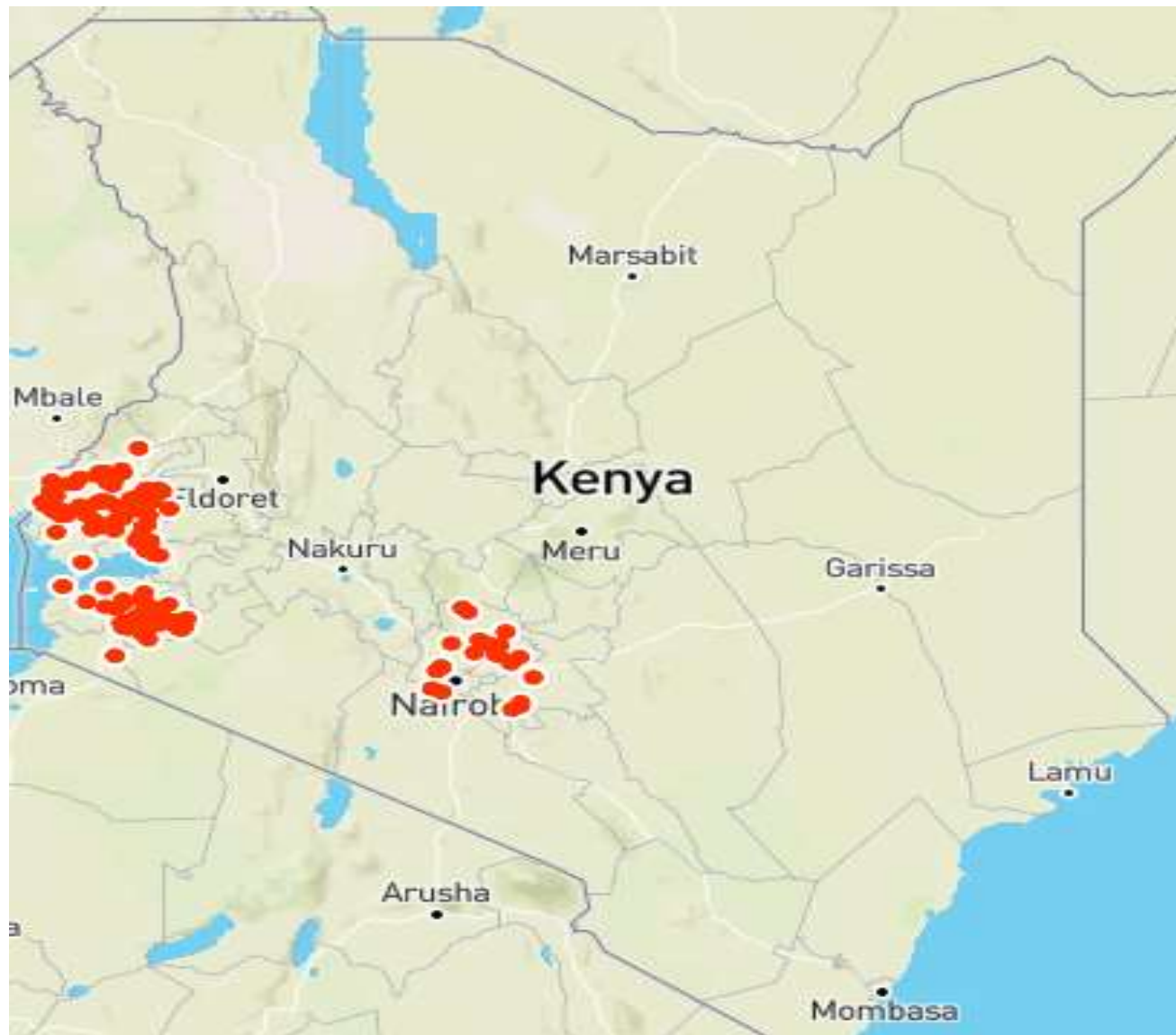


Study Sites

The Study was conducted in the 14 counties where KMAP program is implemented.

GPS information was collected from the different sites.

The spread of farmers interviewed is as shown in the map.



Limitation

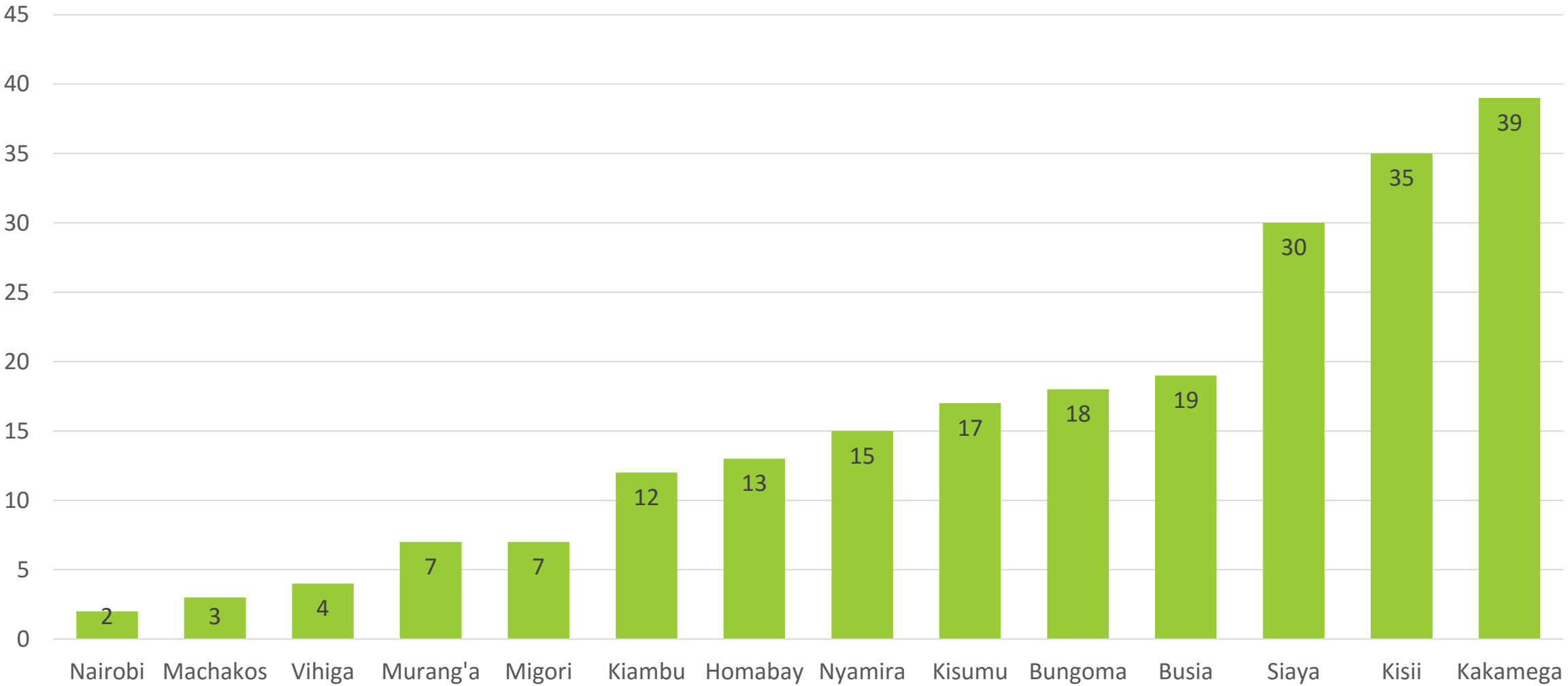
- To enable the computation of gross margins from a complete cycle, the baseline survey was based on recall data from the farmers' previous production cycles (with some recall dating back as far as 4 years) . Though production and sales data have been computed in this study, we do appreciate that recall data may sometimes be over/ under reported and therefore based on this, the production and sales figures will be verified against the data collected in Q1 and Q2.
- Further need to clarify this is based on the fact that only 29% of the farmers reported having a weighing scale indicating that the sales volumes for the majority was based on estimates. Hence, we need the data to be compared against verifiable production in the first quarter of monitoring.

KEY FINDINGS

Summary on enterprises

	Total/ Average	Male	Female	Institution
No. of enterprises Surveyed	221	163	45	13
Number of Tilapia farmers	220	163	44	13
Number of Catfish Farmers	82	58	18	6
Size of farms/ Average area of all ponds per enterprise (<i>in m²</i>)	1,887	1,805	1,847	2,968
Average pond size (<i>in m²</i>)	296	308	238	344
Average number of ponds owned	7	6	7	8
Average number of ponds stocked with tilapia	3	3	3	7
Average number of ponds stocked with catfish	2	2	3	0

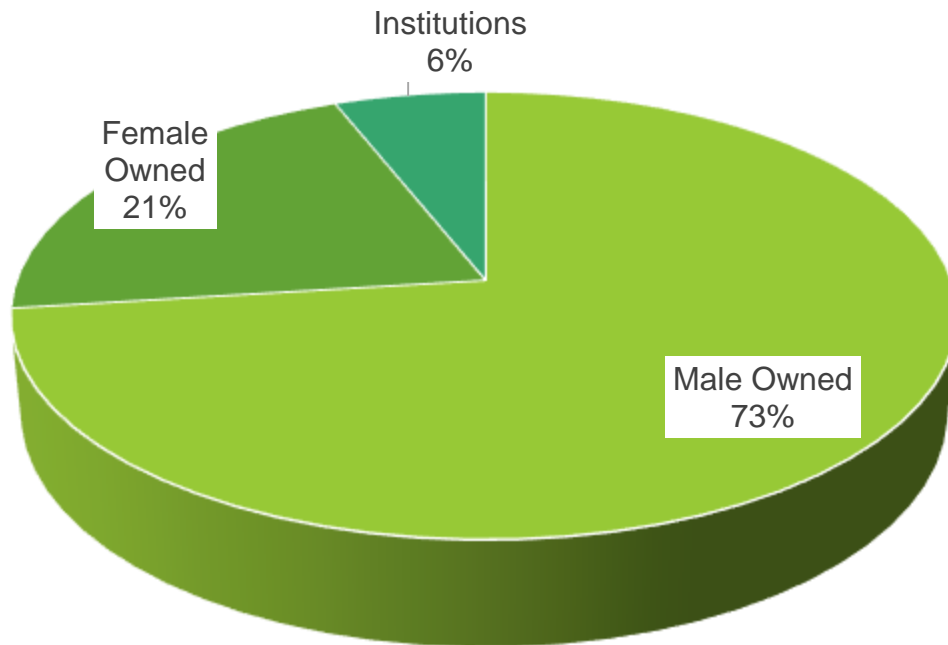
County where fish ponds are located



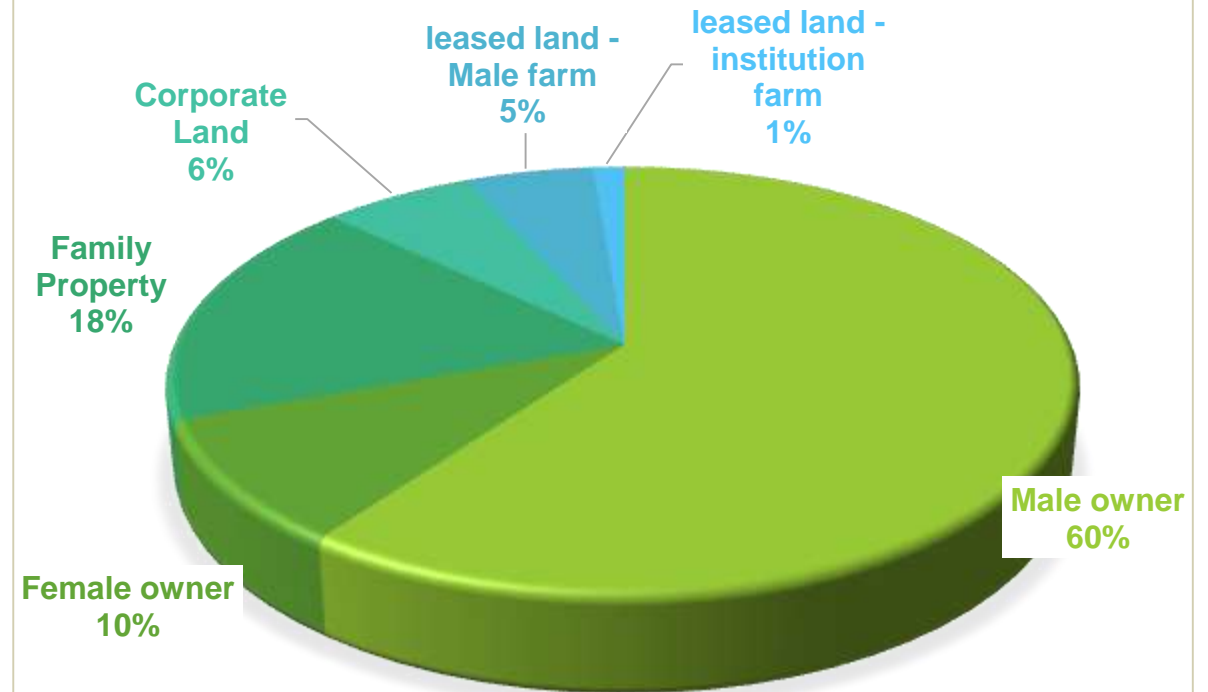
Majority of the farms were male owned. Less than a quarter were female owned enterprises. The project had also recruited some institutions who practice aquaculture as a business.

Land was still majorly owned by men with the second most common ownership being family property. Less than half the women reported that the land in which their ponds were located belonged to them. Also, leasing of land was a practice done by the men with women shying away. None of the women indicated to have leased the property in which they had dug their fish ponds.

WHAT IS THE GENDER OF THE OWNER OF THE FISH FARM ENTERPRISE?

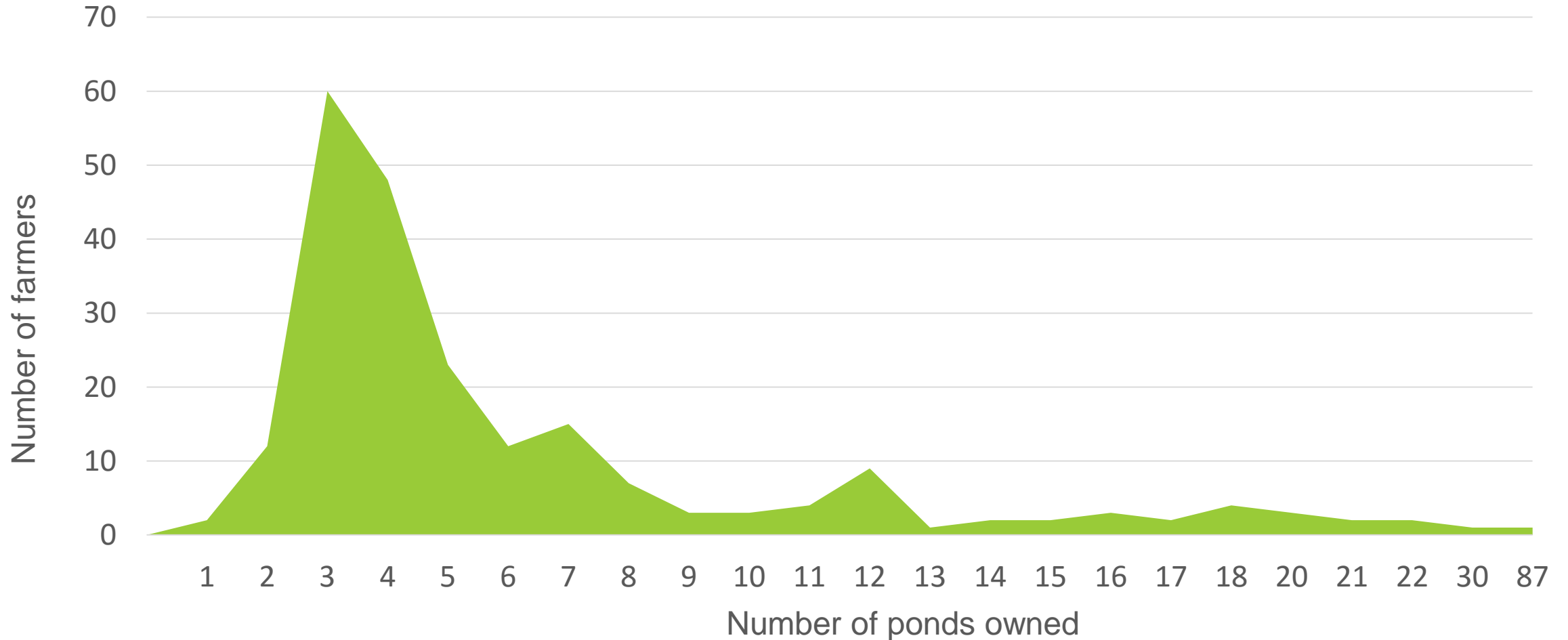


WHO OWNS THE LAND WHERE THE FISH PONDS ARE LOCATED?



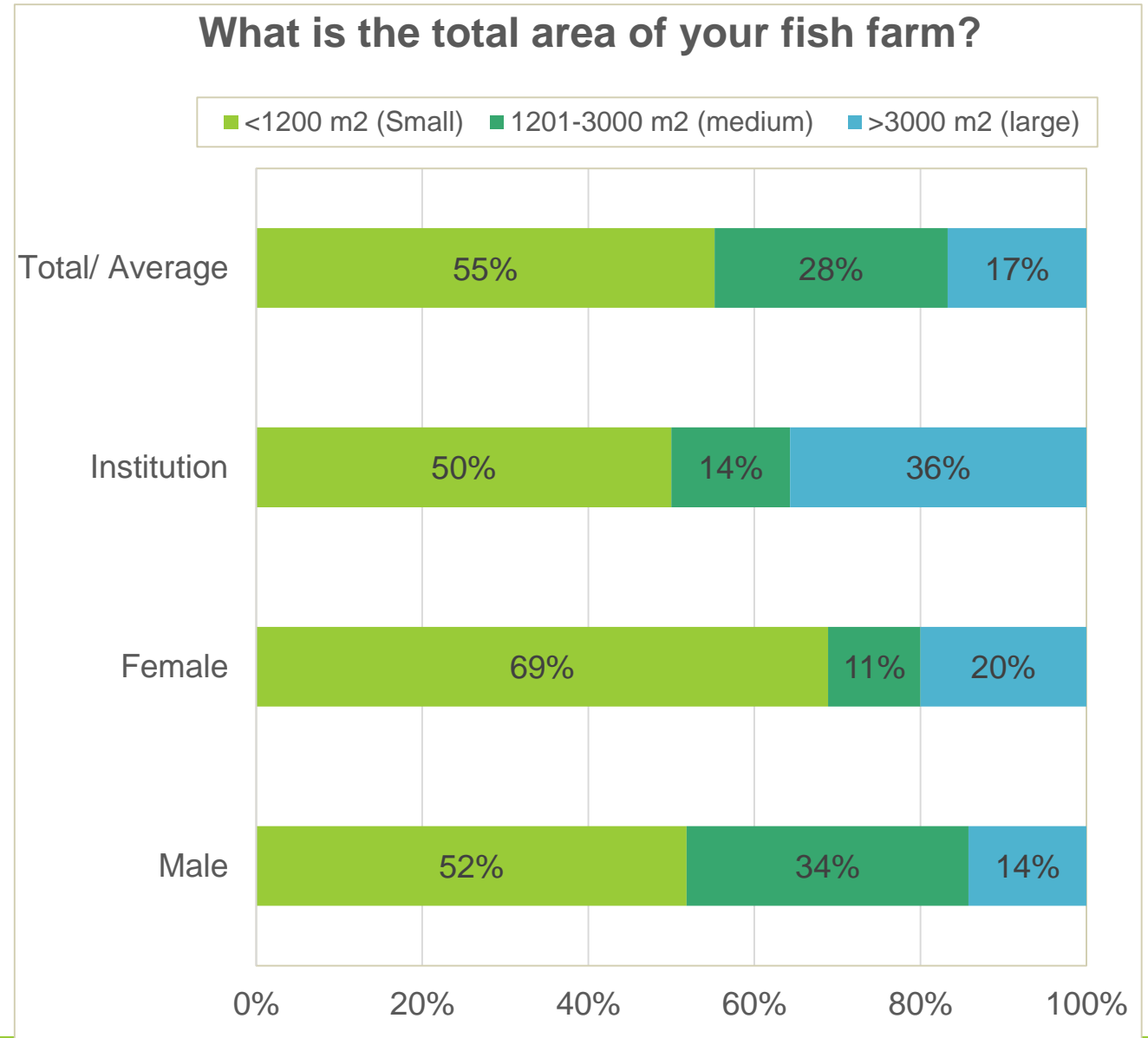
Total number of Fish Ponds owned

Pond ownership varied across enterprises with the largest farm owning up to 87 ponds. Majority of the farmers owned between 3-6 ponds. The minimum required number of ponds for a farmer to qualify for the KMAP project is (the equivalent of) 3 ponds of 300 square meters. For women farm owners that are entrepreneurial it is also possible to qualify with less than 900 m².

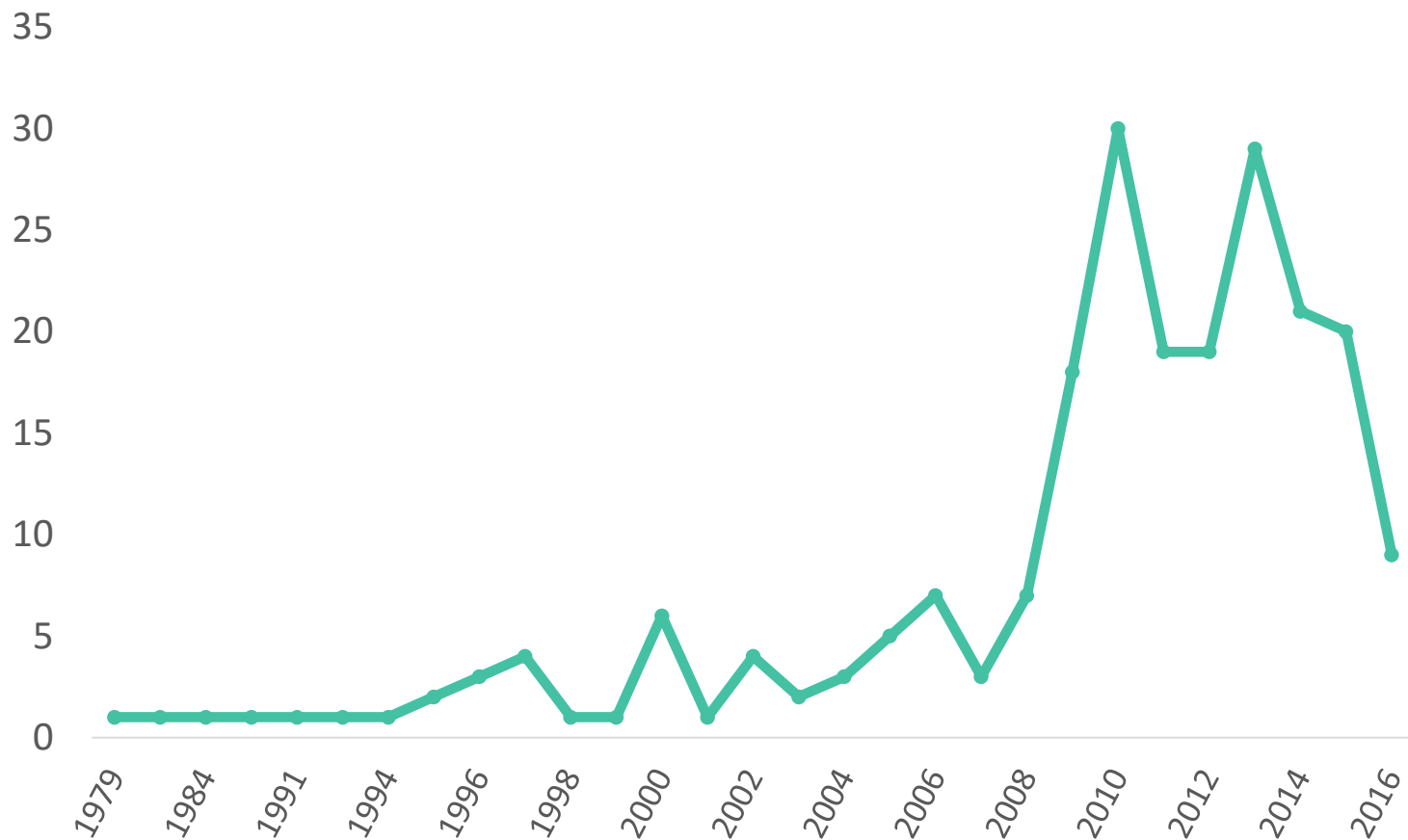


Farm Sizes

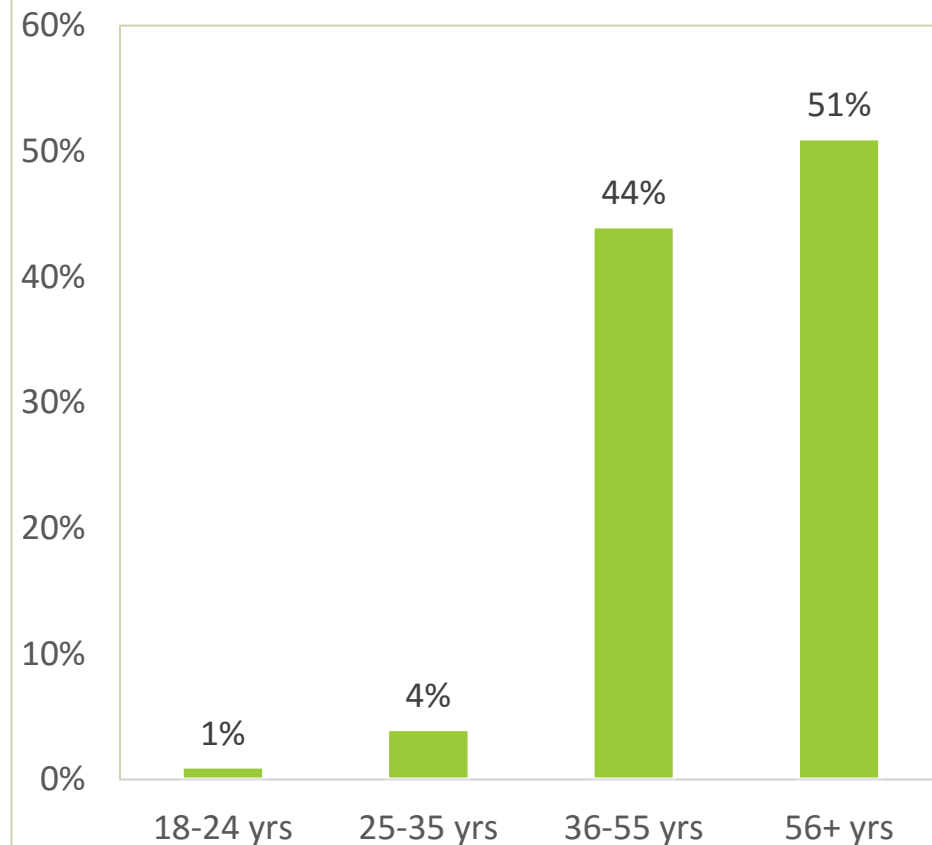
- ❑ Farm sizes assessment was such that those who had cumulative pond size less than 1200m² were classified as small farms, those between 1201 and 3000m² as medium sized and the large farms had overall pond sizes greater than 3000m².
- ❑ More than half the farmers are small scale. Slightly more than a quarter are medium scale enterprises and the large farms make about 17% of all farms.
- ❑ As regards ownership, it is indicative that more of the institutions as well as male owned enterprises were in the medium and large scale categories as compared to the female owned enterprises where a significantly higher proportion owned small farms.



In which year was the fish farming business started?



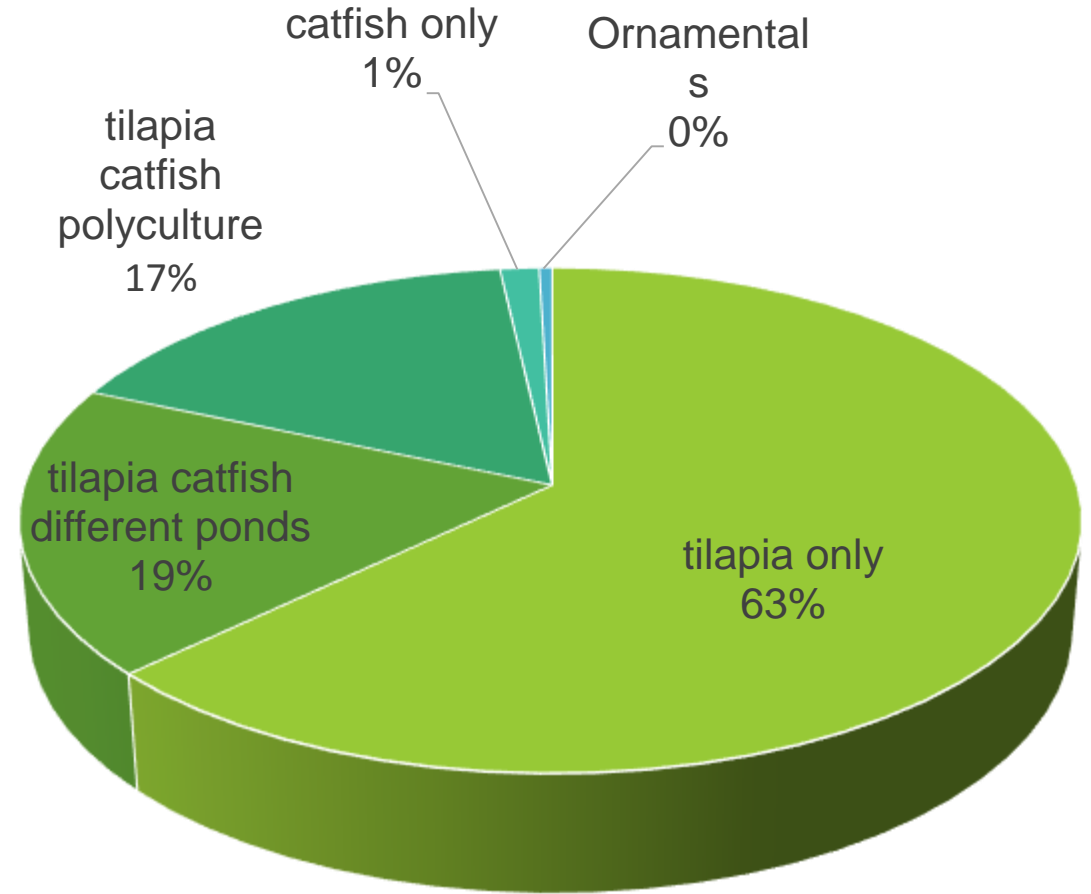
Age of Enterprise Owners



The KMAP farm owners are majorly the older generation aged above 36 years. Youth are less involved since fish farming needs secure access to land is capital intensive. The majority of the farms were established during the ESP (*Economic Stimulus Programme*) government funded project between 2009 to 2012.

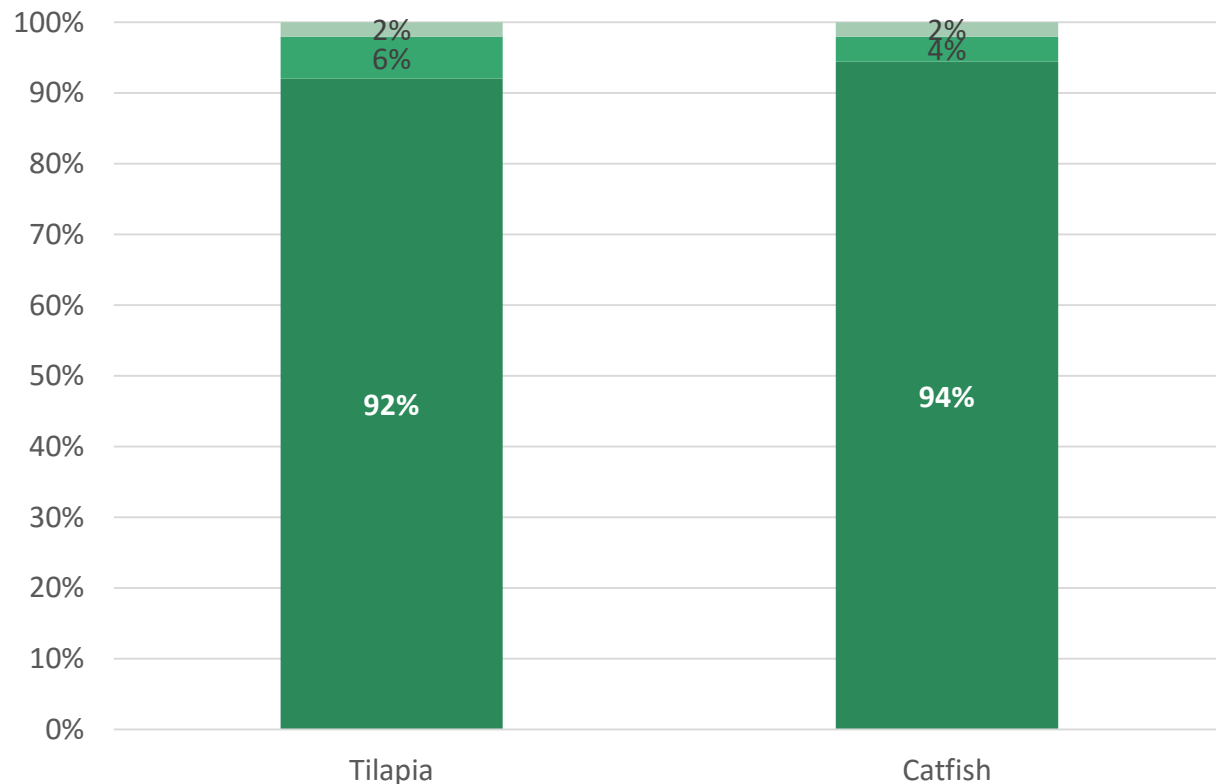
Which fish types do you stock?

- ❑ Almost all the farmers (99%) practiced tilapia farming.
- ❑ Slightly more than a third, 36% were practicing both tilapia and catfish farming.
- ❑ Of these, about a fifth of the farmers indicated to practice polyculture, fish farming where both catfish and tilapia are stocked in one pond. The catfish act as a predator control for unwanted tilapia offspring in this system limiting overcrowding in the pond caused by reproduction of tilapia and resulting in competition for food and consequent yields consisting of small fish of low market value.
- ❑ A very minimal number were practicing purely catfish farming.
- ❑ So was the case for ornamental farming, that was not practiced in isolation but as an addition to having the tilapia and catfish species.

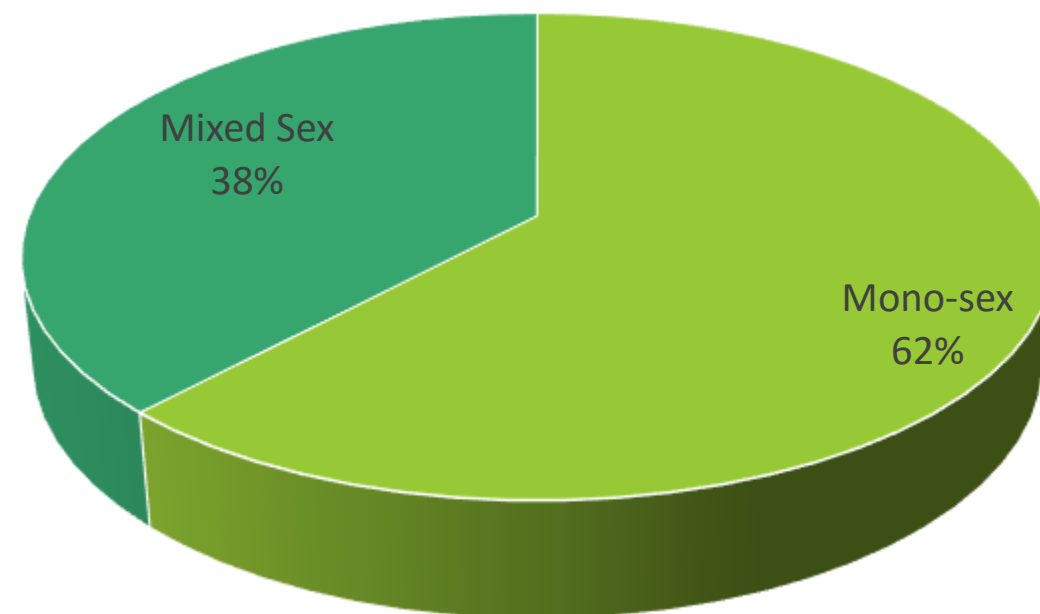


Which farming system do you implement in your ponds?

- Intensive (Quality feeding and aeration)
- Extensive (green water)
- Semi intensive (manuring and supplementing feed)

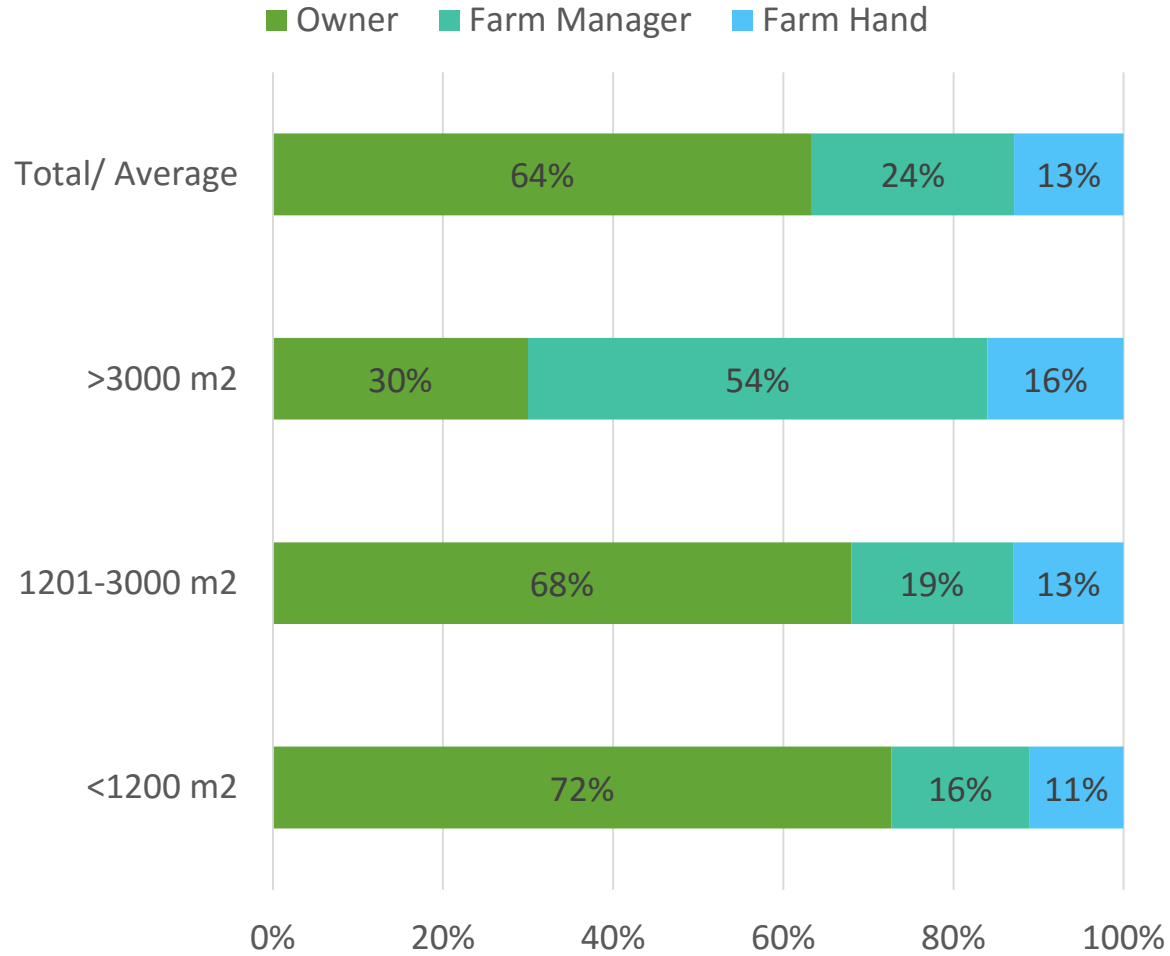


What type of tilapia fingerlings did you stock?



Pond production for both catfish and tilapia farming was majorly the intermediate form of production, semi-intensive, where farmers combined both manuring and supplementing the fish with some commercial feed. Mono-sex tilapia (all male) fingerlings will perform about 30% better than mixed sex. More than a third claimed they stocked mixed fingerlings, but in practice nobody checked. This highlights that awareness needs to be made to the farmers on the importance of using only mono-sex fingerlings. There is need for setting the standard of what % of male is called all male.

Who is responsible for running the day to day operations of the farm enterprise?

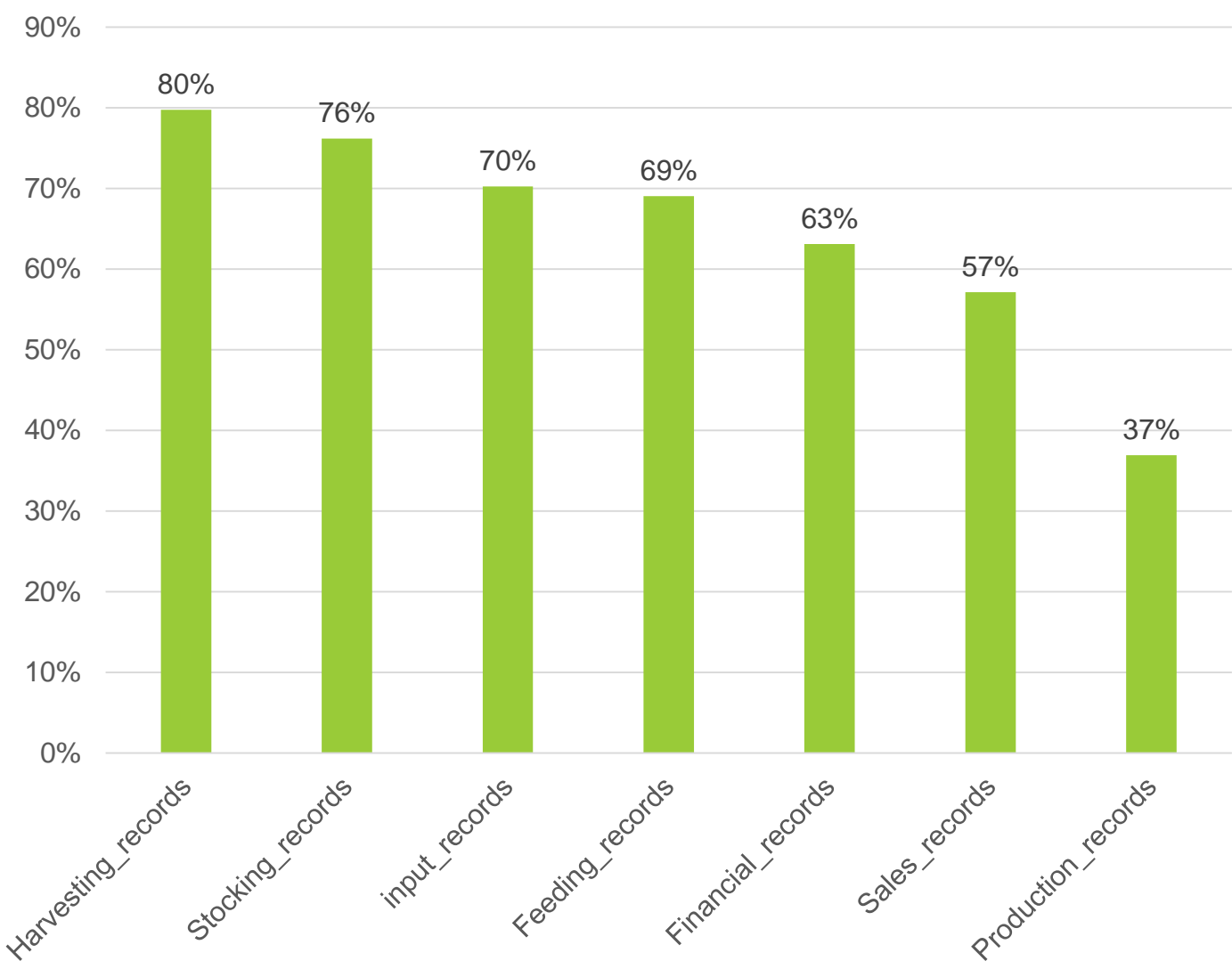
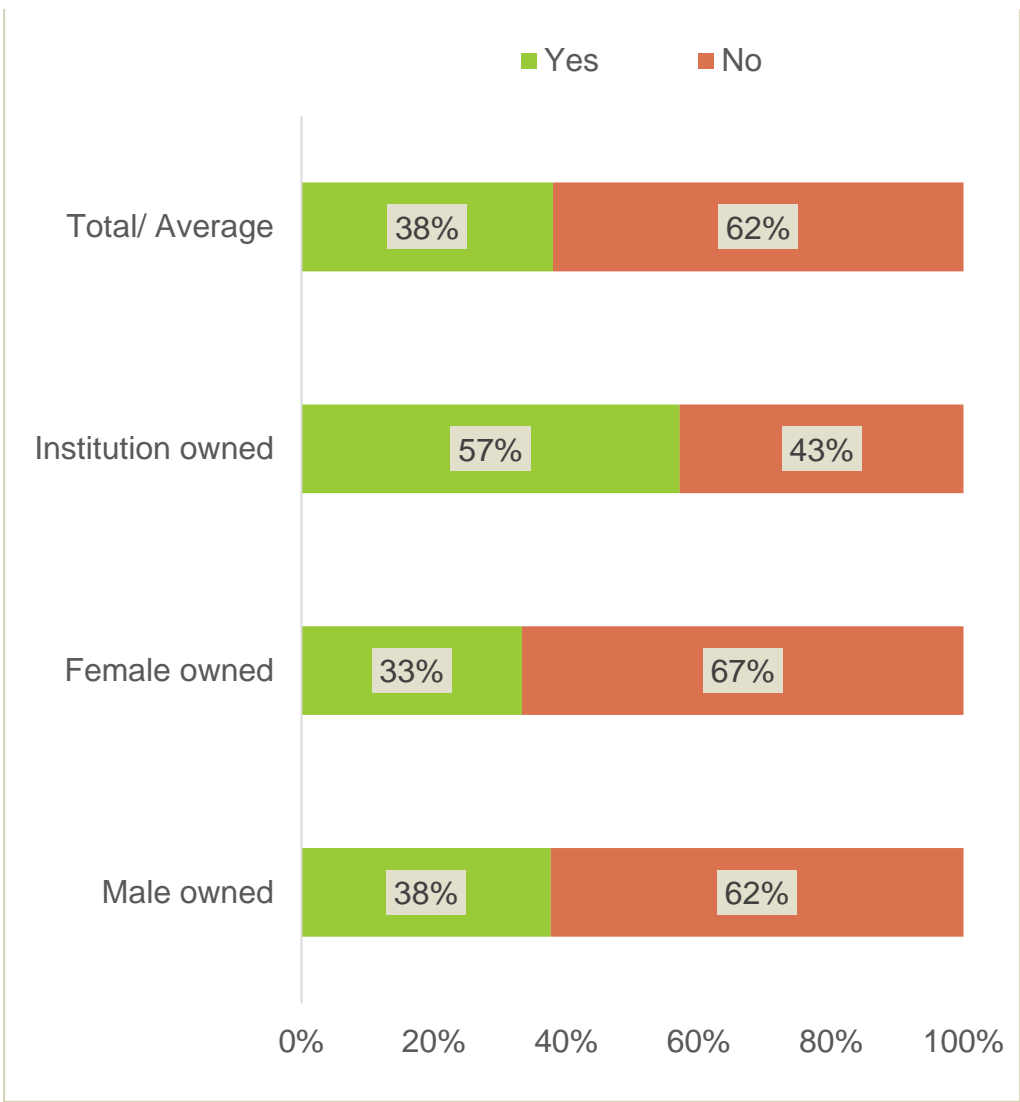


What is the highest level of the person responsible for running the daily operations on the farm?

	Total/ Average	Owner	Farm Manager	Farm Hand
Primary/ secondary level education	52%	54%	31%	82%
Degree/ certification not in aquaculture	23%	29%	12%	11%
Certificate/ Diploma in aquaculture	13%	13%	19%	4%
Degree in Aquaculture	4%	2%	10%	0%
No formal education	2%	2%	4%	0%
Did not disclose	6%	-	25%	4%

Routine management in most of the farms was done by the owners themselves, more so in the small and medium sized enterprises. In the large farms however, the daily operations were commonly done by farm managers. Though the larger majority of those responsible for running the daily operations of the farm had some formal education, only about 20% had some formal training in aquaculture and these were mainly the farm managers.

Routine business management practices like record keeping requires much emphasis, about two-thirds do not keep any records of their fish farm operations. Records are key for knowing the profitability and will also show which type of management is more profitable. KMAP trainings are focusing on instilling record keeping as part of aquaculture as a business.

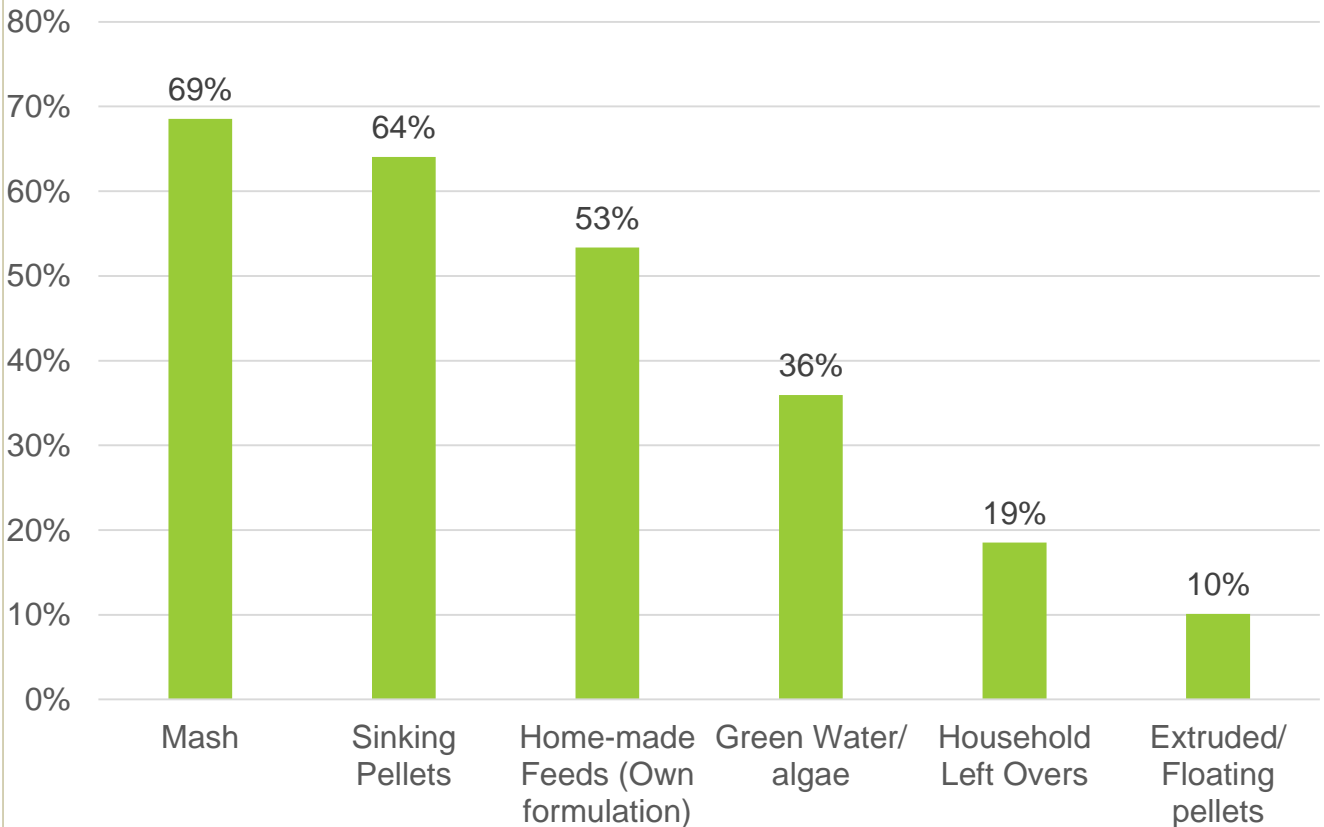


SUMMARY ON TILAPIA PRODUCTION (Annual Production*)

		FARM SIZE			GENDER		
	Average	<1200 m ²	1201-3000 m ²	>3000 m ²	MALE	FEMALE	INSTITUTION
Production Cycle (months)	11	12	10	9	10	12	17
Stocked pieces (No)	3,117	2,078	3,879	5,619	2,806	3,385	6,082
Tilapia Stocking Density (pieces per m ²)	3.6	3.8	3.4	3.3	3.5	4.4	3.1
Mortality rate	27%	29%	26%	25%	28%	27%	22%
Average Kgs harvested per enterprise	686.8	417.1	860.1	1,384.4	633.1	694.6	1,313.3
Tilapia Harvest kg/m ²	0.80	0.79	0.81	0.81	0.81	0.83	0.61
Average Kgs sold per enterprise	646	384	812	1,329	586	668	1,310
Price per Kg (Kshs)	543	553	532	526	534	560	601
Annual value of sales per enterprise (Kshs)	309,374	194,742	376,466	618,663	274,530	313,718	717,636
Value of sales per M ² (Kshs)	353.1	349.2	357.5	359.5	343.9	389.2	355.4
Tilapia Input Costs per m ² (Kshs)	69.04	70.99	56.14	86.87	64.22	87.06	73.27
Labor cost per m ² (Kshs)	134	120	110	234	122	161	197
Margin per enterprise (Kshs)	147,795	88,079	222,910	230,135	140,562	146,031	240,544
Margin per m ² (Kshs)	150	158	192	39	158	141	85

Tilapia Feeds & FCR

What kind of feed did you feed your tilapia in the last production cycle?



Main Feed Type	% using as main type	FCR
Sinking Pellets	38%	2.48
Mash	25%	2.51
Home-made Feeds (Own formulation)	28%	3.07
Household Left Overs	2%	3.12
Green Water/ algae	4%	_*
Extruded/ Floating pellets	3%	1.22
Total/ Average	100%	2.69

**not possible to quantify feed amount*

Most of the farmers use more than one feed type for their fish. The most common were the local feeds consisting of mash and sinking pellets. Use of quality feeds reduces the quantity a farmer needs to feed the fish to achieve the same output, as is also demonstrated by the FCR of the farmers using the extruded pellets, yet use of the extruded pellets was very low, mainly because of the cost implications.

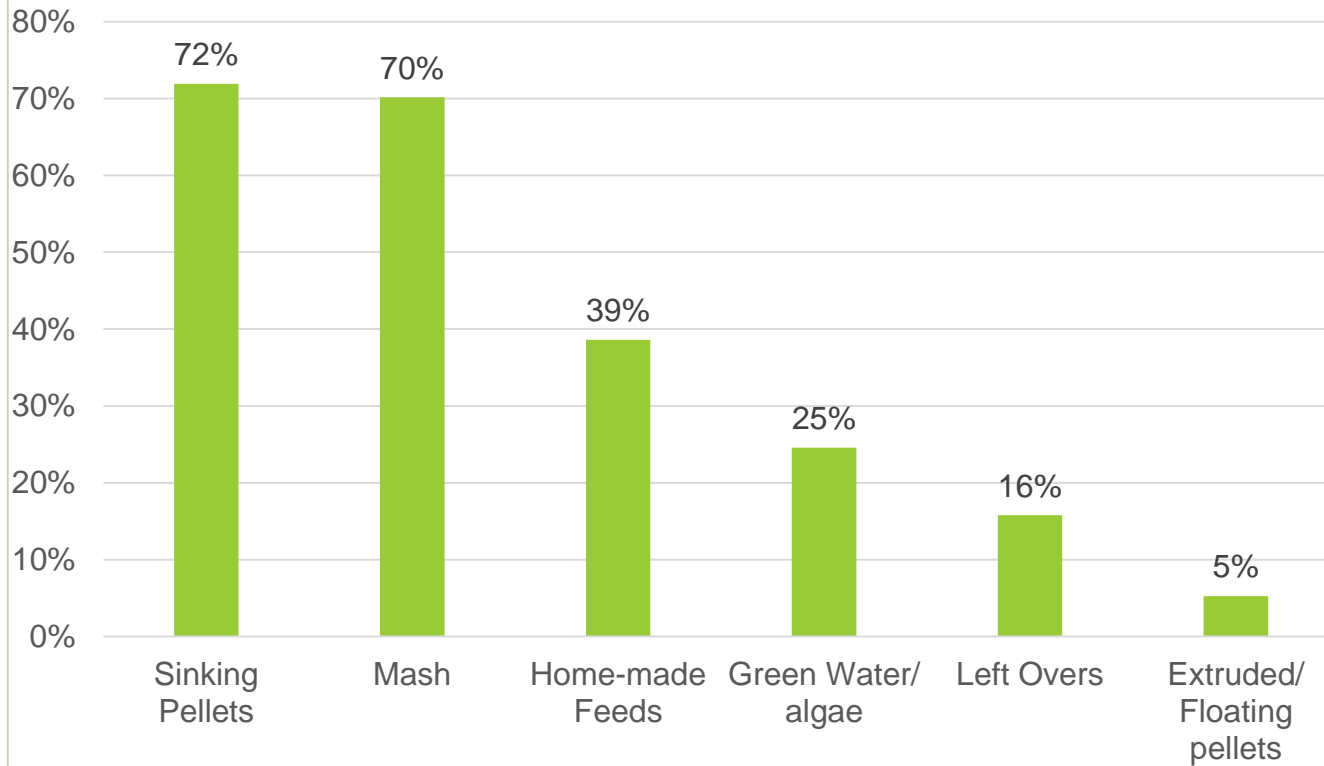
SUMMARY ON CATFISH PRODUCTION (Annual Production*)

		FARM SIZE			GENDER	
	Average	<1200 m2	1201-3000 m2	>3000 m2	MALE	FEMALE
Production Cycle (months)	10	10	11	10	10	11
Stocked pieces (No)	1,500	694	978	3,998	1,657	1,082
Catfish Stocking Density (pieces per m2)	3.2	2.5	3.1	4.7	3.1	3.3
Mortality rate	33%	29%	36%	36%	32%	37%
Average Kgs harvested per enterprise	684	416	472	1,537	722	534
Catfish Harvest kg/m2	2	2	1	2	2	1
Average Kgs sold per enterprise	603	382	449	1,306	636	515
Price per Kg (Kshs)	684	511	780	889	686	678
Value of sales per enterprise (Kshs)	211,345	88,818	145,278	569,972	232,176	155,844
Value of sales per M2 (Kshs)	440	360	419	639	434	456
Catfish Input Costs per m2 (Kshs)	162	164	163	156	164	156
Labor per m2	47	65	35	30	46	51
Margin (Kshs)	76,229	(617)	30,760	307,495	84,767	53,480
Margin per m2 (Kshs)	73	29	63	178	58	111

** Based on recall data that will be verified in Quota 1&2 monitoring data*

Catfish Feeds & FCR

What kind of feed did you feed your catfish in the last production cycle?



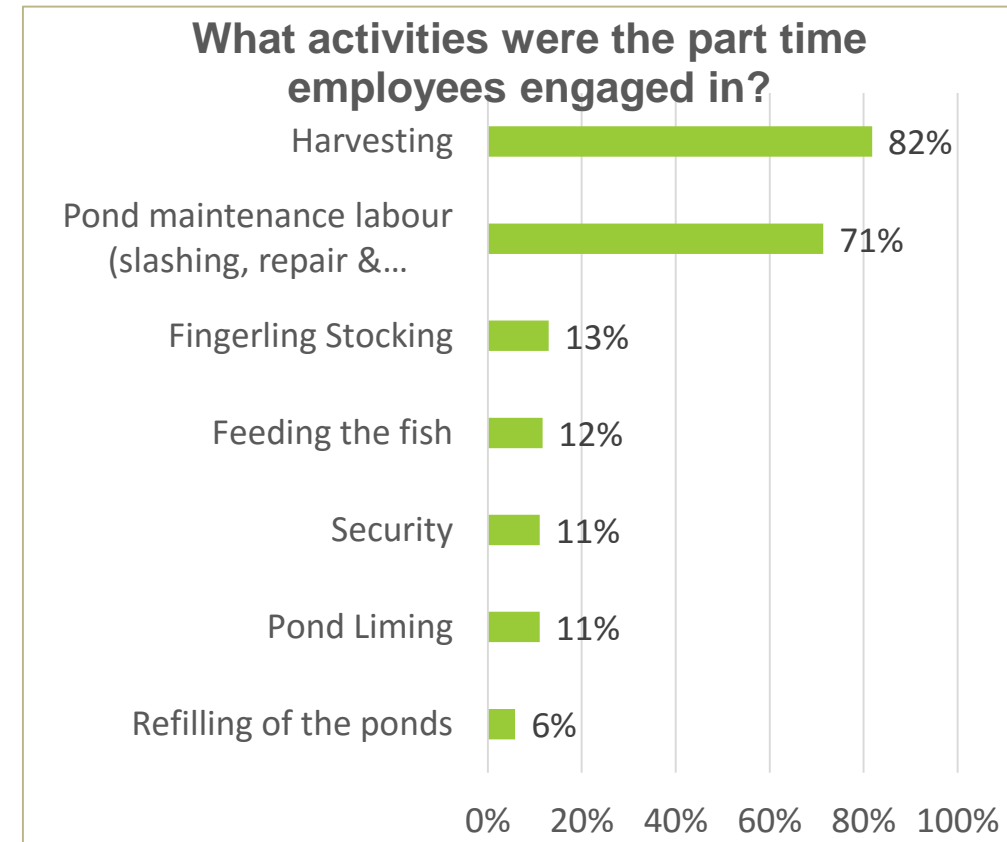
	% of farmers using as main feed	FCR
Mash	47%	0.57
Sinking Pellets	23%	8.73
Green Water/algae	21%	_*
Extruded/ Floating pellets	4%	0.98
Left Overs	4%	15.85
Home-made Feeds	2%	3.87
Total	100%	5.72

The same trend was observed in catfish farming with several feed types being used and very few farmers using extruded feed as a common type despite the fact that these had the overall best FCR as compared to other feed types. A much larger proportion of farmers also indicated that the catfish was left to feed on green water as compared to tilapia farming.

Employment/ labour in the fish farm enterprise

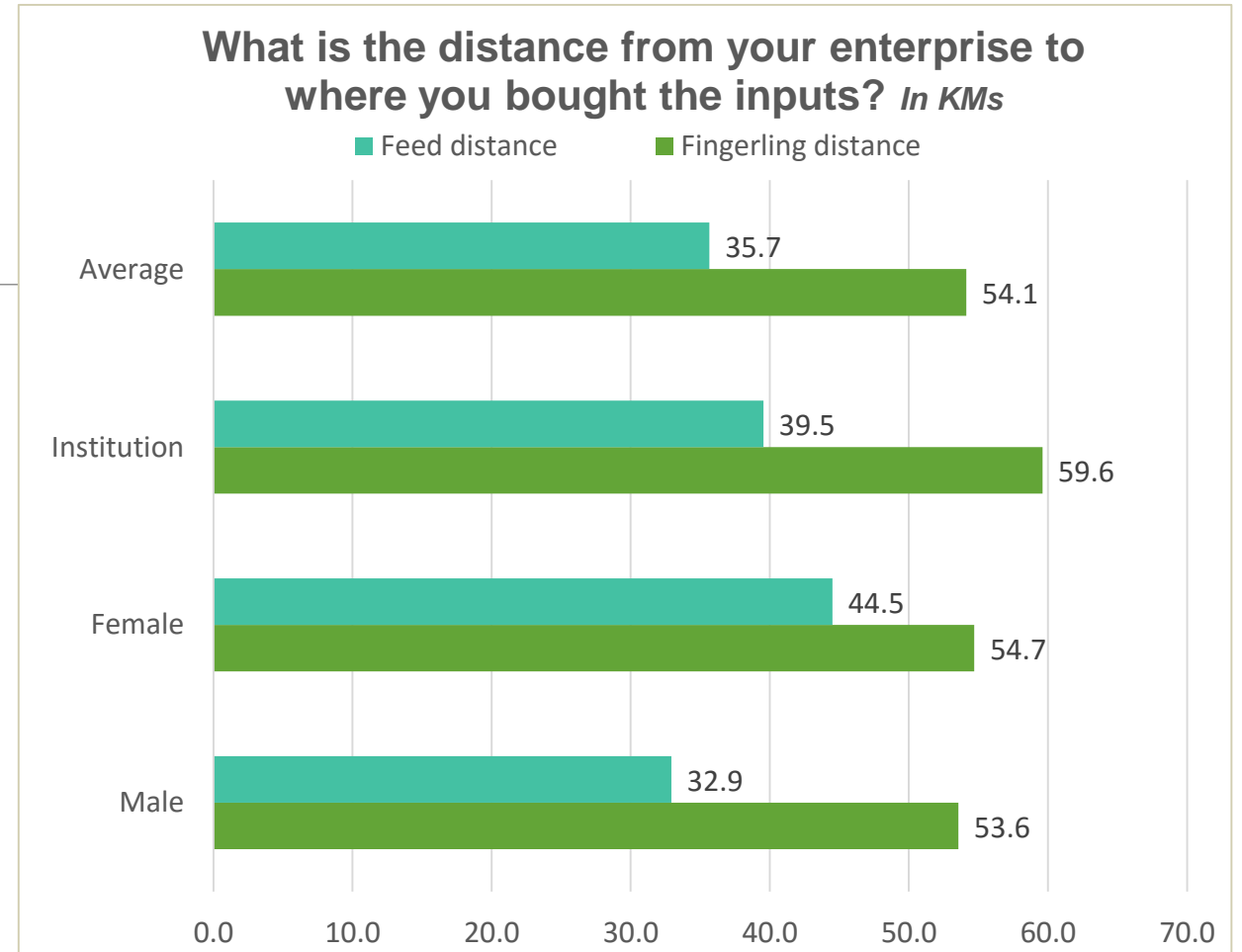
The average number of employees in a fish enterprise were about two. The large farms had more workers than the smaller farms and further paid them substantially more. The institution workers were also paid much more than employees in individual farms. It is one of the key issues that reduces profitability of the larger farms. Casual laborers came in mainly during harvesting and were also largely involved in day to day pond maintenance activities among other activities in lesser numbers. They costed a farmer considerably less as compared to the full time employees.

VARIABLE	AVERAGE	FARM SIZE			GENDER		
		<1200 m ²	1201-3000 m ²	>3000 m ²	MALE	FEMALE	INSTITUTION
No. of permanent Employees	1.6	1.3	1.9	2.5	1.6	1.7	1.8
No. of part time/ Additional Laborers	3.2	2.7	4.4	2.7	3.3	2.9	2.8
Monthly Pay for ALL permanent staff (Kshs)	9,952	6,208	8,317	25,040	8,350	8,704	32,514
Additional labour cost for entire production cycle (Kshs)	9,841	3,909	11,739	26,475	9,450	12,261	6,936



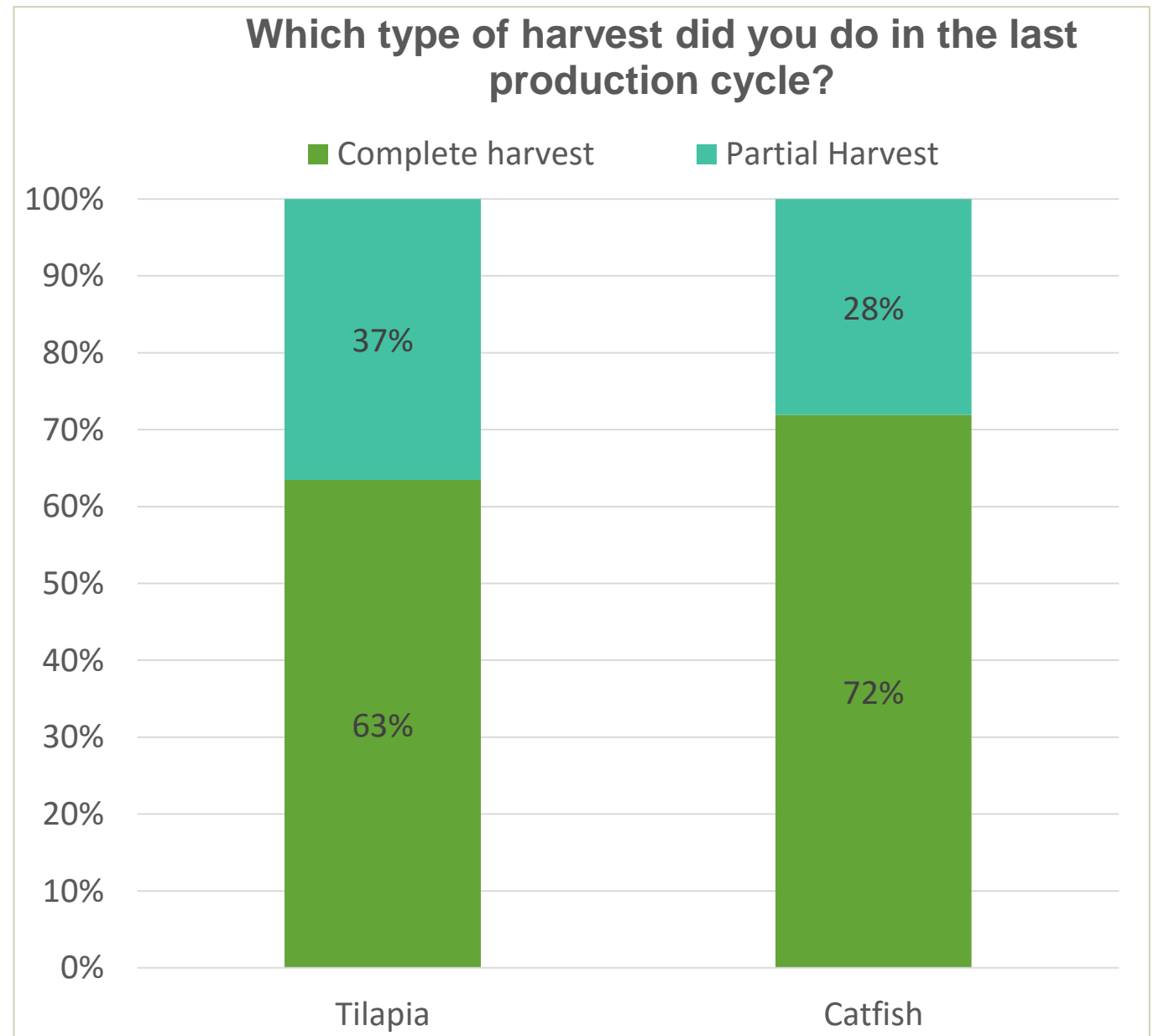
From whom did you buy your inputs?

	Fingerling supplier	Feed Supplier
Individual seller/ local market/ Agrovet	32%	56%
Dominion	17%	8%
Lake Basin Development Authority	11%	1%
Government Fisheries department	10%	9%
Jewlet	9%	8%
Others (KEMFRI, Sagana. Mabro etc)	9%	6%
Kisii Fish Farm	6%	5%
Jambo	2%	5%
Jaffy	1%	1%
Uganda	1%	2%



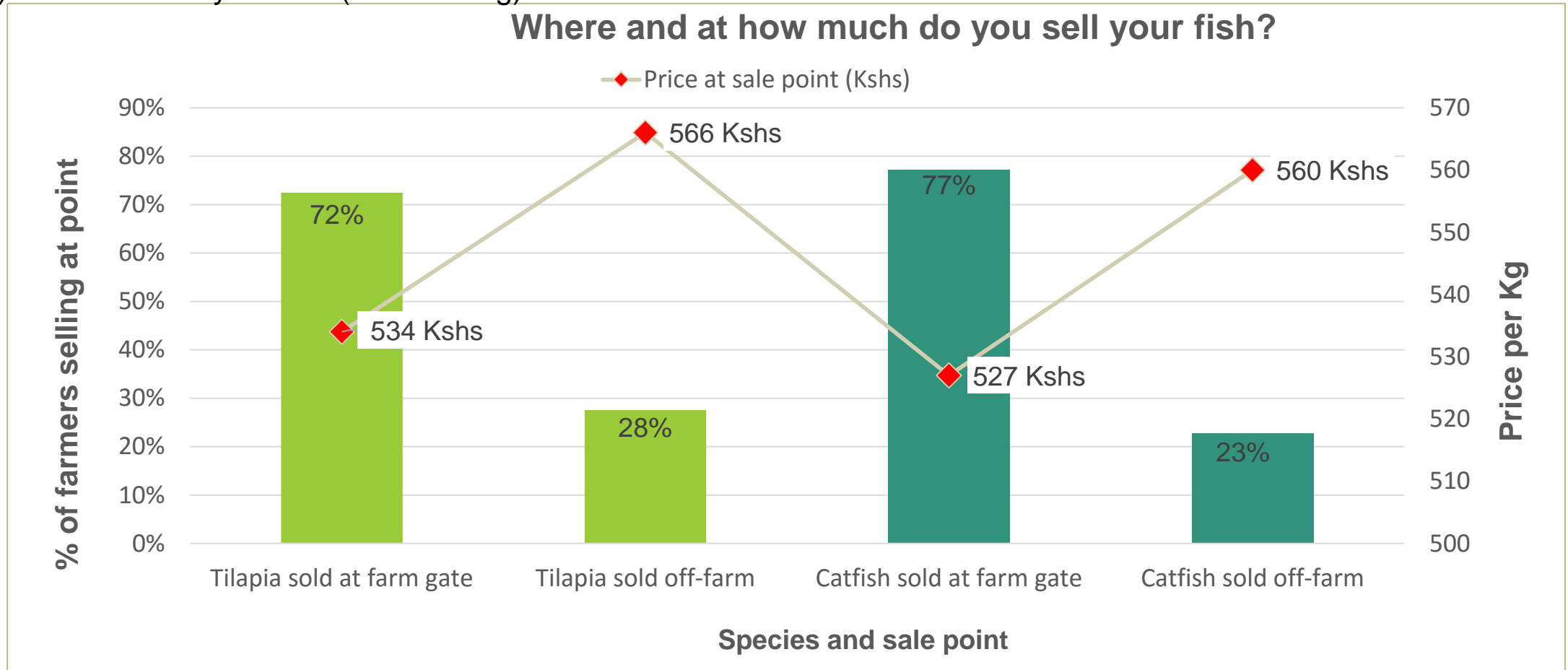
The farmers seemed to approach the same fingerling and feed supplier for their inputs. Also, distance seemed to be a great contributor in selection of the input supplier with the average distance being about 50kms and 34kms for the fingerlings & feed respectively. The farmers commonly went for local providers who were in a radius of close proximity to the premises, instead of focusing on quality.

- ❑ With both species complete harvesting was more common.
- ❑ Complete harvesting in this case was a scenario where the farmer would harvest in less than one month and partial harvesting was where the harvesting took place over a period greater than one month.
- ❑ Partial harvesting was done when the farmer did not have enough market to sell all their produce despite the fact that they were ready for harvest or when the farmer may have needed some quick cash and would sell off some of the fish.



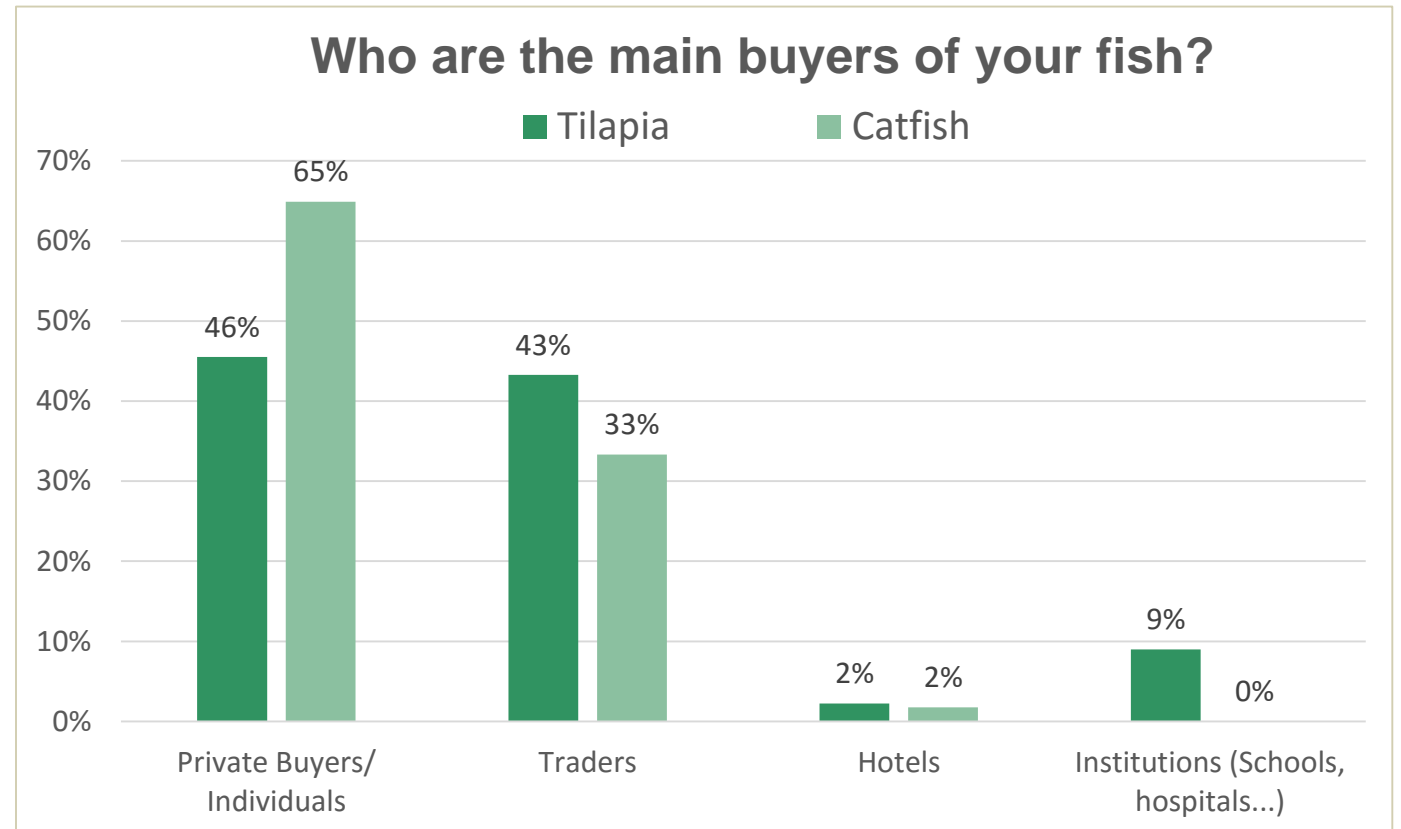
MARKETS: Point of sale and Price

Majority of the farmers would sell their produce at the farm gate. While off-farm they fetch about 6% more for both tilapia and catfish this does not take into account the extra costs incurred. These are much better than at main markets such as Busia (280 KES/kg) and Nairobi city market (400 KES/kg).



MARKETS: Buyers

- ❑ The main buyers constituted four types of persons, private buyers, traders, hotels and institutions.
- ❑ The most common buyers were individuals/ private buyers.
- ❑ For catfish, the majority sold to these private buyers despite the fact that they offered the least price as compared to the other buyers in the market.
- ❑ For tilapia, there was almost equal sales going to both the traders and individual buyers. The traders offered a better price but the best price was from the institutions. However, very few farmers sold their produce to them.



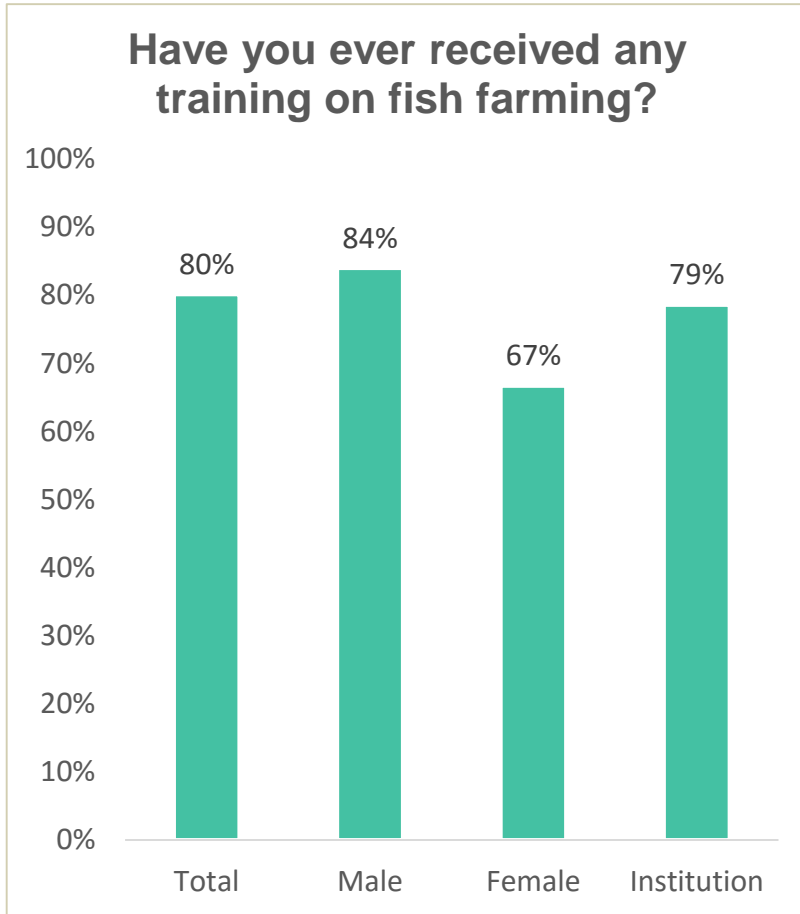
BUYER	Price per Kg (Kshs)	
	TILAPIA	CATFISH
Private Buyers/ Individuals	517	451
Traders	559	699
Hotels	435	500
Institutions (Schools, hospitals...)	625	535

Challenges Faced by Fish Farm Enterprises

	% of Total (221)	Male (163)	Female (45)	Institution (13)
Predation (animal, humans, birds)	50%	48%	53%	57%
High Price of feeds	49%	53%	42%	21%
Difficulty getting quality fingerlings	40%	41%	44%	21%
Difficulty getting affordable quality feeds	36%	35%	38%	43%
Harsh weather (e.g. low temperature, drought, flooding)	26%	28%	22%	21%
Access to finance	23%	25%	16%	21%
High price of fingerlings	19%	17%	31%	7%
Access to markets	10%	10%	11%	7%
High mortality of fingerlings	8%	7%	4%	21%
Limited training on aquaculture	7%	5%	13%	14%
Inability to access extension services	3%	2%	7%	-
High water Cost	3%	2%	4%	7%
High transportation costs to and from markets	3%	3%	2%	-
	-	1%	-	-

The highlighted areas are to be addressed in the trainings. On the other hand marketing is also a key area to improve while this is currently not seen as a priority by the farmers as they tend to focus mainly on technical issues.

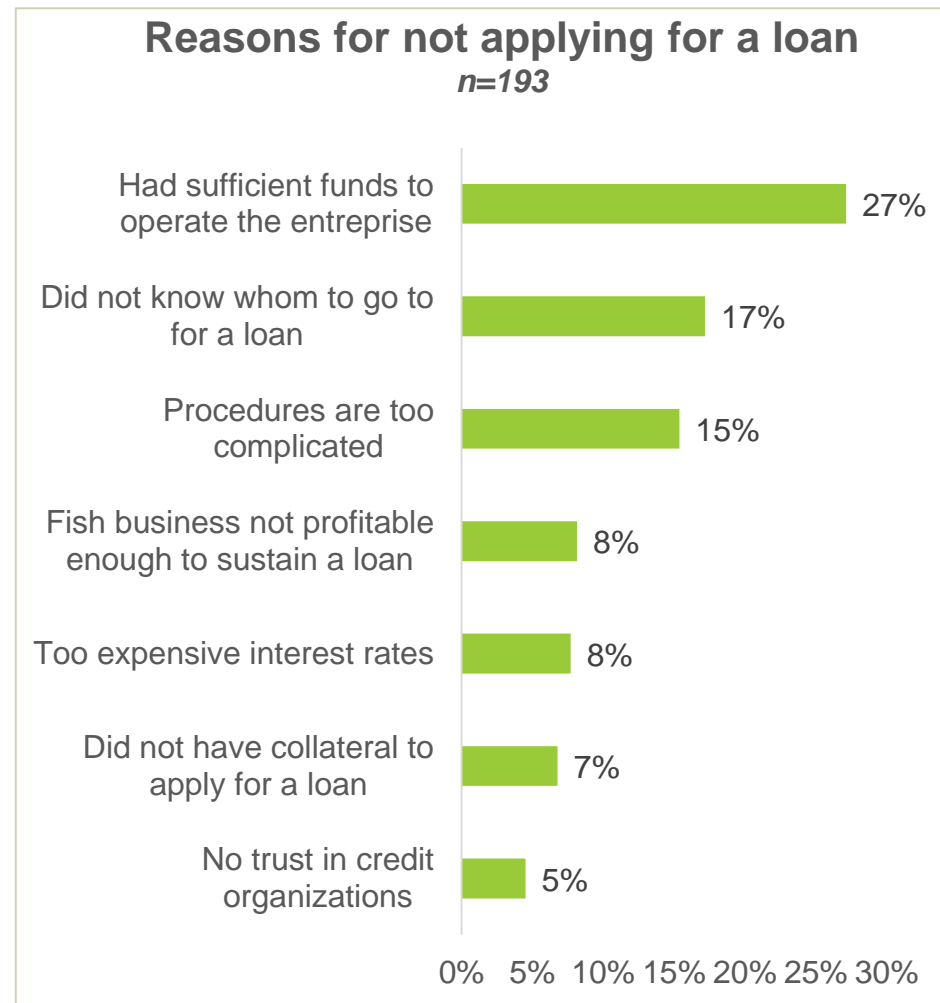
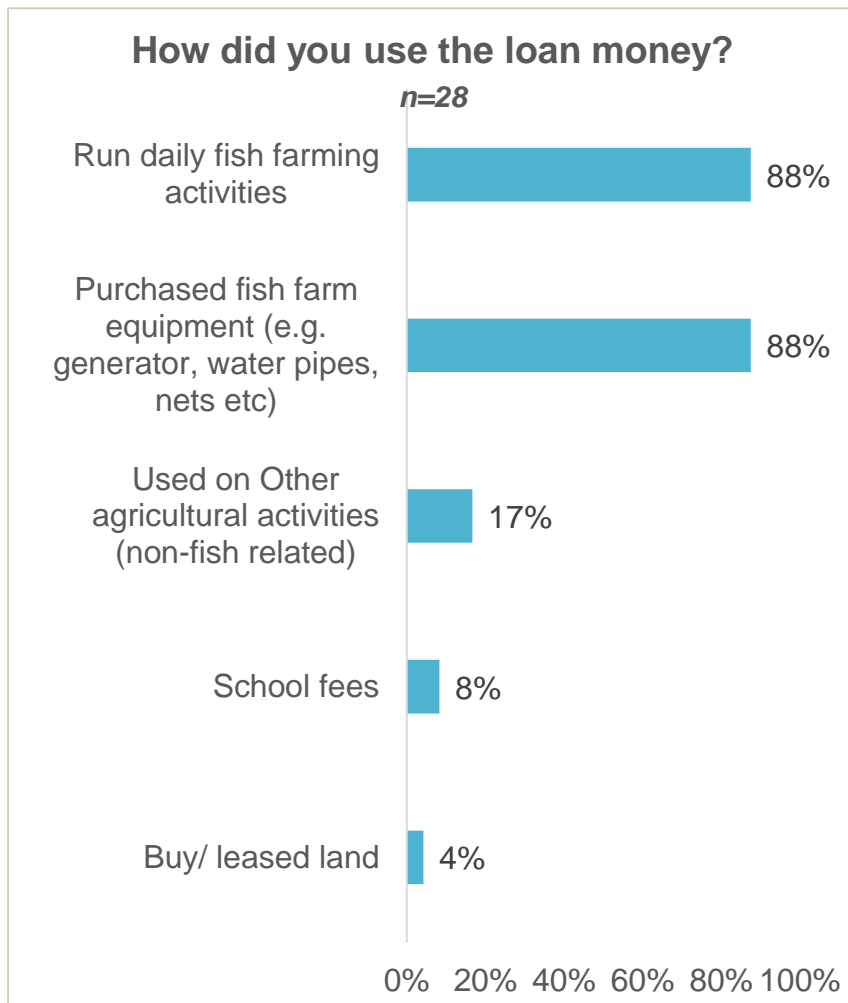
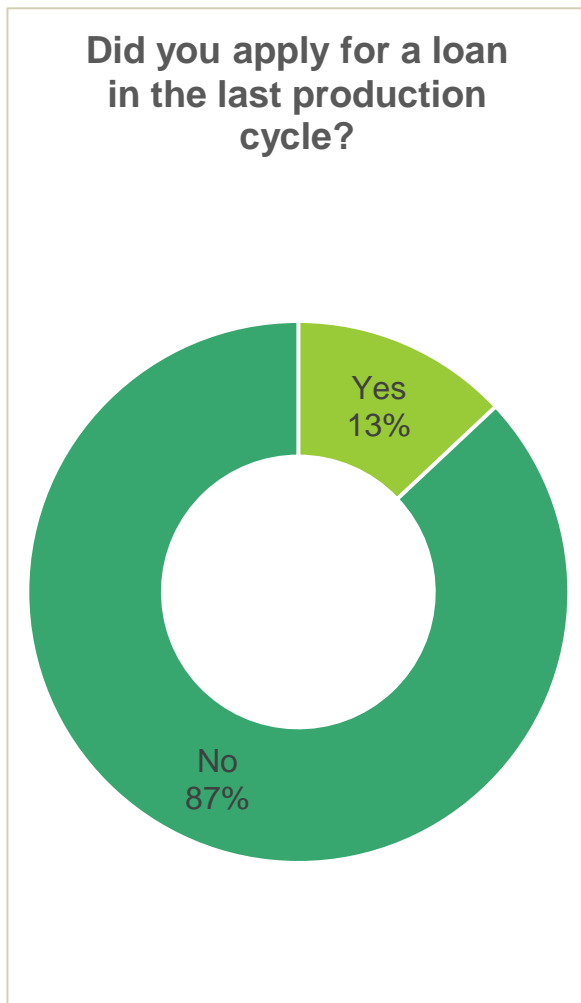
ACCESS TO TRAINING



Majority of the farmers had already attended the first module of KMAP training by the time the survey was carried out. This is reflected in the type of training where the first module trains on aspects like stocking, pond construction and basic pond management while the later trainings involved business management & marketing that was only mentioned by very few farmers. Continued training should be assessed over the project implementation.

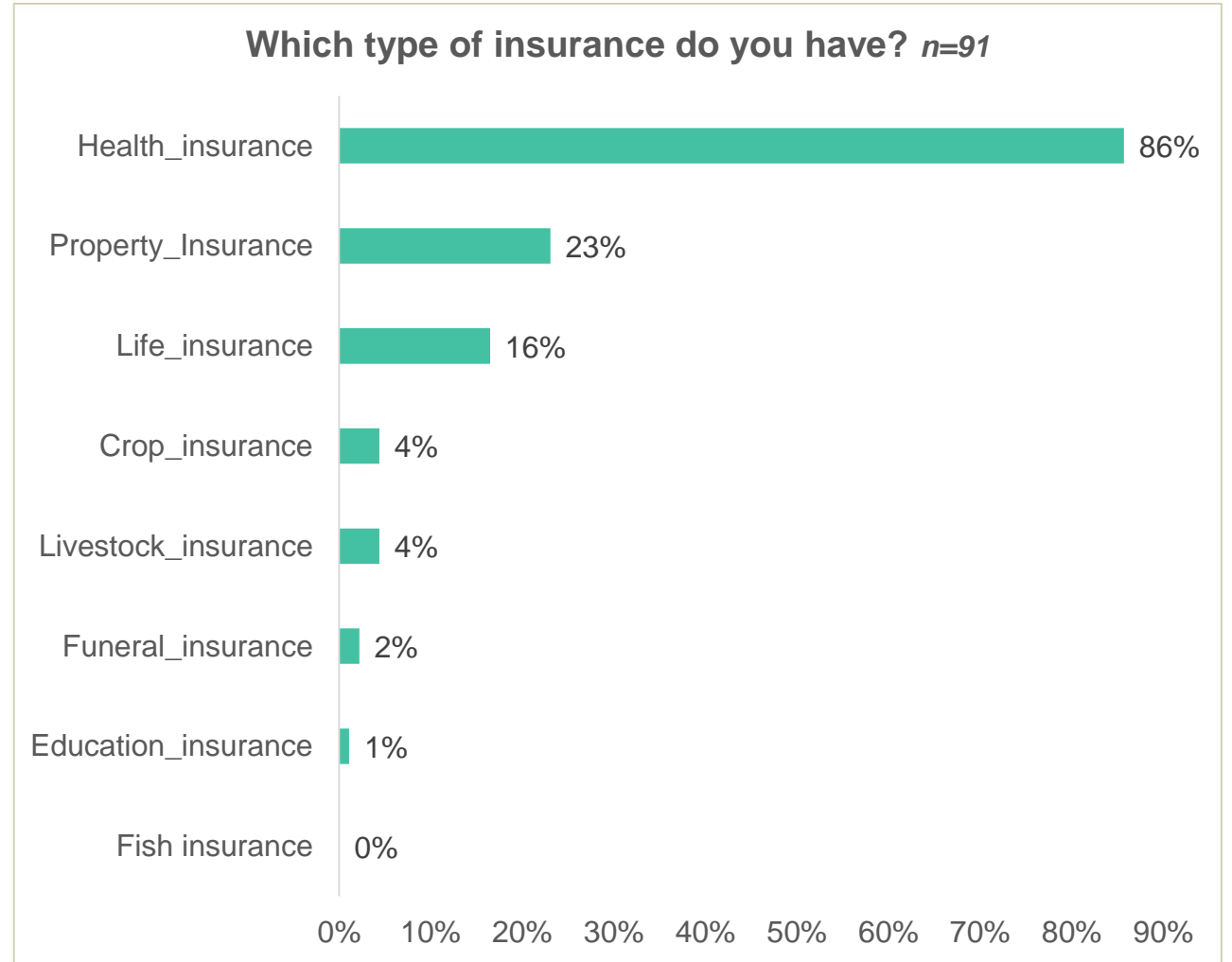
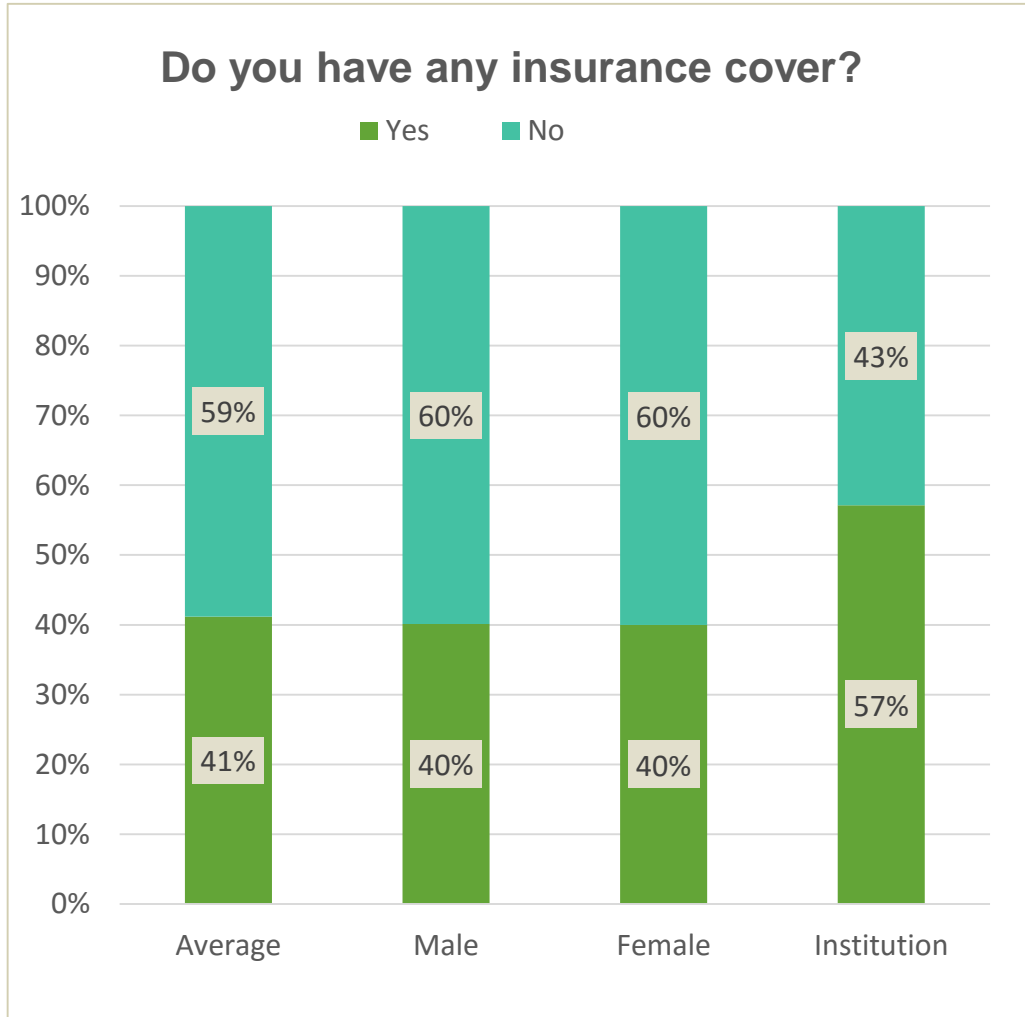
Access to financial/ credit services

Access to credit services had very low intake with majority not using credit services. The farmers indicated several reasons for this. However, key for the project is those farmers who indicated that they did not know whom to go to for a loan. Linkages need to be enhanced within the project so that these farmers can know where to access the services.



ACCESS TO INSURANCE

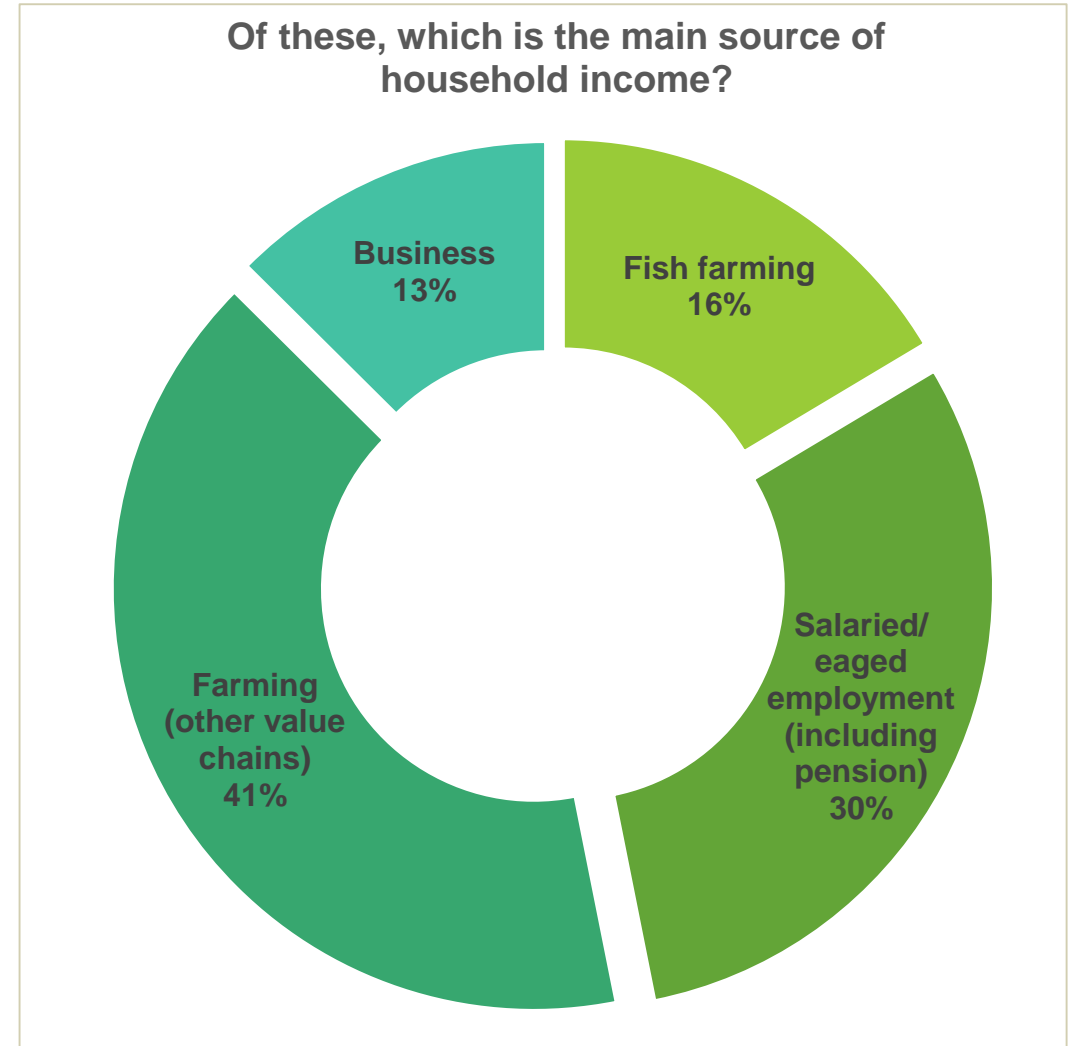
None of the fishfarmers had a fish insurance. There is currently one institution offering this service. On the other hand less than 4% has a crop insurance, so there is need to study this more in depth.



Majority of the farmers had more than one source of income. Of all the farmers only 1% reported that fish farming was their main income earner with the other activities contributing significantly more to the household income.

Sources of household income in the entrepreneurs' household:

	Total (208)	Male (163)	Female (45)
Farming (other value chains)	71%	71%	73%
Fish farming	55%	56%	51%
Salaried /wage employment (incl. pension)	43%	43%	40%
Business	31%	28%	40%



HOUSEHOLD DECISION MAKING

	Gender of owner	Male Owner	Female Owner	Male spouse to owner	Female spouse to owner	Male relative
Who is the main decision maker on how to spend the household income?	Total	76%	14%	8%	2%	-
	M	97%	-	-	3%	-
	F	-	64%	36%	-	-
From the recent fish production cycle, who received the income from fish sales?	Total	67%	18%	9%	6%	-
	M	85%	-	6%	8%	1%
	F	-	82%	18%	-	-
From the recent fish production cycle, who was the main decision maker on how to spend the income received from fish sales?	Total	76%	16%	6%	2%	-
	M	98%	-	-	2%	-
	F	-	73%	27%	-	-

Key Actions for the Project

- ❑ Women inclusion in the project needs to be boosted. Women with less than 3 ponds can be recruited into the project.
- ❑ Youth participation in aquaculture appears low. Strategies on youth inclusion should be developed and explored as a key demographic bracket in Kenya.
- ❑ Farmers' knowledge on sources of quality and affordable fingerlings could be intensified further more so to promote use of good quality fingerlings that would lead to improved FCR and overall production. Have strong campaigns by the team on need of farmers using high quality floating feeds in the course of production.
- ❑ Lack of ease in access to quality inputs should be addressed by the team. Identification of players like the aqua shops who can be linked to manufacturers, suppliers and farmers with a view to enhance access of the inputs would be key in promoting the access of these inputs.

Key Actions for the Project

- ❑ Training of workers within fish farms: farmers should be highly encouraged to engage technical staff even as they themselves (owners) too are taken through fundamental training modules necessary for the profitable running of their fish farming business
- ❑ Results on farmer training should be utilized to enable the technical team know which areas to focus on more for the purposes of objectivity
- ❑ Record keeping is a practice that needs to be upheld by every business enterprise. Record keeping should be encouraged by the KMAP team and included in the trainings.
- ❑ The KMAP team will set up strategies that would address marketing challenges faced by farmers due to several reasons including price, harvesting trends, distance to markets, transport and logistical challenges. The team will pilot together with BoP Inc on setting up a model local traders distribution network within fish producing zones with traders that fit their size.