MARKET AND CONSUMER EVALUATION OF THE MARKETPLACE FOR NUTRITIOUS FOODS PROGRAM: A CASE STUDY APPROACH

PIONEER CASE STUDY – KISUMU AREA, KENYA

FINAL REPORT

Prepared by Altai Consulting for GAIN – September 2017

gain Global Alliance for Improved Nutrition

altai consulting

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ABBREVIATIONS

ca.	*Approximately*
FGD	*Focus Group Discussion*
g	*Gram*
GAIN	*Global Alliance for Improved Nutrition*
KES	*Kenyan Shilling*
kg	*Kilograms*
KII	*Key Informant Interview*
IRB	*Institutional Review Board*
km	*Kilometers*
MIC	*Marketplace Investment Committee*
MNF	*Marketplace for Nutritious Foods*
MNFP	*Marketplace for Nutritious Foods Program*
POS	*Point of Sale*
PPT	*Percentage point*
TA	*Technical assistance*
USAID	*United States Agency for International Development*
USD	*United States Dollar*
vs.	*Versus*

EXECUTIVE SUMMARY

Under GAIN's Agriculture for Nutrition Initiative and with support from the United States Agency for International Development, the Marketplace for Nutritious Foods (MNF) program was established to promote innovation and catalyze private sector engagement in producing and marketing more nutritious foods for lower income households in Sub-Saharan Africa. This is a case study assessment of the Pioneer fish farm, a fingerlings and caged tilapia production and retail business in Kisumu County supported by MNF since 2015. Pioneer fish farm offers, among other products, small fresh tilapia (kadogos) at a competitive price with the aim of making fish available to lower income groups.

Objectives

The purpose of the project is to assess i. to what extent GAIN, via the MNF program, has helped improve availability, affordability, ease of access, convenience and desirability of nutritious food products on local food markets (primary objectives); and ii. to what extent the above-mentioned changes on local food markets have impacted consumers' food purchasing behaviors (secondary objectives).

Methods

The case study includes i. two quantitative surveys that were conducted in intervention markets (markets where Pioneer tilapia has been sold[1]), in control markets (markets where Pioneer tilapia were never sold) and at the only current Pioneer Point of Sale (POS), the Pioneer outlet in front of the farm; and ii. in-depth qualitative interviews of vendors, consumers and Pioneer staff. 633 consumers were interviewed in intervention markets (N=304), control markets (N=282) and POS (N=47) for the quantitative survey. This allowed for comparison of income levels, perceptions of affordability, availability, convenience and desirability as well as fish purchasing and consumption habits across groups. A vendor survey was also conducted: 54 vendors were interviewed, including 14 in intervention markets, 39 in control markets and one at the Pioneer Point of Sale. In-depth interviews were conducted with three members of Pioneer staff, 28 consumers, seven vendors and fifteen pond & cage farmers. Observations in two markets were also undertaken. The field work overall happened between April and July 2017; the surveys and market observations took place between 24 June and 5 July 2017.

Findings

Pioneer fish farm produces high quality sex-reversed[2] tilapia fingerlings as well as tilapia grown in its cages on Lake Victoria.

- Fingerlings are mostly sold to pond and cage farmers in the Kisumu area; those who have already been able to harvest a first load send most of their fish to Nairobi;
- Pioneer full-size tilapia represent one third of the Pioneer sales in terms of pieces but almost three quarters of the company's revenue and likely all of its profit. They are mostly sold in Nairobi;
- Kadogos and medium-size tilapia are sold to end consumers at the Pioneer outlet, which is located in front of the farm. These sizes do not seem very profitable for Pioneer. Sales of kadogos therefore remain limited. Pioneer kadogos are estimated to have reached almost 3,900 households since December 2015.

[1] Since no markets were found where Pioneer tilapia is currently being sold, other than at its on-site shop.

[2] Sex reversal is a technique used to have more male fish, which grow faster and bigger.

Consumers in the Kisumu area like fish very much and most of them buy it at least once a week.

- Tilapia is consumers' preferred type of fish. However, wild tilapia (from Lake Victoria) has become scarce (partly due to over-fishing);
- Fish consumption depends on the seasons. Fish is less available and more expensive during the dry seasons (generally January, February and between July and October). Half of the consumers therefore eat less fish during this time;
- Cage fish can help bypass availability issues as harvests do not depend on seasons. Cage farmers, and especially Pioneer, can ensure a constant supply at a regular price throughout the year, thus having a smoothing effect on availability and affordability of fish, regardless of the season;
- As one of the respondents' preferred types of fish, tilapia is a desirable product. Kadogos are desirable for lower income people because they are less expensive (and, because their smaller size allows them to buy more pieces). Vendors tend to sell more kadogos in the dry season, when fish are more expensive and when people therefore buy less fish;
- The proximity of the market is the main reason mentioned by consumers for choosing one market rather than another to buy fish. 99% of the Pioneer consumers live within 25km of the shop. it is therefore necessary to develop local point of sales if one is to impact a larger number of consumers;
- Price, freshness and cleanliness/appearance of the fish are the most important reasons mentioned by respondents for buying fish. Chinese fish and pond fish are generally not considered fresh fish and consumers try to avoid them;
- Random consumers prefer to buy fried fish but Pioneer consumers favor fresh fish;
- Pioneer is often mistakenly considered to sell pond fish (which tend to be disliked) by people who have never tried its fish (possibly because it did sell pond fish during 2016). However, after buying it a first time, people like it and come back to the shop;
- Over the last year, consumers have perceived an increase in tilapia's availability. This can be partially explained by the increasing quantity of imported Chinese fish and by the increased quantity of cage fish on the local markets (cage fish is a new product and large quantities of it have started to appear on local markets at the end of 2016 and beginning of 2017);
- Most of the vendors in the intervention markets know of Pioneer but less than half of those in control markets do. None of them sell Pioneer fish. The main factors vendors take into consideration when picking suppliers are price, freshness and personal acquaintance with the supplier.

Compared to the average prices recalled by random consumers, Pioneer fish is less expensive and has a stable price throughout the seasons.

- Pioneer's low prices can partially be explained by the fact that they limit intermediaries. While fish sold on local markets generally goes through two or three intermediaries, Pioneer fish is directly sold to end consumers at the outlet in front of the farm;
- Consumers recognize Pioneer's affordability. More than three quarters of them claim to have increased their fish consumption since they started buying fish from Pioneer due to its low prices;
- Pioneer's consumers are slightly older, more men and generally high higher revenues and education than average consumers.

Price and freshness are important factors for Pioneer consumers when buying fish. Most consumers appreciate the cleanliness/freshness of Pioneer fish, the availability of different sizes (which allows them to buy the quantity they want, according to their budget), the cleanliness of the shop and the good customer service. Two thirds of them claim not to have any reason for dissatisfaction with regards to Pioneer. The remaining third mention the prices and lack of product choice as causes for dissatisfaction.

1. INTRODUCTION

The Marketplace for Nutritious Food Program (MNFP) was launched by the Global Alliance for Improved Nutrition (GAIN) in 2013 to promote innovation and catalyze private sector engagement in producing and marketing more nutritious foods for low income households in sub-Saharan Africa, adopting a two-pronged approach: i) a community of practice, with a network open to entrepreneurs, businesses, universities, regulatory bodies, NGOs, etc. interested in knowing more about running a business that helps transform agricultural potential into safe nutritious food and; ii) an innovation accelerator/grant making component, where the most promising proposals are selected to be eligible for Technical Assistance to support the development of feasible business plans, which, upon completion are reviewed by a Marketplace Investment Committee which selects the most investible and impactful concepts to receive grant funding as well as further technical assistance to support business plan implementation.

The program is operating in three countries: Mozambique, Kenya and Rwanda and as of today, 34 businesses have been supported. GAIN received funding from USAID to conduct a series of cross-sectional case study evaluations to assess how the MNF program and its business awardees have affected market-level availability and consumer-level access to nutritious foods.

Within the scope of this research, five case study evaluations were conducted across Kenya (two businesses), Mozambique (two businesses) and Rwanda (one business).

Table 1 – Table of studied businesses

Country	**Mozambique**		**Kenya**		**Rwanda**
Location	Chimoio	Maputo	Eldoret	**Kisumu**	Kigali
Project	KoBen/Vegman fresh vegetables	Alves & Companhia meat products	Tarakwo Dairies pasteurized milk	**Pioneer fish farm**	Trabac egg production

At the time of writing, the ethical approval for the study has not yet been granted for Mozambique. The evaluation for the businesses in Mozambique thus solely focused on the parts of the studies that could be carried out without the approval, i.e. the value chain and the mapping of distribution and reach.

This report covers the case study on Pioneer tilapia, in Kisumu, Kisumu County, Kenya.

Focus Box 1 – Most common types of fish in the Kisumu area, Kenya[3]

Tilapia

Most common fish in Lake Victoria. It comes in different sizes (from less than 100g up to 700g) and is mostly sold fresh or fried. Smaller tilapia (100-250g are locally called kadogos).

Omena

Known as the Lake Victoria sardine. Very small fish that is sold sun-dried, using a can to measure the quantity.

Nile perch (Mbuta)

Other type of Lake Victoria fish, coming in various sizes. Larger sizes are sold to factories for export.

Chinese fish

While representing only 2% of Kenyan fish imports in 2012, Chinese fish now represents more than half of the fish imports. It arrives frozen in boxes. Chinese fish is less expensive than local fish but is sometimes sold at the same price as Lake Victoria tilapia by vendors, who mix the two types of fish in their buckets and at their stalls.

Mgongo Wazi

Fried fish carcass. When sold to factories, fish flesh is exported as filets while the carcass is sold to wholesalers who fry it to resell. Mgongo Wazi is for instance used in soup for children by the poorest consumers.

Mumi, Okoko

Species of catfish.

Wiu

Species of small fish slightly bigger than omena.

[3] Source: for Chinese fish: https://resourcetrade.earth/data?year=2015&importer=404&category=63&units=weight

2. DESCRIPTION OF THE BUSINESS

In 2009, the Kenyan government established a program – the Fish Farming Enterprise Productivity Economic Stimulus Program – which aimed at promoting the expansion of fisheries as a means to stimulate economic growth and increase the incomes of rural Kenyans. Thanks to this program, in 2010 the demand for fingerlings increased from one million to 28 million units in the whole country and farmers came to face a shortage of fingerlings. Pioneer Fish Farm was set up by Mr. Okello in Kisumu County in 2011 under the name ThinQubator Aquaculture with the purpose of producing high quality sex-reversed tilapia fingerlings to face this challenge. The company has since secured its place in the market as a supplier of quality fingerlings. In early 2015, it changed its name to Pioneer fish farm and decided to start selling tilapia in addition to fingerlings. The farm is located on the main road between Kisumu and Busia (at the Ugandan border), 26 km from Kisumu.

Figure 1 – Pioneer fish farm

Pioneer received support from GAIN in 2015 to create greenhouses containing aquaculture ponds to:

i. Increase the company's reach as a regional supplier of quality fingerlings;

ii. Begin cage farming of kadogos (small tilapia between 100 and 250g) and full-size tilapia in Lake Victoria to introduce direct sales of fish to low income consumers of the area through the development of an on-site retail outlet.

Figure 2 – Pioneer greenhouses at the farm

The greenhouses contain aquaculture ponds used to grow fingerlings up to one month on average (two months maximum). They have been in operation since 2015 (pond farming for kadogos) and cage farming began in mid-2016. The first cage kadogos' harvest was brought to market in December 2016 and the first harvest of full-size tilapia from the cages occurred in February 2017.

The farm sold ca.122,000 quality mono-sex[4] fingerlings in Q1 2017 and ca. 95,000 in Q2 2017[5] – compared to ca. 69,000 in Q4 2015. These fingerlings have been sold to large- and small-scale pond and cage farmers, mostly within the region. An additional 30% has been retained by the company to use in Pioneer cages to grow fish.

In each cage, fish are sorted between the third and fourth months through a process called grading. The purpose is to identify slow growers (120-150g) and fast growers (200g and above). In a cage, around 25% of the fish are slow growers and are sold as kadogos. The fast growers are retained in the original cages and are harvested after 8 months at their full-size. Harvested fast growers can range from around 450g to above 550g. During field work, it was noticed that pieces of around 450g are mostly sold to end consumers at the outlet while pieces of 550g and above are mostly sent to Nairobi and to restaurants. In this report, full-size fish will be defined as an intermediary (in terms of size and price) between these two categories.

Table 2 – Pioneer farm-gate fish prices, July 2017

Kadogos (100-250g)	Middle size tilapia (400-450g)	Big size tilapia (550g and above)
280 KES/kg	360 KES/kg	400 KES/kg

These prices are the same regardless of seasons.

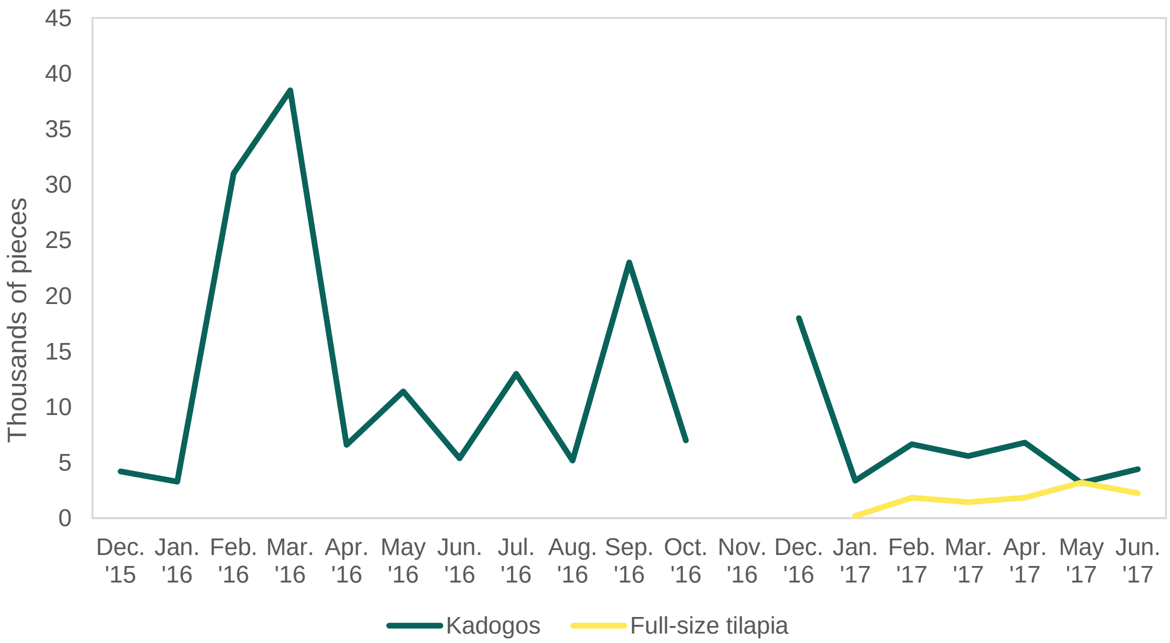
[4] Only male fish.

[5] Source: Mr. Okello's report 'Sales in 2017'.

In this report, the distinction will be made between kadogos and full-size tilapia. An average size of 500g and price of 380 KES/kg will be used for full-size fish and an average size of 150g and price of 280 KES/kg will be used for kadogos throughout the report. This choice of an average size for both types of tilapia might explain some discrepancies between Altai's calculation and the data provided by Okello to GAIN – as Okello sent some information about his revenues to Altai while he reports everything in terms of pieces to GAIN.

Before 2017, Okello used to grow kadogos in ponds behind his house and in the greenhouses. Sales varied greatly with peaks in February, March and September 2016. From 2017, all the tilapia sold at the farm (for both kadogos and full-size) has been coming from the cages. Since January 2017, sales of kadogos have been mostly stable with an average of ca. 3,500 pieces sold per month (one piece corresponds to one fish) while the sales of full-size fish have been increasing (except for June 2017).

Figure 3 – Evolution of kadogos and full-size tilapia sales from December 2015 to June 2017[6]



Pioneer's strategic objectives are to:

- Be the leading fingerling producer in Kenya;
- Be an efficient producer and marketer of fresh tilapia throughout the country, avoiding too many intermediaries within the value chain to ensure the best price to the end consumers. This has been started by the opening of an outlet in front of the farm and a kiosk in Maseno in June 2017 (this kiosk was closed during the fieldwork because of school/university holidays). Other outlets are planned in Kisumu (three locations have been identified so far) and in Nairobi (one location has been identified).

Pioneer has a production capacity of around 200,000 fingerlings and 4 tons of fish per month.

Table 3 – Pioneer production capacity, July 2017

[6] Source: data provided by Okello to GAIN

	Kadogos	Full-size tilapia
Pioneer capacity per month (in kg)	1,320	2,680
Pioneer capacity per month (in pieces)	8,844	5,360

Pioneer production capacity is based on sales figures of June 2017. 67% of the sales are full-size tilapia and 33% are kadogos. The table does not include fingerlings.

In addition to Mr. Okello, six people work at the farm and four at the lake (one deals with the management of the cages while the three others ensure security). Pioneer cages are situated on the lake, near Ndere Island, 28 km from the Pioneer shop.

Pioneer will need to meet some key challenges to scale up and sustain a social business:

- Stimulate demand for its products: cage fish is still a quite new product; advertising and explaining it could help it reach its potential;
- Find sufficient and adequate distribution channels. Opening new outlets in adequate locations with consumers buying fish year-round could allow a wider distribution;
- Secure a regular supply of all sizes of tilapia to retain clients: Pioneer sometimes needs to source fishes among other cage farmers to resell to its institutional clients (e.g. restaurants) to ensure a weekly supply;
- Balance financial sustainability and social goals. Pioneer must guarantee its profitability while ensuring its social goal of supplying quality tilapia to lower income people.

3. METHODOLOGY

3.1. OVERVIEW

This cross-sectional case study evaluation concerns GAIN's MNF support to the Pioneer fish farm. It is based on a combination of qualitative and quantitative research that took place between April and July 2017.

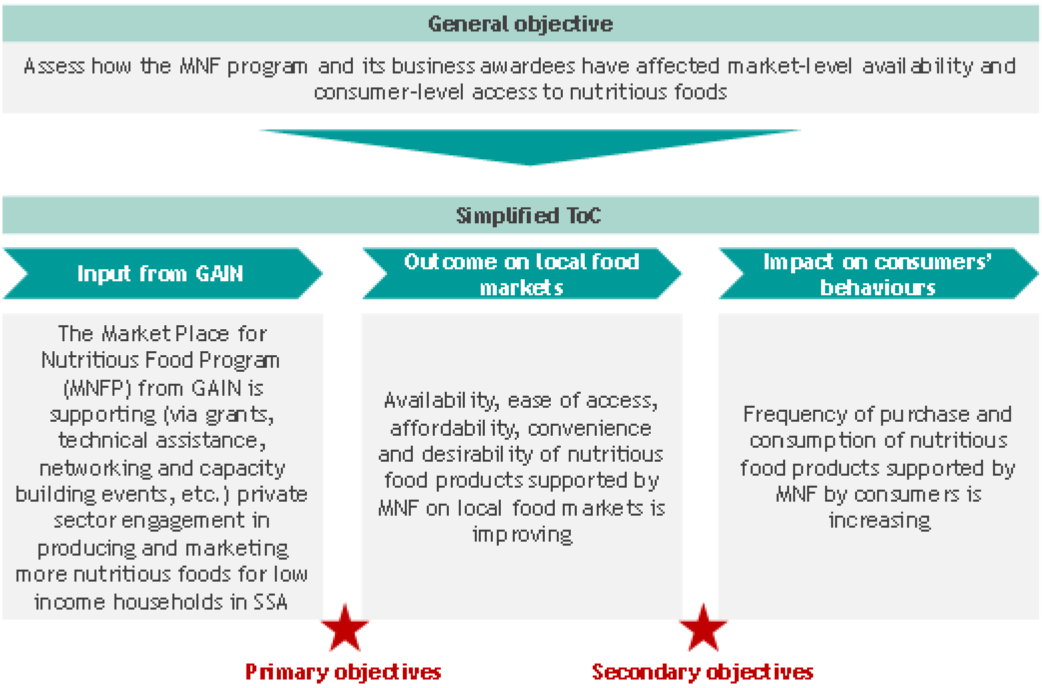
3.2. OBJECTIVES

The evaluation aimed at assessing:

i. To what extent GAIN's inputs via the MNF program helped improve availability, affordability, ease of access, convenience and desirability of nutritious food products on local food markets (**Primary objectives**). This was done mainly through comparisons between intervention and control markets;

ii. To what extent the above-mentioned changes on local food markets have impacted consumers' food purchasing behaviors (**Secondary objectives**). A comparison was made between before and after the introduction of MNF food products on local markets.

Figure 4 – Simplified theory of change for GAIN's MNF program



3.3. ANALYTICAL FRAMEWORK

The research was organized through a cross-sectional case study design, using a combination of methods and tools, both quantitative and qualitative, to capture behaviors and preferences and gather additional insights to explain them as fully as possible.

The main tools used included quantitative surveys of both consumers and vendors; various forms of key informant interviews (KII) depending on the interviewed audience, the needed information and the module in the project; focus group discussions; ethnographic interviews of both consumers and vendors; different types of observations and price checks.

The project was organized around seven key modules:

i. An **inception module**, the aim of which was to collect all the necessary background information for the project; start drafting a detailed methodology and tools; finalize partnerships with local data collection firms and IRB facilitators and launch the ethical clearance processes in the three countries;

ii. A **road to market** module aimed at mapping the routes from production to end-consumers, looking at intermediaries, identifying key actors in the value chain and the value added by each of them, mainly through key informant interviews among actors of the value chain;

iii. A module of **formative key informant interviews** was designed to try to understand if and how the availability and affordability of foods changed the market; determine factors that influence purchase; identify qualities in MNF foods valued by consumers; and collect insights to refine project methodology and further develop the research tools;

iv. The **consumer quantitative surveys** focused primarily on determining MNF's impact on availability, affordability, convenience and desirability of nutritious foods and to a lesser extent on understanding the relationship between the availability, affordability, convenience and desirability of the MNF foods on purchasing and consumption habits of their consumers;

v. **Vendor surveys and market observations** to measure availability and affordability of MNF-supported and status quo foods, as well as competition generated because of the successful establishment of MNF businesses;

vi. Additional **qualitative insights from consumers and vendors** on MNF market dynamics aimed at understanding how the food (and drink) environment had changed over time and deep dive into findings from the other modules; collect insights on the barriers and levers to boost MNF presence and traction;

vii. Finally, a **synthesis and report-writing** phase served to cross-analyze findings from the different project modules and draft the final reports, substantiated by photos, tables, graphs and any other relevant information, including the SPSS databases.

3.4. ROAD TO MARKET AND VALUE CHAIN RESEARCH

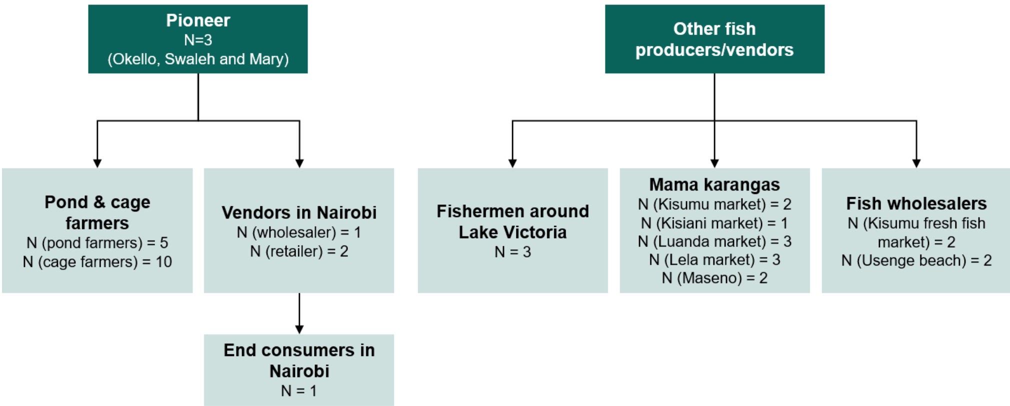
The aim of the Road to Market module is to get a holistic view of the presence of MNF-supported products (in this case tilapia) from a market standpoint, i.e. to assess where the product goes and what value addition (or loss) is made along the way.

After a secondary research effort to get a better understanding of the relevant market (in this instance, the fish market in Kenya and more specifically Kisumu county), this module's work was largely based on in-depth or key informant interviews with different actors of the value chain. The goal is to arrive at a description of the overall value chain of the business type (including key components, production and/or transformation processes), its distribution map and its geographical reach as well as a breakdown of the value among key players and a focus on bottlenecks, weaknesses and opportunities.

For this module, 40 interviews were conducted in Kisumu and surrounding areas, including with Pioneer management and employees (three), pond and cage farmers buying Pioneer fingerlings (fifteen), fishermen around Lake Victoria (three), wholesalers in the Kisumu fresh fish market and mama karangas[7] in six different markets.

[7] Term used to define female street vendors of various types of fried fish.

Figure 5 – Diagram of value chain interviews[8]



3.4.1. REACH

A calculation of reach of the MNF products was made based on a combination of information gathered in this module and from the consumer survey, taking into consideration sales of kadogos, average quantity of fish bought each time per person and number of times people are buying fish per week.

The reach of kadogos from December 2015 to June 2017 is estimated at 3,891 households. Reach calculations are based on the number of kadogo pieces sold each month since December 2015 (data provided by Okello to GAIN). The number of purchases per week is then determined (= number of kadogos sold per month / 4 weeks / average quantity of fish bought each time per person). Average quantity of fish bought each time per person comes from the Consumer survey. The number of consumers per month is equal to the number of purchase per week divided by the number of times people buy fish per week. The latter also comes from the Consumer survey. In order to determine the number of new consumers per month, the difference of consumers between month N and month N-1 is added to the number obtained through the assumption that there is a turnover of consumers of about 10% each month. When the result of this calculation is negative, the number of news consumers is taken as zero, given that even those who stop buying Pioneer tilapia have once been reached by it.

[8] Does not include consumers although information from ethnographic interviews and Focus Group was also sometimes used.

Calculation of reach of Pioneer's kadogos from December 2015 to June 2017

			2015	2016											
	Source	**Figures**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
# kadogos sold per month - pieces	Okello's reporting to GAIN	-	4,200	3,300	31,000	38,500	6,600	11,400	5,400	13,000	5,200	23,000	7,000		18,000
# kadogos sold per week	Calculation	-	1,050	825	7,750	9,625	1,650	2,850	1,350	3,250	1,300	5,750	1,750		4,500
Average quantity of fish bought each time per person	Quantitative study	3													
# purchase per week	Calculation	-	350	275	2,583	3,208	550	950	450	1,083	433	1,917	583	n.a.	1,500
# times people buy fish per week	Quantitative study	2													
# consumers per month	Calculation	-	175	138	1,292	1,604	275	475	225	542	217	958	292		750
# consumers that stop coming	Assumption	10%													
# new consumers per month	Calculation	-	175	0	1,168	442	0	228	0	339	0	763	0		488

			2017					
	Source	**Figures**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
# kadogos sold per month - pieces	Okello's reporting to GAIN	-	3,372	6,660	5,600	6,800	3,180	4,400
# kadogos sold per week	Calculation	-	843	1,665	1,400	1,700	795	1,100
Average quantity of fish bought each time per person	Quantitative study	3						
# purchase per week	Calculation	-	281	555	467	567	265	367
# times people are buying fish per week	Quantitative study	2						
# consumers per month	Calculation	-	141	278	233	283	133	183
# consumers that stop coming	Assumption	10%						
# new consumers per month	Calculation	-	0	151	0	73	0	64
# households reached	Calculation	3,891						

3.5. QUANTITATIVE RESEARCH

3.5.1. CONSUMER SURVEY – PRIMARY SAMPLING FRAME

The primary sampling frame objective was to determine the MNF impact on availability, affordability, convenience and desirability of nutritious foods, in this case tilapia. To do so, **intervention markets,** where MNF supported foods – in this case Pioneer tilapia – have been introduced, were compared with **control markets**, where no MNF supported foods are available – i.e. markets with no vendors selling Pioneer fish. Control markets could hence be considered similar to intervention markets prior to the introduction of Pioneer tilapia.

This random customer survey was structured as explained in the table below:

Table 4 – Summary table for random consumer survey

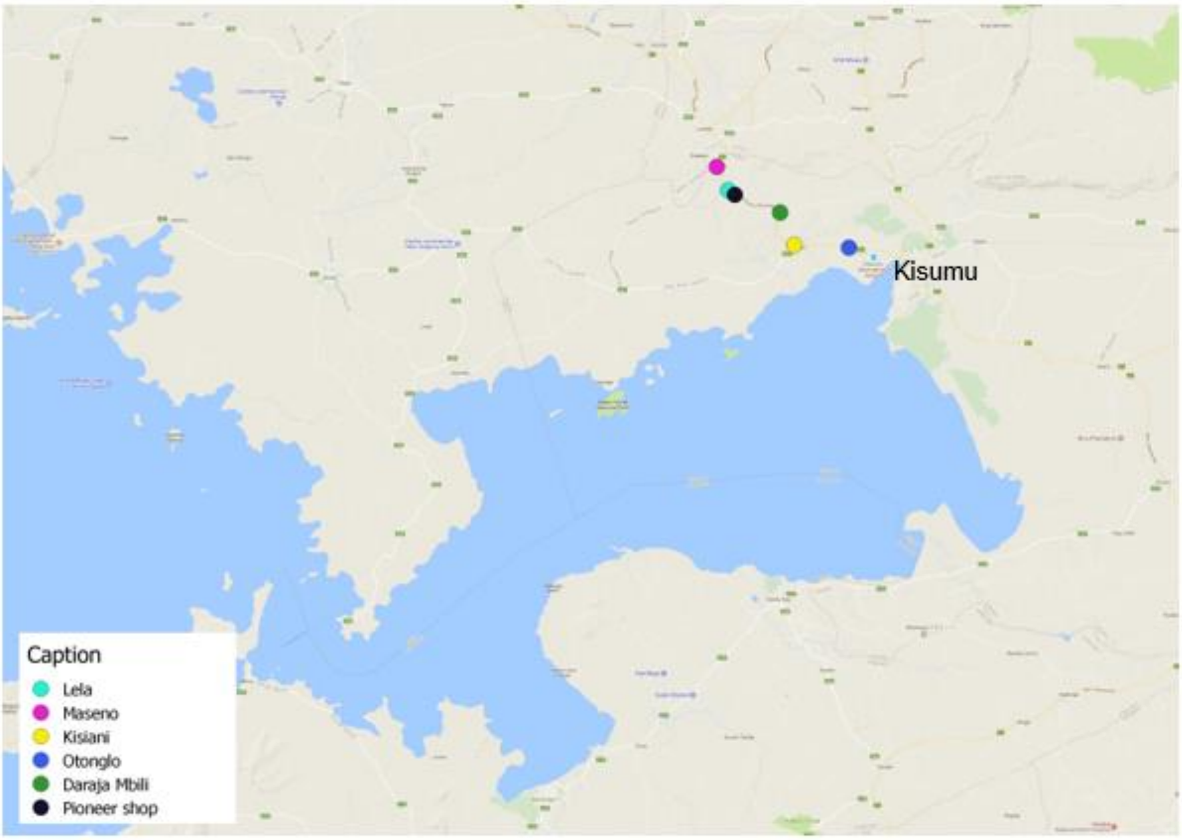
Type of Interview	Location	Quota (goal)	Quota (reached)	Recruitment method	Inclusion criteria
Survey 1: Random consumer intervention market 1	Lela	100	193	Random selection at the defined local food markets, using the street intercept methodology	Above 18 years old, buying fish for personal or household consumption (excluding business)
Survey 1: Random consumer intervention market 2	Maseno	100	111		
Survey 1: Random consumer control market 1	Kisiani	100	113		
Survey 1: Random consumer control market 2	Otonglo	100	139		
Survey 1: Random consumer control market 3	Daraja Mbili	0	30		

Consumers were randomly selected among shoppers making purchases in the local food market using the street intercept methodology, i.e. a quantitative research survey whereby respondents are intercepted in public spaces, most often markets or malls. The process involves stopping shoppers and administering a survey on the spot (or alternatively inviting them to a research facility nearby to complete the interview).

Approximately 30 minutes long face-to-face interviews in the relevant local languages (English or Swahili, depending on the interlocutor's preference) were conducted with shoppers at the intervention and control markets.

Some interviews were conducted in a back-up market (Daraja Mbili) as Kisiani and Otonglo were not large enough to meet the quota of consumers in control markets. The quota in control markets was slightly increased due to difficulties to reach quota at the POS.

Figure 6 – Location of the different markets used in the survey



Lela market was picked as an intervention market because some mama karangas used to sell Pioneer tilapia there and because of its proximity to the Pioneer shop.

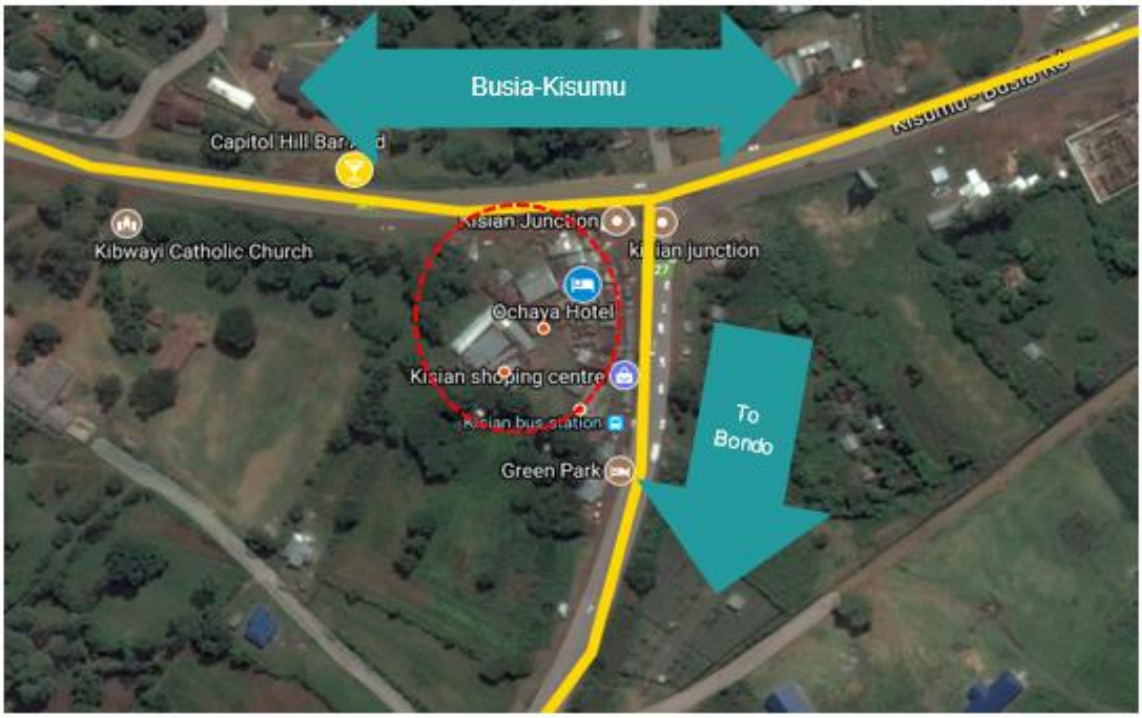
Figure 7 – Lela market

Maseno was picked as an intervention market because of the presence of a Pioneer kiosk that sold fried fish there for a few weeks. This shop closed in mid-June because its main clients were students that left Maseno for the holidays and it is supposed to re-open in September.

Figure 8 – Maseno market

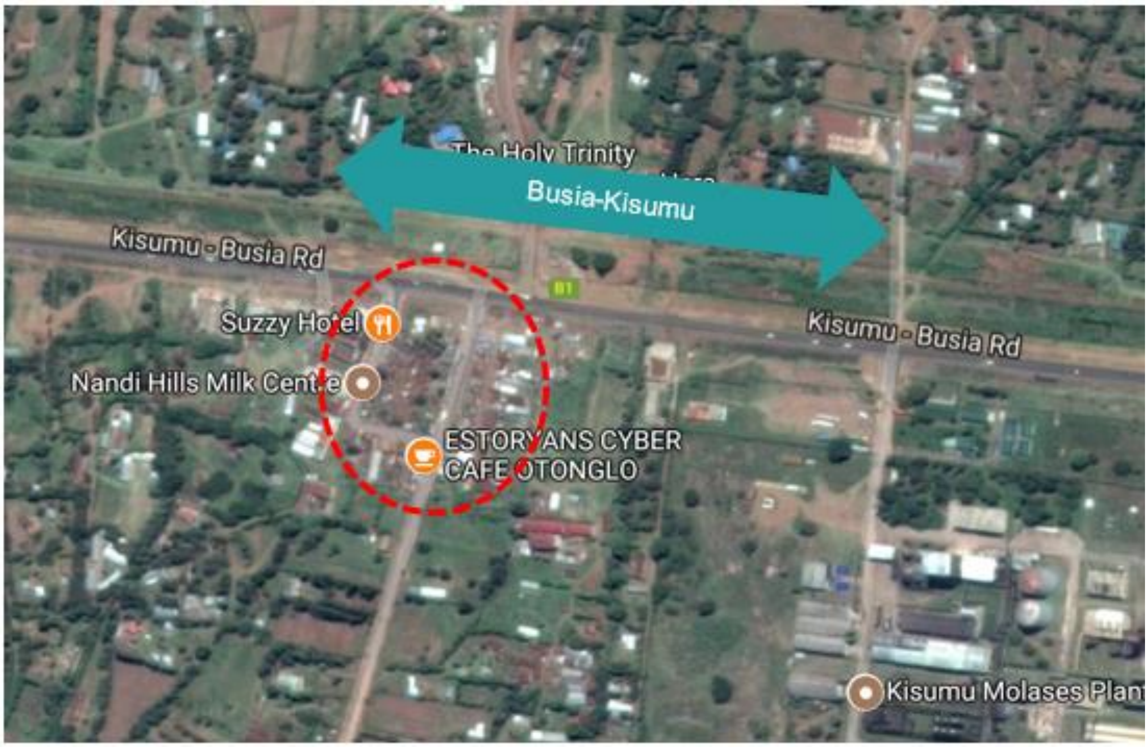
Kisiani market was picked as a control market because it was similar to Lela (similar number of vendors, proximity of the Kisumu-Busia road, accessibility by public transport, etc.) but had no vendors selling or having sold Pioneer fish.

Figure 9 – Kisiani market



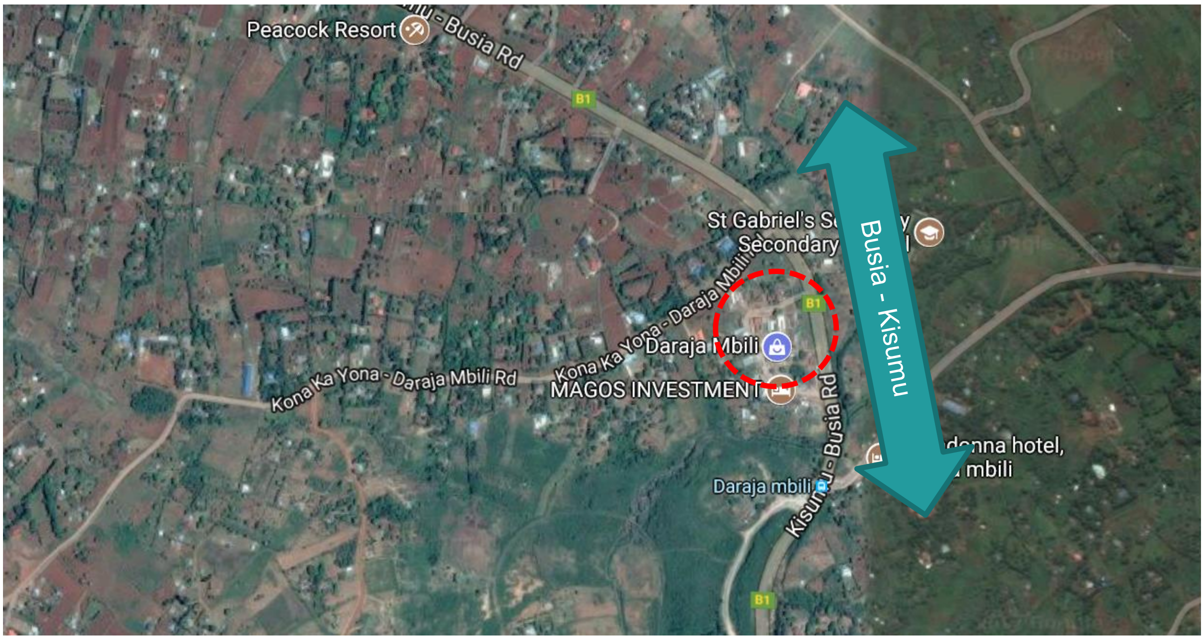
Otonglo was picked as a control market for similar reasons.

Figure 10 – Otonglo market



Daraja Mbili was picked as a back-up control market for similar reasons.

Figure 11 – Daraja Mbili market



Sample sizes were determined by GAIN, based on a previous research conducted in 2015 in Kenya on an MNF supported agri-business estimated to reach a population of approximately 1,200 households. Considering similar outreach for the five projects covered in the current study, conducting N=200 interviews per consumer category allows for robust statistical significance, with margins of errors never reaching more than +/- 6.33ppt by consumer category at 95% confidence interval.

The interviews were done using structured questionnaires which were uploaded onto electronic Tablets using the SurveyToGo software. The data was collected daily by synching the tablets with the online software. Key Performance Indicators (KPIs) were collected and reviewed daily allowing to make necessary changes to ensure a representative sample but also to add interview locations when necessary. The main KPIs were number of people approached, interviewed, refusing to answer, under age and who did not consume or buy fish as well as gender, average age, household income and education level.

Data collection took place from 24 June to 5 July 2017.

Altai Consulting provided tools (questionnaire and detailed sampling and methodology) and training materials and Altai's local partner Sagaci Research implemented the research on the ground (with Altai's presence and supervision). The field survey was preceded by a two-day training and a one-day pilot by Sagaci and Altai, with the presence of a GAIN staff member for the pilot. The training and pilot allowed to further refine the methodology as well as certain aspects of the questionnaire.

All participants were informed of the study's purpose and of the voluntary and confidential nature of the interview. Informed consent was affirmed by a written signature, and a copy of the consent form including contact information for study coordinators was provided to each participant.

Quality control was ensured through a combination of GPS monitoring (all interviews' GPS coordinates were recorded and verified), consistency monitoring (questionnaires lasting less than fifteen minutes or failing to meet most of consistency checks were cancelled) and call-back monitoring (a percentage of all interviewees were called by phone and asked a few questions to ensure that they had indeed been interviewed).

Results of the quantitative survey will be presented throughout the report presenting, when possible, the p-values from association test, calculated using the Pearson Chi-Squared on SPSS.

3.5.2. CONSUMER SURVEY – SECONDARY SAMPLING FRAME

The secondary sampling frame objective meant to understand the relationship between availability, affordability, convenience and desirability of MNF food (Pioneer tilapia) and the purchasing and consumption habits of their consumers. To do so, consumers of Pioneer tilapia were interviewed, with a questionnaire designed to understand the changes in their purchasing and consumption habits since Pioneer tilapia was made available on their local food market.

Table 5 – Summary table for fish point of sale consumer survey

Type of Interview	Location	Quota (goal)	Quota (reached)	Recruitment method	Respondents' profile
Survey 2: Consumers at the Pioneer Shop	Pioneer shop near Lela market	200	47	Buyers at the POS	Above 18 years old, buying Pioneer tilapia from the designed POS for personal or household consumption (excluding business)

The **Pioneer shop** was selected for the POS consumer survey as it was the only open shop that sold Pioneer tilapia at the time of the study. During the survey, however, it was noted that there were not enough consumers at the Pioneer shop to fulfill the quota of 200. Interviewers spent full days at the shop but were only able to interview between five and ten persons per day. In light of this, additional interviews were conducted in Lela (intervention market) to achieve the overall quota of 600.

The sample size for this survey was also determined by GAIN based on previous research (cf. above). Consumers were randomly selected among shoppers having just completed a purchase at the Pioneer shop. As with the random survey described above, approximately 30min, face-to-face interviews in the local languages (English or Swahili depending on the customer's preference) were conducted.

The same procedures as for the primary sampling were implemented regarding interviewer training, field supervision and monitoring (see details above) as well as regarding consent.

3.5.3. VENDOR SURVEY AND MARKET OBSERVATIONS

Two detailed **market observations** were conducted, one in an intervention market (Lela) and one in a control market (Kisiani), to get a detailed description of the markets (actual offering at time of visit, ease of access to the products, prices, customer presence, quality of the products, etc.).

The market observations were done based on a specifically designed detailed questionnaire on which interviewers were trained in advance. They also included price checks for relevant products (i.e. the main types of fish identified in prior modules) at a variety of stalls also identified in the prior modules. The price checks were done in about 20 stores in each of the markets, a number which was considered – given the size of the markets – to offer a representative image of each market.

The vendor surveys were designed based on a series of assumptions/hypotheses derived from the research done in the initial modules as well as the distribution models and total number of vendors distributing the studied products. In the case of Pioneer, and to cover the different types of relevant vendors in both markets, it was decided to do a total of at least 40 interviews. The breakdown of interviews was the following:

- Intervention market/POS vendors:
    - Ten interviews with tilapia vendors in Lela;
    - Four interviews with tilapia vendors in Maseno;
    - One interview with the Pioneer vendor in the outlet.

- Control market vendors:
  - Four interviews with tilapia vendors in Kisiani (the interviewers interviewed all the tilapia vendors in Kisiani);
  - Nine interviews with tilapia vendors in Otonglo (the interviewers interviewed all the tilapia vendors in Otonglo);
  - 26 interviews with tilapia vendors in Daraja Mbili. These interviews in the back-up market were necessary to achieve the vendors' quota in control markets as the two others did not have enough tilapia vendors.

All interviewers were provided with a detailed list of food products to track, prices to collect, and types of vendors to interview. The questionnaire and list of data to collect were scripted into STG (SurveyToGo software) as per the consumer survey. All interviews took place in the relevant local languages (English or Swahili as needed).

As with the consumer surveys, consent forms were read with, distributed to and signed by every interviewee at the beginning of each interview.

One SPSS database for the vendor survey and two market observation reports were delivered.

3.5.4. POVERTY ANALYSIS

To assess the level of poverty of the survey respondents, two different methods were used. The first one is the Progress out of Poverty Index, a measurement tool used by organizations and businesses to assess the level poverty in a community. It is based on ten standard questions (that were included in the consumer survey) regarding the characteristics and living standards of the household. However, the results of this calculation appeared to be too optimistic regarding the level of poverty of respondents, probably because some of the indicators, which were formulated in 2005, are now outdated (e.g. the possession of a TV in 2017 is not as relevant as an indicator of wealth as it was in 2005).

For this reason, a second methodology was elaborated. This is based on the calculation, for each respondent, of the total household monthly income divided by the number of members of the household. When this value is under the Global Poverty Line of 1.90 USD a day[9] per person (197 KES as of July 2017), the individual is considered poor. Since the income level was recorded as belonging to a certain income bracket, an intermediate value was taken for each interval[10]. It was possible to carry out this calculation exhaustively only for the consumer survey, where all the necessary information was available.

3.6. QUALITATIVE RESEARCH

Specific interview guidelines, based on the Most Significant Change Methodology (MSC)[11] developed by Davies, were developed, tested during the beginning of the project and refined continuously by Altai conjointly with GAIN. Respondents were asked to tell about the most significant changes they had observed or experienced since the introduction of MNF supported foods in different domains such as sales, customer profiles, emergence of competitors, etc. for vendors, and food purchasing behavior and consumption for consumers.

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[9] Source: World Bank, October 2015.

[10] "Do not know" and "do not want to answer" were not computed. For the number of household inhabitants, answer "1 to 2 people" is computed as 1.5, "7 to 8 people" as 7.5, and "9 people or more" as 10.

[11] Technique used to evaluate complex interventions that emphasizes the participation of the stakeholders involved to identify the most significant effects on their lives.

The qualitative research was distributed as follows:

- **Five key informant interviews with vendors** were conducted:

These individual interviews aimed to enable vendors to express themselves freely, without fearing to have to disclose confidential data to competitors. The sampling was designed to cover a variety of types of relevant vendors. Both MNF product vendors and non-MNF product vendors but also different types of points of sale were interviewed:

  - One omena vendor;
  - Two mama karangas that used to sell Pioneer tilapia;
  - One vendor selling several types of fish;
  - One Pioneer vendor in Maseno.

Interviews took one hour on average.

- **Two Focus Group Discussions with consumers**:

The Focus Group Discussion (FGD) format was picked to encourage debates between respondents and elicit the most significant qualities of the MNF-supported foods and the factors that affect their purchase as opposed to the purchase of competing or substitute products.

The FGDs gathered eight to twelve interviewees each, to discuss their purchase and consumption habits when it comes to fish (specifically Pioneer tilapia) and to learn more about what attributes they particularly valued in fish.

The participants were recruited on the intervention and control markets, preferably shopping for fish. Efforts were made to ensure the participants were as homogeneous as possible, especially with regards to gender, age and socio-economic profile to ensure they would feel comfortable sharing their experience. An excel tool was developed and shared with the local fixer to help him in the recruitment.

Figure 12 – Example of guidelines for the recruitment of the participants to one of the FGD

			Market	Products sold/bought	Gender	Income
FGD2 number 1	MNF-product	1	Pioneer shop	Pioneer Tilapia	Woman	<700KES/day
		2	Pioneer shop	Pioneer Tilapia	Woman	
		3	Pioneer shop	Pioneer Tilapia	Woman	
		4	Pioneer shop	Pioneer Tilapia	Man	
		5	Kiosk in Maseno	Pioneer Tilapia	Woman	
		6	Kiosk in Maseno	Pioneer Tilapia	Woman	
	non-MNF product	7	Lela/Maseno/Kisiani	Fish from the lake	Woman	
		8	Lela/Maseno/Kisiani	Fish from the lake	Woman	
		9	Lela/Maseno/Kisiani	Fish from the lake	Woman	
		10	Lela/Maseno/Kisiani	Fish from the lake	Man	
		11	Lela/Maseno/Kisiani	Fish from the lake	Woman	
		12	Lela/Maseno/Kisiani	Fish from the lake	Woman	

The discussions took place in enclosed, private spaces (one was held at the Pioneer shop and the other at a hotel, the Peacock resort in Chulaimbo) where the participants were fully capable of expressing themselves without concern of being overheard. Before the beginning of the discussion, the moderator explained in detail how the focus group discussion would take place and what would be expected of the participants. They were given the possibility of opting out of the discussion at any point. The participants were also compensated with small amounts (so as not to bias the process) to compensate for their time and transportation costs.

The two FGDs were divided as follows:

- One FGD had eleven participants from Lela (intervention market), Chulaimbo and Kisiani (control market), five of them consuming Pioneer fish, the others consuming Nile perch or tilapia;
- The other FGD had nine participants from Lela (five), Chulaimbo (one), Kisiani (one), Daraja Mbili (one) and Maseno (one), four of them consuming Pioneer fish, the other five consuming tilapia.

Both FGD took approximately two to three hours.

- **Ten one-day ethnographic interviews** with:
  - Four consumers buying Pioneer tilapia;
  - Four consumers not buying Pioneer tilapia but buying omena and other types of tilapia;
  - One vendor selling Pioneer tilapia;
  - One vendor not selling Pioneer tilapia but selling kadogos.

The objective of the ethnographic research was threefold:

- Capturing the context and vendor/consumer perspective: this approach took the vendor/consumer point of view as a starting point, exploring the wider contextual elements of people's lives before narrowing the focus to foods in general and then gradually to Pioneer tilapia. Developing this broad contextual picture aimed at exploring the factors that influenced and shaped people's choices;
- Explaining the data: qualitative insights helped provide a greater depth of understanding to the quantitative research and helped us get to the "whys" behind the data;
- Leaving room for the unexpected: capturing unexpected insights, hence more nuanced learnings around people's experience with MNF food products.

The ethnographic interviews took on average one full day per participant. Given the time commitment required, participants in ethnographic interviews were offered a small (so as not to bias the study) sum to compensate for their time.

For the qualitative interviews (including the FGDs and the ethnographic interviews), the recruitment of participants was done through random selection in intervention and control markets (and other relevant markets when required), and by ensuring that the selected individuals fulfilled a number of pre-defined criteria: age, gender, type of product bought (or sold in the case of vendors), preferred point of sale, consumption occasion and income level/socio-economic profile.

As with the quantitative surveys, consent forms were read through, distributed to and signed by every interviewee at the beginning of each interview, ethnography or FGD.

All qualitative interviews, FGD and ethnographic interviews were conducted in local languages by experienced moderators, specifically trained on the guidelines written by Altai Consulting/GAIN. All interviews were audio-recorded and English transcripts are available.

For all efforts involving individuals (quantitative and qualitative), it was clearly explained to them that data collection was fully confidential and that all the participants had the right to stop any interview if they wished to do so for any reason.

3.7. DATA ANALYSIS

The main methods of data collection included structured questionnaires, guidelines for key informant interviews, FGDs and ethnographic interviews and templates for market observations and price checks. Qualitative data was recorded with audio-recorders and transcribed, then typed into MS Word and analyzed based on emerging and predetermined themes and sub-themes. Quantitative data was entered directly into the SurveyToGo software on portable tablets which were synched every day. Data cleaning and validation as well as consistency checks (including call-backs of interviewees when necessary) were performed to ensure as clean a dataset as possible, that was then exported into a Statistical Package format (SPSS version 17.0) for analysis. Back-up files were kept to avoid any loss or tampering. All the questionnaires and interview forms were stored in a lockable drawer for confidentiality.

Data analysis was conducted using the SPSS statistical software and the QGIS mapping software. Exploratory data techniques were used at the initial stage of analysis to uncover the structure of data and identify outliers or unusual values.

3.8. CHALLENGES AND LIMITATIONS

The greatest challenge of the study was by far the time it took to receive the ethical approval. While the study officially started on 1 April 2017, the approval was only received on 9 June. Thus, the field work took place – as soon as the enumerators could be trained and deployed – from 24 June to 5 July 2017.

The distribution channels for Pioneer's tilapia were also the source of some limitations: due to limited direct sales to end consumers in the Kisumu area – most Pioneer fish is sent to Nairobi – it was not possible to reach the quota of POS interviews in a reasonable time.

The fluidity of the market and business itself also presented a few limitations:

- The identification of small retailers buying from Pioneer to fry and resell the fish was a challenge. The three mama karangas in Chulaimbo and Lela who used to sell Pioneer fish stopped doing so at the end of April. The others were not tracked by Pioneer staff. Lela and Chulaimbo were first supposed to be the intervention markets. However, because of the end of sales of the three-above-mentioned mama karangas, the definition of intervention market had to be changed from one where Pioneer fish was being sold at the time to a market where Pioneer fish had been sold in the recent past;
- The kiosk in Maseno that opened at the end of May closed suddenly due to the school holidays. This kiosk was supposed to be one of the POS and 100 interviews were first planned there. POS interviews which were supposed to take place at this kiosk had to be cancelled and the full quota (200) of POS interviews was therefore reallocated to the Pioneer outlet.

Finally, although most interlocutors were remarkably forthcoming, the inherent difficulty in obtaining delicate information is always a concern, be it cost and margin data from businesses or income and status-related information from individuals. Thus, it was not always possible to procure all the necessary information and some extrapolations and inferences had to be made during the analysis, all of which are recorded in the report, along with their underlying assumptions.

4. BUSINESS BASED STUDY

KEY TAKEAWAYS

- Fingerlings are mostly sold to pond and cage farmers in the Kisumu area. The farmers that have already been able to harvest fish send most of them to Nairobi;
- Pioneer full-size tilapia represent one third of the Pioneer sales in terms of pieces but almost three quarters of the company's revenue and almost all of its profit. They are mostly sold in Nairobi;
- Kadogos – which are mostly sold to the end consumers – appear to be barely profitable for Pioneer. The reach of Pioneer kadogos since December 2015 is estimated at 3,891 households.

4.1. ROAD TO MARKET

Pioneer has different types of clients:

- Fingerlings are sold to pond and cage farmers or retained in Pioneer's cages;
- Full-size tilapia are mostly sold to retailers in Nairobi or restaurants;
- Kadogos are mainly sold to end consumers and to occasional mama karangas in the outlet in front of the farm.

Figure 13 – Pioneer's distribution model by percentage in volume (kg), April 2017

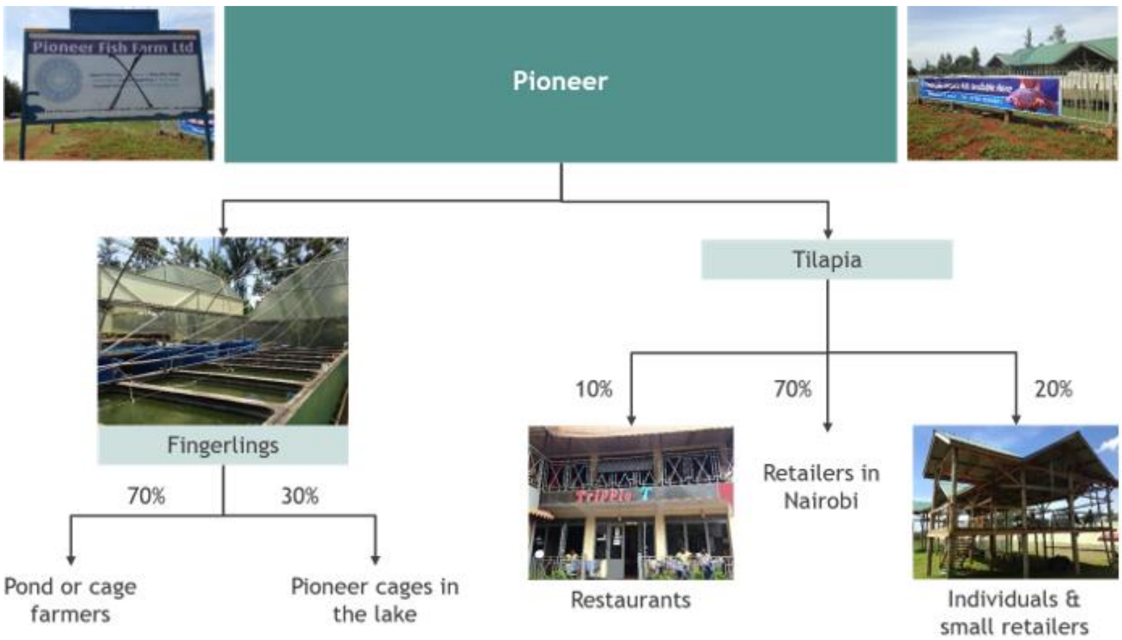


Figure 14 – Position of Pioneer within the overall fish value chain

Within the fish value chain, Pioneer acts as a supplier of fingerlings and tilapia but also as a wholesaler/retailer for kadogos. By selling its kadogos directly to end consumers, Pioneer therefore limits the number of intermediaries in the value chain and ensures his products (the kadogos as well as a few tilapia) reach consumers directly, thus controlling and therefore lowering the price to consumers.

4.1.1. FINGERLINGS

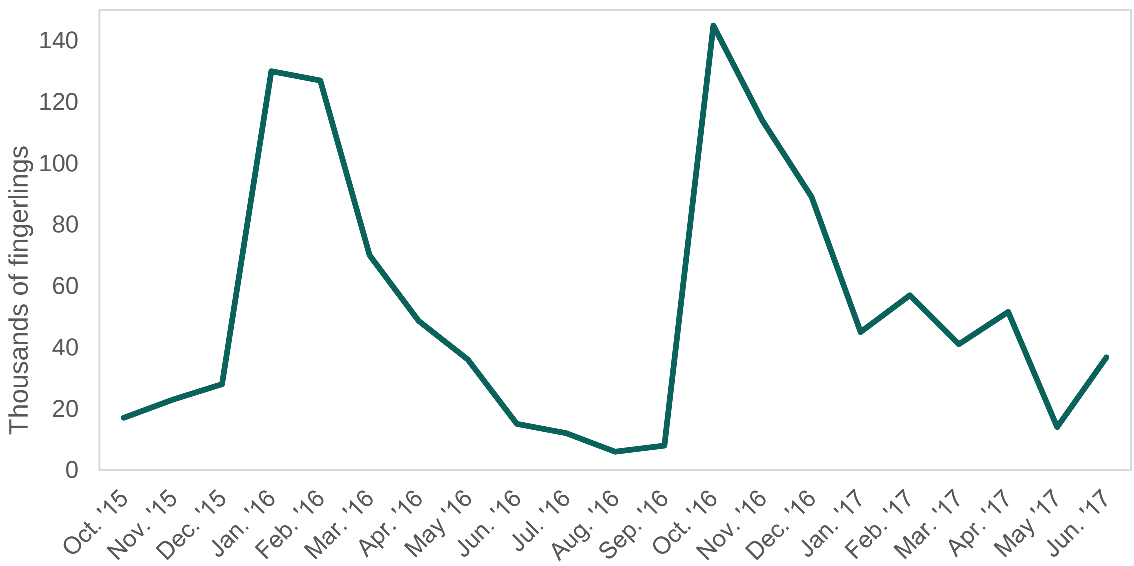
In 2017, sales of fingerlings have been as follows:

Table 6 – Sales of fingerlings, June 2017

	Jan 2017	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017
Fingerlings sold – KES[12]	180,000	256,500	172,200	258,000	75,800	142,000
Fingerlings sold - quantity (number of pieces)[13]	45,000	57,000	41,000	51,600	14,000	36,750

Sales of fingerlings have fluctuated during the first half of 2017, the peak being in April.

Figure 15 – Evolution of fingerlings sales (number of pieces) from 2015 to 2017, September 2017[14]



[12] Source: Mr. Okello's report 'Sales in 2017'.

[13] Source: Reports provided by Mr. Okello to GAIN.

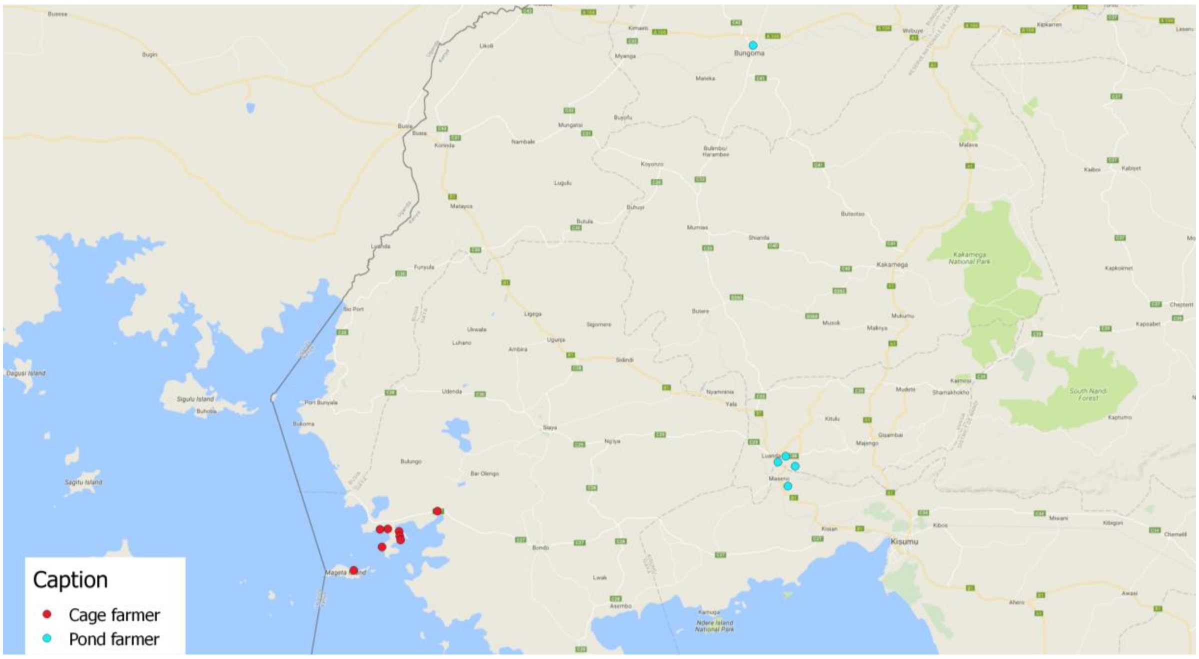
[14] Source: GAIN 'Compilation of Monitoring and Field Visit MNF Data' document.

Pioneer's sales of fingerlings have widely fluctuated since October 2015, with peaks occurring in January, February and October 2016. Since then, sales have been decreasing and there has been no peak in the first half of 2017.

Pioneer is constantly canvassing new pond and cage farmers to market its fingerlings. Farmers that have tried Pioneer fingerlings are generally pleased with the customer relationship and with the fingerlings quality: they have a lower mortality rate and with the same amount of feed, Pioneer fingerlings tend to grow more rapidly than Pioneer competitors' fingerlings.

Fingerlings are sold aged one to two months to pond and cage farmers, most of whom are in the Kisumu area[15]. They are sold 5 KES per piece when aged one month. The price then increases by 1 KES per week of growth. Pond farmers tend to buy between 1,500 and 5,000 fingerlings by purchase while cage farmers tend to buy between 10,000 and 30,000 fingerlings by purchase[16]. Pioneer farm delivers for free for purchases above 10,000 fingerlings.

Figure 16 – Pioneer fingerlings consumers, June 2017



Pioneer's fingerlings consumers' records present a list of 14 cage farmers and 8 pond farmers[17]. Of the 14 cage farmers, 10 were interviewed and 4 declined to participate in the study. Of the 8 pond farmers, 5 were interviewed, 2 had not bought fingerlings from Pioneer and 1 declined to participate.

The five pond farmers that were interviewed are represented on the map. Only 8 cage farmers out of the 10 who were interviewed are represented on the map as GPS coordinates were not available for the last 2.

Among the farmers that have bought fingerlings from Pioneer so far, some have not yet started harvesting, some had their fish stolen/poisoned and some had trouble feeding the fish - leading to the loss of the full harvest (and investment). Out of fifteen conducted interviews, six farmers have started harvesting, five have not, one was growing fingerlings up to 2 months to resell them to Pioneer, two had trouble with feed (leading to the death of all their fish) and one's fish were poisoned. Of the six farmers who have started harvesting, three are mostly selling full-size tilapia that they send to Nairobi.

[15] The Kisumu area is defined as the region around Kisumu city and near the lake.

[16] Source: interviews with 15 pond and cage farmers.

[17] List available in Appendix.

They also sell some to end consumers from the beaches close to where the cages are located. These consumers mainly live around the beaches and walk there to buy fish. The three others sell medium and full-size tilapia in Kisumu's fresh fish market, hotels in Kisumu and Bondo and a university in Bondo.

4.1.2. FULL-SIZE TILAPIA

In 2017, sales of full-size tilapia have been as follows:

Table 7 – Sales of full-size tilapia, June 2017

	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017
Fish sold – KES[18]	293,700	244,800	403,200	543,660	364,820
Fish sold – kg[19]	773	644	1,061	1,431	960
Fish sold – pieces[20]	1,850	1,450	1,850	3,200	2,253

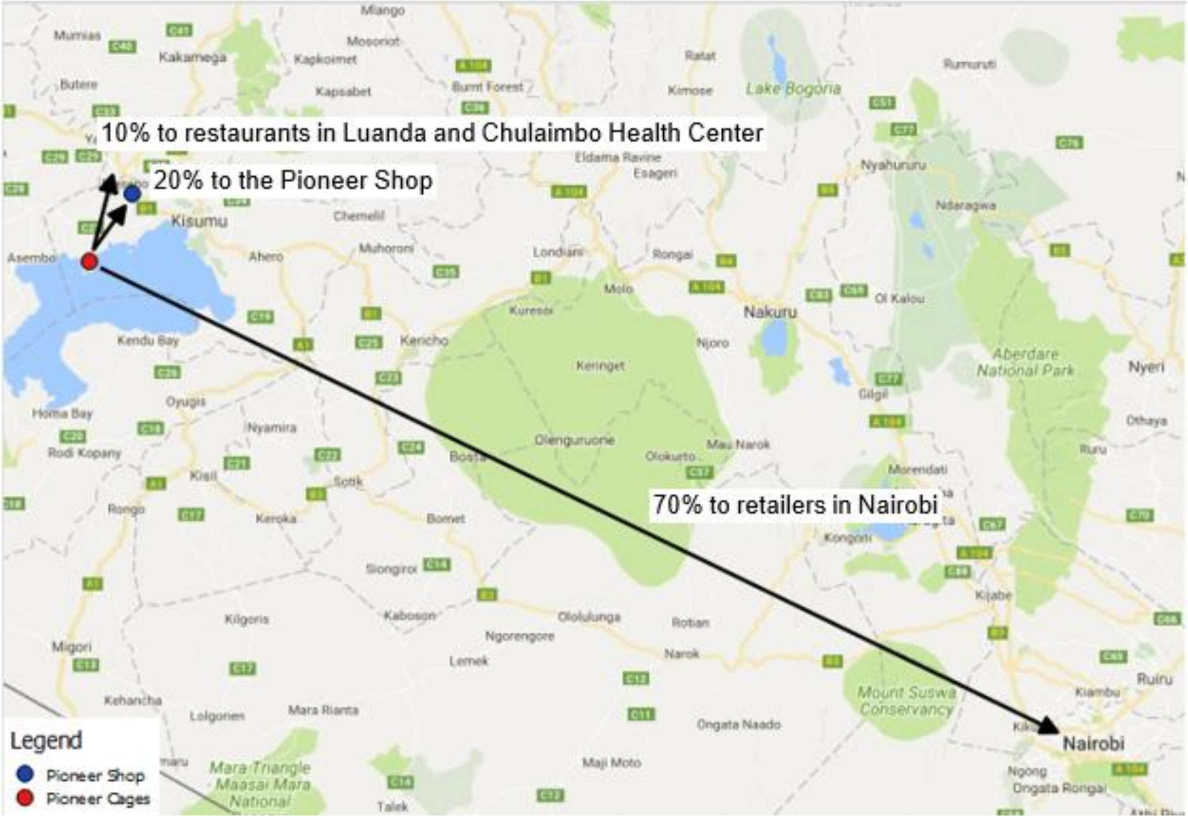
Sales of full-size tilapia have mostly increased in 2017 with a peak in May. Full-size tilapia is mostly sold to restaurants and a hospital in Chulaimbo or sent to Nairobi. Pioneer ensures a weekly supply for all these clients. They sometimes even buy fish to resell when they do not have enough available. This mostly happen for big size fish for which they have weekly orders from restaurants and hospital in Chulaimbo. If they do not have enough fish who have grown to maturation on a particular week, they will buy additional pieces to a cage farmer located near Usenge. Their margin will be lower but they will keep the weekly orders from their clients.

[18] Source: Mr. Okello's report 'Sales in 2017'.

[19] Source: Mr. Okello's report 'Sales in 2017'.

[20] Source: Reports provided by Mr. Okello to GAIN.

Figure 17 – Pioneer full-size tilapia consumers, June 2017



4.1.3. KADOGOS

In 2017, sales of kadogos have been as follows:

Table 8 – Sales of kadogos, June 2017

	Jan 2017	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017
Fish sold – KES[21]	101,160	166,500	156,800	170,000	159,000	132,040
Fish sold – kg[22]	361	595	560	607	568	472
Fish sold – pieces[23]	3,372	6,660	5,600	6,800	3,180	4,400

Sales of kadogos in 2017 have been stable, with a slight peak in April 2017.

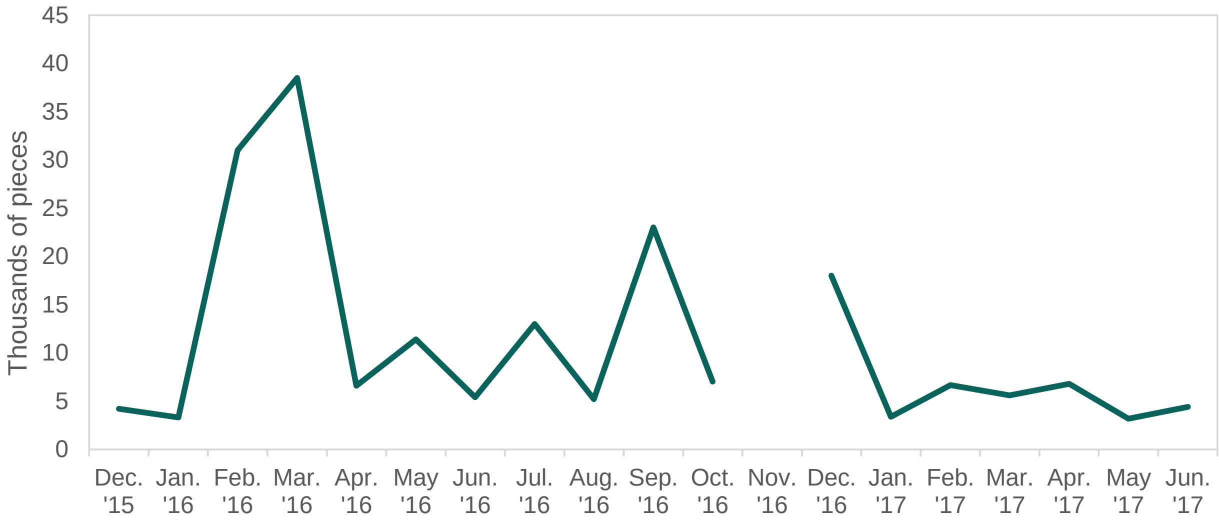
Looking back further in time, the evolution of kadogo sales is more uneven, as seen in the below graph:

[21] Source: Mr. Okello's report 'Sales in 2017'.

[22] Source: Mr. Okello's report 'Sales in 2017'.

[23] Source: Reports provided by Mr. Okello to GAIN.

Figure 18 – Evolution of kadogo sales (number of pieces) from 2015 to 2017, June 2017[24]



According to the reports provided by Okello to GAIN, Pioneer's sales of kadogos have widely fluctuated since December 2015, with peaks occurring in February, March, September and December 2016. Okello used to grow kadogos in ponds near his house and in the farm's greenhouses before growing them in the lake's cages (the first harvest in the cages happened in December 2016). Some discrepancies between the figures provided by GAIN and the figures calculated based on Okello's sales report for the first half of 2017 have emerged. This can potentially be explained by the difference of reporting methods. Okello has indeed reported to GAIN the number of sold pieces while he reported his revenues in his sales report.

Kadogos are mostly sold at the Pioneer outlet to end consumers. The outlet is located on the Busia-Kisumu road, between Chulaimbo (4 km away) and Lela (1 km away). 64% of the consumers walk to the Pioneer outlet. More than half of the consumers (55%) live less than 1 km away from the outlet. 99% of the consumers live less than 25 km away[25].

Table 9 – How far do you live from this market (in km)? (Consumer survey, N=633)

Mean	Minimum	Maximum	Percentile 25	Median	Percentile 75	Percentile 95	Percentile 99	Standard deviation
3	0	250	1	1	2	10	30	12

[24] Source: reports provided by Mr. Okello to GAIN. Data is not available for November 2016.

[25] Data extracted from the quantitative survey.

Figure 19 – Pioneer kadogos' reach, June 2017 (consumer survey)

The number of households reached by Pioneer's kadogos from December 2015 to June 2017 has been estimated at 3,891 households (detailed calculation available in the methodology section).

Table 10 – Approximate number of people reached by Pioneer's kadogos

	Source	Results
Average number of people per household	Consumer survey, Q61	4.6
Average number of household members aged 18 years-old or less	Consumer survey, Q62	1.8
Average number of household members below 5	Consumer survey, Q63	0.7
Female population aged 15-49	CIA World Factbook, 2016	24%
Poverty headcount ratio at $1.90 a day (2011 PPP) (% of population)	World Bank, 2005	34%
Number of people reached by Pioneer's kadogos (from December 2015)	Calculation	17,898
Number of youth aged 18 years-old or less reached by Pioneer's kadogos (from December 2015)	Calculation	7,003
Number of children ages 5 years-old or less reached by Pioneer's kadogos (from December 2015)	Calculation	2,723
Number of women aged 15-49 reached by Pioneer's kadogos (from December 2015)	Calculation	4,295
Number of low income people reached by Pioneer's kadogos (from December 2015)[26]	Calculation	6,085
Number of low income households reached by Pioneer kadogos (from December 2015)	Calculation	1,322

[26] "Low income" was defined as living under 1.90 USD per day.

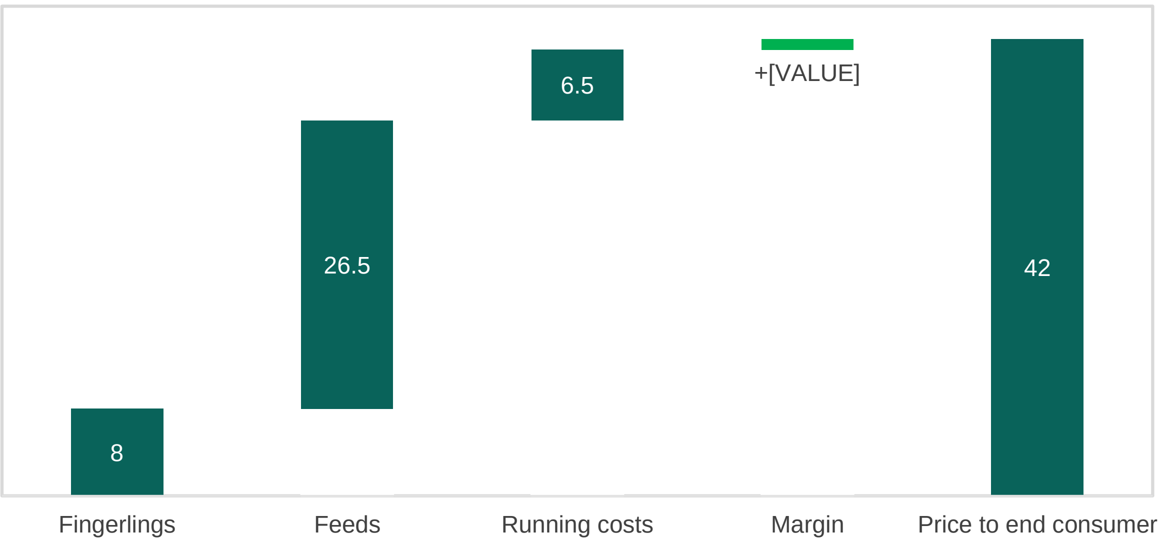
4.2. VALUE CHAIN

Fingerlings are sold as they reach one month and older. At one month, they are sold at 5 KES per piece. For older fingerlings, 1 KES is added to the price per week of growth. These prices have been fixed to ensure a 30% margin on each fingerling.

Considering that kadogos spend four months in the cages to reach maturation while full-size fish spend eight months, value chains have been established for both types giving the following results:

Figure 20 – Pioneer's value chain for full-size tilapia in KES, per piece, September 2017[27]

Figure 21 – Pioneer's value chain for kadogos in KES, per piece, September 2017[28]



In both value chains:

[27] Source: costs given by Mr. Okello, June 2017. Selling price refers to the price at which tilapia is sold at the Pioneer shop.

[28] Source: costs given by Mr. Okello, September 2017. Selling price refers to the price at which kadogos are sold at the Pioneer shop.

- The cost of fingerlings used in the value chain (8 KES) does not correspond to the sales price to pond and cage farmers as it factors in the age of the fingerlings put in the cages and the transportation cost (from the greenhouses to the cages);
- The running costs include the licensing, cage rental, CCTV (security system), boat running costs, offshore floating deck costs, water testing, and salaries and wages;
- The high price of feed has a major impact on the viability of the business, as it represents 65% of the cost for kadogos and 80% of the cost for full-size tilapia.

Some kadogos are sold because they are slow growers and would not reach full maturation after 8 months. Between the third and fourth month after stocking the cage with fingerlings, the tilapia is sorted (the process is called grading). The purpose of grading is to identify the slow (120-150g) and fast growers (200g and above) from the same cage, stocked at the same time. Disposing of kadogos is important as they consume a lot of feed but gain weight slowly. By selling them, Pioneer therefore takes out the cost of four additional months of feed that would not suffice for them to reach the size of the fast growers (after eight months of growth, they could still not be sold at the same price as fast growers even if they consumed the same quantity of feed).

Table 11 – Contribution of kadogos and full-size tilapia to Pioneer's revenues and sales[29]

	Revenues	Sales in kg	Sales in pieces
Full-size tilapia	73%	67%	34%
Kadogos	27%	33%	66%

It appears that kadogos are barely profitable although they represent most of the sold pieces. Most of Pioneer's sales in terms of weight (as well as revenues and profit), however, come from the full-size tilapia: the market in Nairobi can absorb an extremely large quantity of full-size cage fish and ensures a higher revenue to cage farmers. Thus, like other cage farmers, Pioneer is ensuring a sufficient revenue thanks to its sales in Nairobi.

[29] Source: Mr. Okello's report 'Sales in 2017' & reports provided by Mr. Okello to GAIN.

5. CONSUMER BASED STUDY

5.1. CHARACTERISTICS OF RESPONDENTS

KEY TAKEAWAYS

- Respondents are generally young and with some level of education, with almost equal representation of both genders;
- The great majority of the respondents are employed, with a high prevalence of small business owners and casual workers;
- A considerable percentage of respondents seem to be living below the poverty line.

The sample consists of 633 consumers in total. 48% of the respondents were interviewed at an intervention market, 45% at a control market, and 7% were interviewed at the Pioneer POS. An SPSS database containing 304 interviews done in intervention markets, 282 interviews done in control markets and 47 interviews done at the POS was delivered. All of those interviewed at the Pioneer POS had just bought food from the shop. In terms of socio-demographic profiles, the most important differences were observed between Pioneer consumers on one side, and intervention and control markets respondents on the other side.

More than half of the interviewees (52%) are under 30 years old. Four out of five are under 40, and nine out of ten are under 50. Overall, males are 57% of the whole sample. The ratio is rather stable in each age group. The ratio is in line with the overall population of Kenya, which is evenly split between the two genders (World Bank, 2016). Most of those who refused to declare their age are female respondents (88%).

About two thirds of the respondents (64%) have achieved a secondary school diploma or higher. A very small portion of the sample has not completed primary school (2%). Male respondents usually progress more in the school system: they are more likely to have at least a secondary school diploma or a higher education degree such as college or university.

The most common occupation is business owner and self-employed, especially among women. Many of those employed in these professions are most likely operating in the informal economy (78% of total Kenyan employment, UNECA, 2015). Unemployment is higher among women. The median income, excluding “does not want to answer” and “does not know”, is situated in the 10,001 - 15,000 KES bracket. The median value for females belongs at the very low end of this bracket, and for men at the upper end, thus suggesting a higher average salary for men.

The average household is composed of 4.71 people (answer “9 or more” was taken as 10, “seven and eight” as 7.5, and “one to two” as 1.5), in line with the average household size of Kenya of 4.4 people (Michael Bauer Research GmbH, 2015). Most of the interviewees live in a household with at least one person under nineteen. The average number of household members under five years old is around 15%, a value in line with the percentage of Kenyan population between 0 and 4 years old, which is about 13% (CIA World Factbook, 2017).

None of the characteristics of the sample was properly controlled, i.e. interviewees were selected randomly. Only for what concerns gender, interviewers were given the instruction to be as much balanced as possible.

Table 12 – Key characteristics of respondents (Consumer survey, percentage of respondents)[30]

		Values per type of consumer						
		Intervention market	**Standard deviation**	**Control market**	**Standard deviation**	**Pioneer POS**	**Standard deviation**	**p-value**
Number of respondents		304		282		47		
Age		N=301		N=276		N=46		0.303
	18-25 years old	39%		39%		24%		
	26-30 years old	22%		18%		20%		
	31-35 years old	11%		16%		17%		
	36-40 years old	10%		9%		15%		
	41-50 years old	12%		9%		9%		
	Over 50 years old	6%		9%		15%		
Age, average years		31	11.24	32	11.54	35	12	
Gender, % men		59%		53%		68%		0.084
Education		N=304		N=282		N=47		0.011
	None	2%		3%		0%		
	Primary	31%		38%		24%		
	Secondary	42%		44%		38%		
	Above	25%		15%		38%		
Occupation		N=304		N=282		N=47		<0.001
	Unemployed	6%		3%		0%		
	Retired	0%		1%		4%		
	Housewife	3%		5%		4%		
	Student	15%		10%		13%		
	Farmer	9%		4%		15%		
	Casual worker	20%		21%		18%		
	Qualified worker	5%		6%		13%		
	Business owner	33%		46%		15%		
	Middle level position	6%		3%		9%		
	Highly qualified position	3%		1%		9%		
Household monthly income		N=270		N=255		N=42		<0.001
	<5,000 KES	18%		23%		0%		
	5,001 - 10,000 KES	23%		26%		5%		
	10,001 - 15,000 KES	17%		18%		17%		
	15,001 - 20,000 KES	16%		13%		28%		
	20,001 - 25,000 KES	11%		6%		10%		
	25,001 - 50,000 KES	11%		11%		21%		
	>50,000 KES	4%		3%		19%		
Household size		4.72		4.74		4.41		
# household members under 19[31]		1.97		1.87		1.60		
# household members under 5[32]		0.75		0.70		0.60		
Has bought tilapia in past 2 weeks, %		64%		51%		96%		<0.001

[30] Excludes “does not want to answer” and “does not know”.

[31] Answer “Nine or more” was computed as 10, “1 to 2” as 1.5, and “Seven to eight” as 7.5.

[32] Answer “Five or more” was computed as 6.

About 11% of consumers interviewed claimed not to like tilapia. They are more frequent among control market respondents (20%) than among intervention market respondents (9%). Everyone likes tilapia among Pioneer consumers.

Among random consumers, those who like tilapia generally have a higher income (57% have a household income above 10,000 KES per month, against 38% for those who do not like it). Other characteristics do not show significant variations according to like / dislike of tilapia.

Table 13 – Key characteristics of random respondents – consumers who prefer eating tilapia (Consumer survey, percentage of respondents)[33]

	Values among random consumers				
	Likes tilapia	Standard deviation	Does not like tilapia	Standard deviation	p-value
Number of random consumers	515		71		
Age, average years	31	14.05	32	13.95	
Gender, % men	55%		62%		0.291
Education	N=515		N=71		0.935
None	3%		3%		
Primary	34%		35%		
Secondary	42%		46%		
Above	21%		16%		
Occupation	N=515		N=71		0.406
Unemployed	4%		7%		
Retired	1%		0%		
Housewife	3%		7%		
Student	12%		13%		
Farmer	7%		8%		
Casual worker	19%		25%		
Qualified worker	5%		7%		
Business owner	40%		30%		
Middle level position	5%		3%		
Highly qualified position	2%		0%		
Household monthly income	N=467		N=58		0.030
<5,000 KES	19%		33%		
5,001 - 10,000 KES	24%		29%		
10,001 - 15,000 KES	18%		9%		
15,001 - 20,000 KES	15%		7%		
20,001 - 25,000 KES	9%		5%		
25,001 - 50,000 KES	10%		16%		
>50,000 KES	4%		2%		
Intervention vs control consumers, % of intervention	54%		34%		0.001

Poverty analysis

[33] Excludes “does not want to answer” and “does not know”.

According to the Progress out of Poverty Index, the average likelihood for one of the respondents to be living below the poverty line is low, specifically 3%.

According to a second analysis based on their income level and number of household members, many more live below the poverty line: of 567 respondents who provided details about their income, 460 (81%) live under the poverty line of 197 KES a day.

The explanation of both calculations has been covered in the methodology section.

5.2. PIONEER CONSUMERS

KEY TAKEAWAYS

- Pioneer consumers generally come from a higher social background than other consumers in terms of education and revenue;
- They are slightly older than random consumers and present a higher prevalence of male respondents.

As discussed above, the survey highlighted key differences between random consumers and Pioneer consumers. The consumers of Pioneer generally have a higher level of education, they are older, and they have more qualified positions.

This reflects the common belief, among consumers, that tilapia is an exclusive fish, mostly consumed by the higher classes. Pioneer consumers are, by definition, tilapia consumers, since this is the only product they can buy there. Among other consumers, only 58% stated that they had bought tilapia in the past two weeks.

> "*People perceive it [tilapia] as a fish for upper class people. When I eat tilapia, I also feel like someone from the upper class*."
>
> **Rose Atieno, Focus Group Discussion held at Pioneer shop**
>
> Rose, 24, is a casual worker and mother of three children who lives in Chulaimbo. She has a personal monthly income of 10,000 KES.

Age

The trend suggests that Pioneer consumers are, on average, slightly older. The average age for Pioneer consumers is 35 years old, whereas it is 31 for random consumers. 15% of Pioneer consumers belong to the oldest age group (over 50). For non MNF consumers, this group represents 7%.

Gender

In terms of gender, the concentration of men is higher among Pioneer consumers. Male respondents represent 68% of Pioneer consumers, but 56% of intervention and control market consumers.

> "*Most of the consumers are men, especially the old ones: 70% are male while 30% are women, because most of the men are working, while women are unemployed*."
>
> **Mary Ndonj, Vendor, Pioneer shop (Ethnographic interview)**
>
> Mary, 20, works at the Pioneer shop in Lela

Education

All Pioneer consumers have completed primary school and are, on the whole, slightly more educated than the random consumers. 38% of Pioneer consumers have a higher education degree (college, university or similar), compared to only 19% of random consumers. Furthermore, 77% of Pioneer consumers have at least a secondary school diploma compared to 63% of random consumers.

Occupation

All Pioneer consumers are employed. Furthermore, they are more likely to occupy a highly qualified professional position, or a middle level one. Business owners (who tend to be on the lower income scale) represent 39% of random consumers but only 15% of Pioneer consumers.

Household monthly income

Pioneer consumers generally have a better household income. None of them is in the income bracket “below 5,000 KES”. On the other hand, almost one out of five has a monthly household income of “over 50,000 KES”, vs. only one out of 25 random consumers. This is in line with the trend highlighted so far.

Poverty analysis

The analysis based on income level and number of household members of respondents highlights a higher percentage of respondents living under the poverty line among random consumers (83%) than among Pioneer consumers (55%).

5.3. CONSUMER PURCHASING & CONSUMPTION HABITS

KEY TAKEAWAYS

- Tilapia is consumers’ preferred type of fish. However, there are issues with scarcity of wild tilapia (from Lake Victoria);
- Fish is more expensive during the dry season. Half of the consumers therefore eat less fish during that season. Harvests of cage fish do not depend on season. Cage farming can therefore ensure a regular supply at constant prices throughout the year;
- The proximity of the market is the main reason mentioned by consumers to choose one market rather than another to buy fish. The development of local point of sales in different places close to people is therefore an important way of reaching consumers;
- Fried is the overall preferred way of buying fish for random consumers. Among Pioneer consumers though, buying fresh fish is far more popular;
- Price, freshness and cleanliness/appearance of the fish are the most important reasons mentioned by respondents for buying fish. Chinese fish and pond fish are generally not considered fresh fish and consumers try to avoid them.

Consumers like fish and buy it often. 94% of the respondents claim to buy fish at least once a week during the rainy season, and during the dry season – when fish is less available and more expensive – 67% of them still buy it at least once a week and 31% at least once a month.

Focus Box 2 – Origins of fish sold in Kenya (2015)[34]

Lake Victoria annual catches	111,900 Tons
National aquaculture production	20,000 Tons
Other national sources of production	52,000 Tons
Imports from China	10,000 Tons
Other imports	9,000 Tons

Table 14 – Average prices (KES/kg) of fish, chicken & eggs (Market observations)[35]

Chicken	Eggs[36]	Tilapia (300g)	Kadogos	Chinese fish (300g)	Mgongo wazi	Omena
850	190	650	550	500	350	150

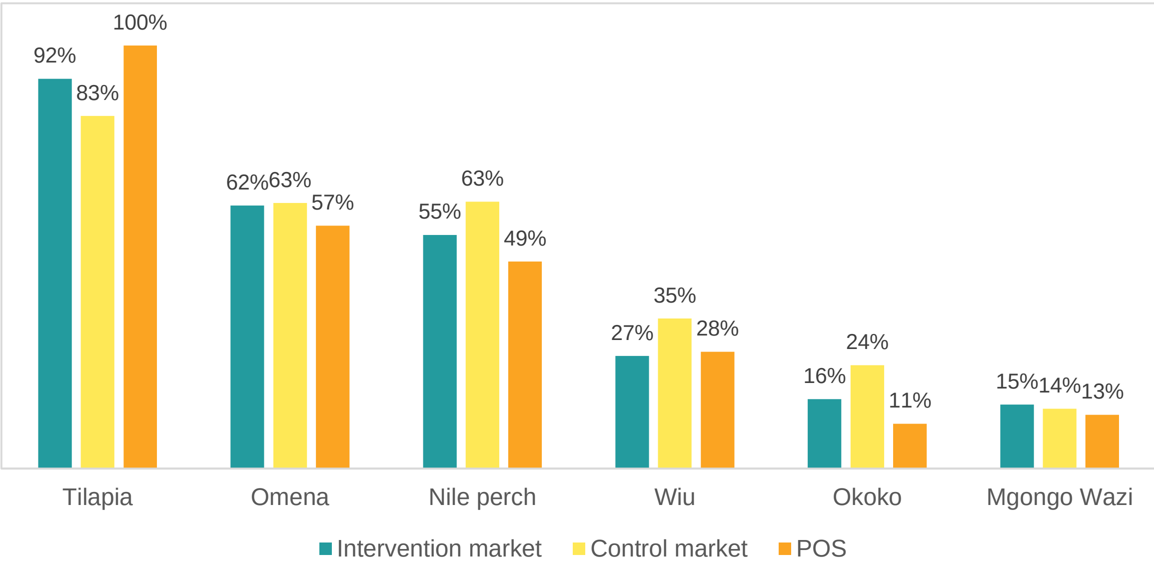
[34] Sources: World Bank data (2015) & Resourcetrade.earth.

[35] These prices were mainly calculated based on market observations.

[36] 1 kg containing 18 eggs was used as a reference for the calculation.

Figure 22 – What types of fish do you prefer to eat? (Consumer survey, percentage of answers)[37]

N (intervention market) = 304; N (control market) = 282; N (POS) = 47



Tilapia is by far the preferred fish of all respondents. Consumers generally prefer fish from the Lake and avoid Chinese fish.

"*I like Tilapia because of its high protein content.*"

Rose Atieno, Focus Group Discussion held at Pioneer shop

Rose Atieno is a 24-years-old mother of three children. She lives in Chulaimbo. She eats tilapia once a week: if it is fried, she makes a soup and if it is fresh, she boils it with onions and salt. She claims that people perceive tilapia as a fish for upper class. She likes eating tilapia because she then feels like someone from the upper class.

"*Chinese fish is thorny and not as tasty as our tilapia.*"

Margaret Owira, Focus Group Discussion held at Pioneer shop

Margaret Owira is a 53-years-old mother of four children. She lives in Lela. Her family's diet is mostly based on local vegetables (kienyeji) but they sometimes eat fish. They mostly eat tilapia (either boiled or deep fried) and omena (deep fried with soup). She also likes Nile perch and local fish from Lake Victoria but can hardly get them.

"*Chinese fish has no taste.*"

Mercy Achieng, Focus Group Discussion held at Peacock Resort

Mercy Achieng is a 30-years-old mother of five children. She lives in Maseno. She likes tilapia and eats it three times a week. She buys fried tilapia and then makes stew. Each time, she buys one big fish that she shares with her husband and small pieces for her children. Price and freshness are the most important factors for her when buying fish. She therefore avoids Chinese fish.

[37] Multiple answers were allowed. Details available in appendix.

While Chinese fish has become increasingly available on markets, wild tilapia has become rarer. Over-fishing and fishing of very small tilapia (smaller than kadogos), which are trapped in the fishing nets but not released by the fishermen, have been affecting the ecological balance of Lake Victoria.

The very small tilapia sold on the markets do not have the same nutritious value as kadogos or full-size tilapia. It is either important to further control wild fishing to avoid the catch of very small tilapia or to change people's mentality in terms of consumption habits so that they avoid buying very small tilapia and favor kadogos instead.

5.3.1. DIFFERENCES IN CONSUMPTION ACCORDING TO SEASONS

Fish in general is more expensive during the dry season, typically in January and February and between July and October. Differences in prices of tilapia between the dry and rainy seasons were tested in the quantitative survey:

Table 15 – Reported tilapia prices in rainy and dry season (Consumer survey, average price per piece)[38]

		Intervention market	Control market
Less than 250g		N=46	N=21
	Average price (KES/piece) in rainy season	101	100
	Standard deviation (rainy season)	68	67
	Average price (KES/piece) in dry season	127	126
	Standard deviation (dry season)	69	87
Between 250g and 350g		N=74	N=43
	Average price (KES/piece) in rainy season	190	172
	Standard deviation (rainy season)	92	77
	Average price (KES/piece) in dry season	227	209
	Standard deviation (dry season)	124	97
Between 350g and 450g		N=52	N=43
	Average price (KES/piece) in rainy season	256	252
	Standard deviation (rainy season)	129	86
	Average price (KES/piece) in dry season	301	336
	Standard deviation (dry season)	164	123
Between 450g and 550g		N=14	N=25
	Average price (KES/piece) in rainy season	338	295
	Standard deviation (rainy season)	178	117
	Average price (KES/piece) in dry season	350	384
	Standard deviation (dry season)	229	160
More than 550g		N=10	N=11
	Average price (KES/piece) in rainy season	465	441
	Standard deviation (rainy season)	101	138
	Average price (KES/piece) in dry season	536	564
	Standard deviation (dry season)	254	158

Perceived tilapia prices increase by an average of 16% between the rainy and dry seasons in intervention markets and by an average of 25% between the rainy and dry seasons in control markets. Resultantly, 43% of respondents in intervention markets and 56% of respondents in control

[38] These prices come from the respondents' answer to the question: "During the dry/rainy season, how much do you usually pay per piece of tilapia?" (quantitative survey).

markets eat less fish in the dry season than in the rainy season. Detailed results for differences in consumption according to markets are available in the appendix.

"*During the rainy season, the price of fish is low and I buy more fish - like four times a week - while in the dry season the price of fish is high and I buy fish twice or even once a week.*"

Beatrice Adoyo, Focus Group discussion held at Peacock resort (Chulaimbo)

Beatrice Adoyo is a 29-years-old mother of five children. She lives in Lela. She is a business lady selling vegetables and omena. She likes fish and eats mostly tilapia and omena. She tends to buy the bigger sizes of tilapia so that she can divide them easily. She takes two, one worth 250 KES to share with her husband and one worth 300 KES to divide among her children. Her family's fish consumption clearly depends on the season.

"*In the rainy season, I buy a lot of fish because the prices are low while in the dry season I buy less fish due to high prices.*"

Dorothy Ogonda, Focus Group discussion held at Peacock resort (Chulaimbo)

Dorothy Ogonda is a 62 years-old mother of six children. She lives in Rabuor. She eats fish at least twice a week (tilapia and omena). She used to buy fried tilapia at the market but she now buys fresh fish at Okello's shop because she knows how it is prepared and the price is affordable. She buys one piece per member of her family. Her consumption also depends on the season.

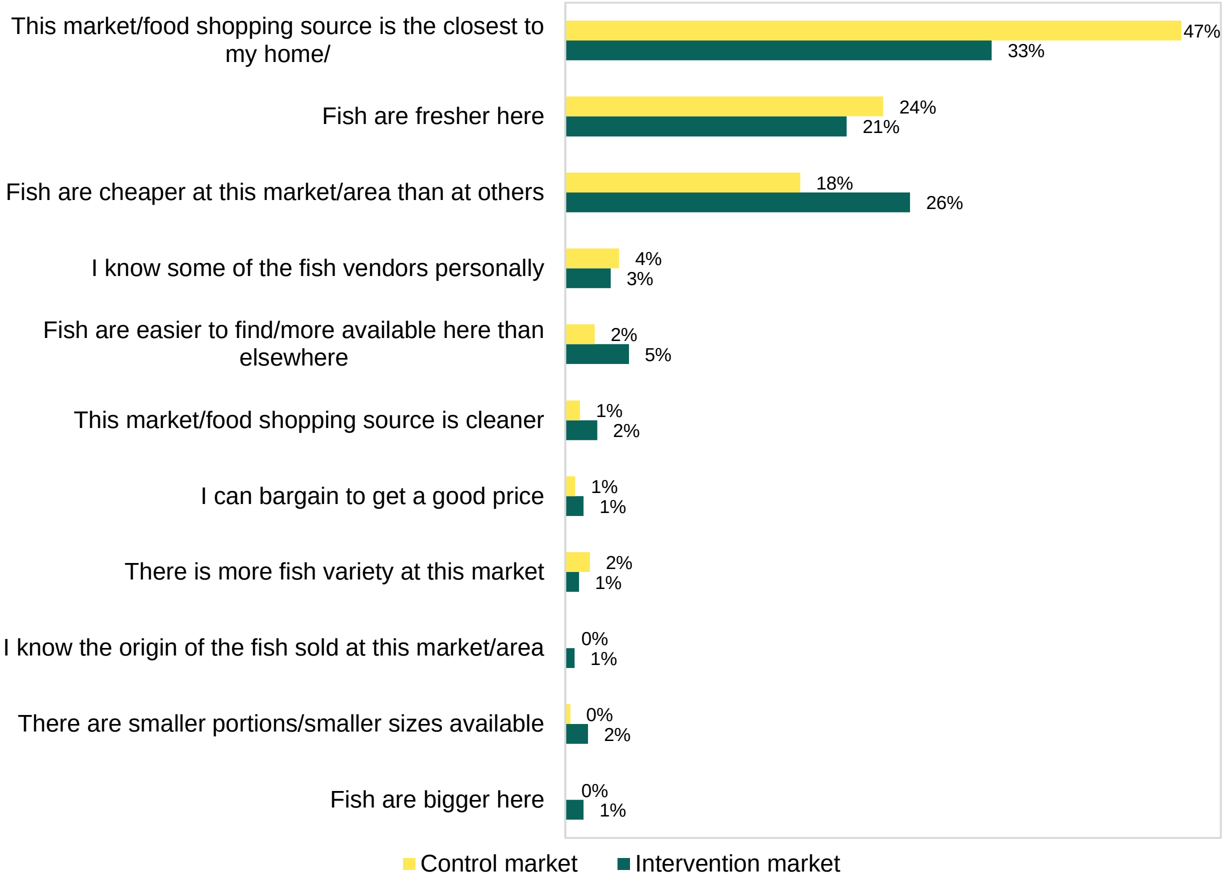
One benefit of cage farming is to ensure a regular supply at a constant price as the harvests do not depend on the season.

5.3.2. REASONS TO CHOOSE ONE MARKET RATHER THAN ANOTHER

More than a third of the respondents (33% in intervention markets and 47% in control markets) mentions the proximity of the market as the most important reason for them to choose one market rather than another to buy fish. People take an average of 18 minutes to go to the market and 71% of the respondents walk to the market.

Figure 23 – What is the most important reason for you to choose this specific market/area rather than another to buy fish? (Consumer survey, percentage of respondents)[39]

N (intervention market) = 282; N (control market) = 268



[39] This question was asked to all the random consumers buying fish. The answers do not take into account answers "Other" and those with less than 1% of respondents. Single answer question. Details are available in appendix.

"*Daraja Mbili is walking distance, so most of the time I buy my food there.*"

Mercyline Akinyi, Ethnographic interview held in Chulaimbo

Mercyline Akinyi is a 32-years-old mother of four children. She lives in Chulaimbo. She sells vegetables and tomatoes at the local market. She buys tilapia and beef once a week in small quantities, just enough for the day. She also buys wiu once a week and omena three times a week. She usually goes to Daraja Mbili market on Tuesdays and Fridays. She gets there in 25 minutes by foot.

Mercyline's local market, Daraja Mbili

Mercyline buying tomatoes in Daraja Mbili

"*I buy my products like rice, beans and maize flour at Riat market because it's close to my home and the quality is good.*"

Lucy Anyango, Ethnographic interview held in Otonglo

Lucy is a 32 years-old mother of two children. She lives in Riat-Otonglo. She buys some products at Riat market and others like fish, milk and mandazi at Otonglo market (because they are better in terms of freshness and taste). Both markets are located close to where Lucy lives, in the suburbs of Kisumu. She buys some food weekly, like sugar, maize flour and rice, other daily like milk, bread, *mandazi*, *chapatti* and vegetables and others every 3 days like tomatoes and onions. Otonglo market is a 10 minutes' walk from her home.

Price and freshness are also important reasons for people when choosing a market to buy fish.

5.3.3. MOST IMPORTANT FACTORS CONSIDERED WHEN BUYING FISH

Price, freshness and cleanliness/appearance of the fish are the top reasons mentioned by respondents for buying fish. Most of the consumers agree that Chinese and pond fish are not fresh and those who are able to recognize them tend to avoid them. They will therefore tend to choose among the cheapest vendors those that they can trust and who receive supplies of fresh fish (vendors sometimes mix fresh fish with spoilt or Chinese fish).

Table 16 – What are the most important reasons for you when buying fish? (Consumer survey, percentage of respondents) [40]

	Intervention market			Control market			POS		
	First ranked	Second ranked	Third ranked	First ranked	Second ranked	Third ranked	First ranked	Second ranked	Third ranked
Number of respondents	303	286	229	281	260	206	47	45	37
Price	40%	26%	19%	42%	22%	20%	53%	24%	16%
Freshness	31%	31%	24%	33%	35%	15%	32%	44%	11%
Cleanliness/appearance of the fish	8%	10%	19%	7%	16%	26%	2%	0%	19%
Size of the fish: large	7%	12%	6%	7%	10%	8%	4%	13%	5%
Nutritional value/ good for health	6%	5%	9%	6%	6%	10%	0%	7%	3%
Taste	4%	8%	11%	2%	5%	15%	4%	2%	24%
Size of the fish: small	1%	4%	3%	1%	3%	3%	2%	9%	0%
Easy to find/availability	1%	2%	7%	2%	2%	1%	0%	0%	16%
Origin of the product/I know where they come from	1%	2%	2%	1%	1%	2%	2%	0%	5%

"*They [the consumers] really examine the fish to see if it is Chinese fish or pond fish and look at the physical appearance, the shape of the head and the reddish color on the fish.*"

Jane Monica, Vendor at Lela

Jane Monica is a 59-years-old mother of three children. She has been managing her business for six years. She sells her products in Lela market. She sells tilapia, Nile perch (mbuta), kamongo (lungfish) and mumi (catfish). For tilapia, she washes them, dries them and does the frying. For kamongo, mbuta and mumi, she cuts them into pieces before deep frying them. Most of her consumers (she has an average of 30 consumers on a busy day and 20 on a slow day) check the fish's freshness before buying them.

5.3.4. FISH PREPARATION

Most of the fish is consumed in the evening, when families usually gather and have their main meal of the day, which most of the time includes ugali[41] as a staple. During the day, some family members are away for work and some children have lunch at school. For this reason, the busiest time at the market is in the late afternoon.

"*Friday and Wednesday are the busiest days, especially around 4 to 8 pm, because people prefer buying fish for supper.*"

Swaleh Omondi, Vendor, Ethnographic interview, Pioneer Shop

[40] Does not take into account answer "Other". P-value for the first reason ranked = 0,726; p-value for the second reason ranked = 0,114; p-value for the third reason ranked < 0,001.

[41] Dish made of maize flour.

Full-size tilapia is considered an exclusive product, in comparison to others such as wiu, omena, mudfish and Nile perch, which are more affordable. It is seen as a very tasty fish. Its high demand has resulted in overfishing. It has now become scarcer in the lake and consequently in the market. Some consumers prefer fried tilapia because of its convenience (it is easy to cook) and taste, others prefer to buy it fresh, because, they say it is the best way to appreciate the good quality of a fish. Some vendors indeed sell fresh tilapia at first and then tend to fry it when it hasn't sold after a day. Consumers either buy it fried, usually with a little extra-charge on the initial price, or they fry it at home.

"*I prefer fried [tilapia] to fresh because it is sweeter and tastier.*"

Lucy Anyango, Ethnographic interview in Otonglo

Lucy is a 32-years-old mother of two children. She lives in Riat-Otonglo. Her family's favorite food is chicken and fish with ugali or chapatti. She eats fish three times a week. She usually buys tilapia of the medium size. If she has bought fresh tilapia, she will wash it, remove the dirt (intestines) and scales, then she will boil it for a long time and make a stew.

"*I cooked it fresh [Pioneer's tilapia], without deep frying it first, because that is the easiest way to determine the quality of the fish.*"

Milka Ochieng, Focus Group Discussion held at Pioneer shop

Milka Ochieng is a 35-years-old mother of five children (she lives with all of them plus a nephew). She lives in Karateng. She likes tilapia with a small head, wide thorax and slender abdomen. She likes it fresh. She likes to buy it before the vendors put it in the fridge. She then fries it with ingredients like *hoho* (capsicum), onions and tomato.

"*I don't buy the fried ones because I don't know if there are fresh or not.*"

Jacinta Awino, Focus Group Discussion held at Peacock Resort

Jacinta Awino is a 64-years-old mother of seven children. She lives in Karateng. She is a farmer but her products are mainly for her own consumption. She eats tilapia three times a week. She buys it fresh and fries it herself. Buying fresh tilapia allows her to test its freshness (if it spoilt or not). After frying the fish, she re-uses the cooking oil for other purposes.

When consumers have financial constraints but still want to buy fish, they buy one piece and cut it in several parts so that all family members can have some, or they buy the very small tilapia commonly known as fulu. Fulu is illegally fished from the lake before attaining maturity. Tilapia is usually consumed with vegetables such as tomatoes, onions, saga (Kenyan traditional vegetable) or sukuma wiki (kale) and ugali. It can also come with rice or chips. Particularly entrepreneurial vendors sell chips (fries), tomatoes and onions along with the fish as a type of "one stop shop".

Fried fish presents some advantages in terms of preparation. If the tilapia is fresh, the preparation process involves washing the fish and removing the intestines and scales, boiling it and finally making the stew. When it is bought already fried, it can directly be stewed.

Table 17 – How do you prefer to buy your fish? (Consumer survey, percentage of respondents)[42]

	% of consumers in intervention markets (N=304)	% of consumers in control market (N=282)	% of Pioneer consumers (N=47)	p-value
Fresh	51%	50%	91%	<0.001
Fried	76%	75%	49%	<0.001
Sun-dried	13%	10%	2%	0.057
Smoked	8%	7%	0%	0.152

Random consumers overall prefer to buy their fish fried. Among Pioneer consumers though, buying fresh fish is far more popular, with over 91% of preferences, against 49% for fried.

Focus Box 3 – Preparation of fish with Filgona Auma, Lela

"*I like the fresh tilapia from Pioneer, but my family prefers the fried one. When I buy it fresh, sometimes I boil it and then make a stew, some other times I fry it and stew it. I serve it with vegetables and ugali.*"

Filgona Auma, Ethnographic interview in Lela

Filgona used to buy fish from Luanda market, but since she found out about Pioneer in April 2017, she buys her fish at their shop, which is walking distance from her house.

In the picture below, she is cleaning the Pioneer fish she just bought. Afterwards, she soaks it in a salty solution for a few minutes and then leaves it drying in the sun for about an hour. This facilitates the following steps of the cooking process, as it prevents the fish from sticking to the frying pan (which means she can use less cooking oil) and makes it cook faster. After frying the fish for about ten minutes, she stews the fish, which is ready in 30 minutes.

5.3.5. DIFFERENCES IN CONSUMPTION HABITS PER LEVEL OF INCOME

Slightly less low-income consumers seem to buy tilapia: while more than half of the respondents with an average monthly household income of more than 5,000 KES in both intervention and control markets had purchased tilapia in the last two weeks, among the poorer group (less than 5,000 KES per month), 42% in intervention markets and only 34% in control markets had done so. Tilapia, which

[42] Respondents could choose multiple options.

is a much-appreciated fish among all respondents regardless of their level of income[43], may therefore be a luxury product of sorts for low-income consumers.

Table 18 – Have you purchased tilapia in the past two weeks? (Consumer survey, percentage of respondents)

	Intervention market	Control market
Number of respondents	270	255
Less than 5,000 KES	42% (N=48)	34% (N=59)
5,001 – 10,000 KES	65% (N=62)	55% (N=66)
10,001 – 15,000 KES	67% (N=45)	63% (N=46)
15,001 – 20,000 KES	77% (N=43)	58% (N=33)
20,001 – 25,000 KES	61% (N=31)	60% (N=15)
25,001 - 50,000 KES	79% (N=29)	43% (N=28)
More than 50,000 KES	83% (N=12)	88% (N=8)

The level of income, however, appears to have no or limited impact on the difference in fish consumption between the dry and the rainy seasons, the most important reason for choosing which fish to buy (price is not mentioned more among low-income consumers than among more well-off consumers) or the frequency of fish purchase. Detailed results are available in appendix.

5.4. AFFORDABILITY

KEY TAKEAWAYS

- Compared to the average prices given by random consumers, Pioneer fish is less expensive and has a stable price through the seasons;
- Pioneer's lower prices can partially be explained by Pioneer's willingness to limit intermediaries to ensure the lowest possible price to end consumers. While fish sold on local markets generally go through two or three intermediaries, most Pioneer fish is directly sold to end consumers at the outlet in front of the farm;
- Consumers recognize Pioneer's affordability. More than three quarters of POS consumers claim to have increased their fish consumption since they started buying fish from Pioneer thanks to the affordability of Pioneer tilapia.

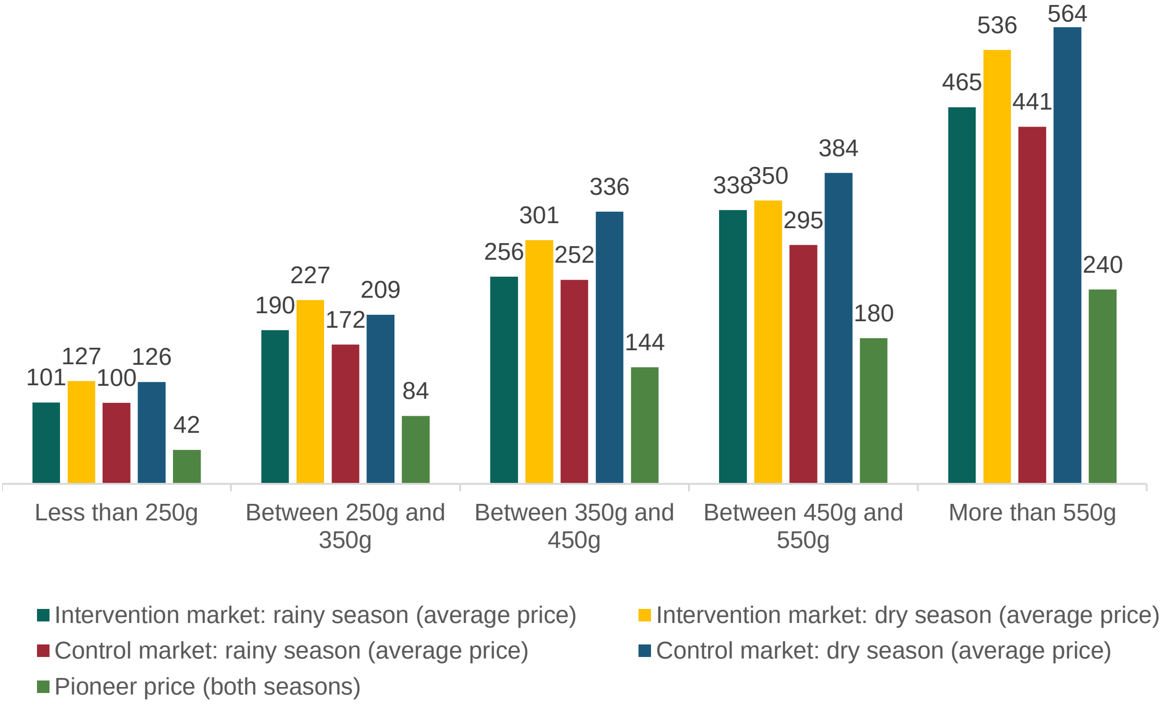
The price of tilapia sold on the market depends mostly on the size of the fish. Vendors and consumers generally compare them to a hand size. Pioneer prices depend on the weight. While some consumers prefer bargaining at the market, others are more comfortable paying a price relative to a precise weighted quantity.

[43] More details available in Appendix.

Figure 24 – Weighting of the fish at Pioneer shop, July 2017

Average prices of the different sizes of tilapia in both dry and rainy seasons have been determined (as of June 2017) thanks to the quantitative survey. Tilapia is more expensive in the dry season. Compared to the average prices given by random consumers, Pioneer fish is less expensive and has a stable price through the seasons. Prices of fish on markets as recalled by consumers are on average 105% more expensive than Pioneer prices in the rainy season and 140% more expensive in the dry season.

Figure 25 – How much do you usually pay per piece of tilapia in the dry and rainy season? (Consumer survey compared to average observed Pioneer price)[44]



While tilapia is more affordable in intervention/control markets as well as at the Pioneer shop in the rainy season, the difference of answers between random and POS consumers grows in the dry season. 32% of consumers in intervention markets and 51% in control markets find tilapia not affordable in the dry season while only 11% of POS consumers find it not affordable.

Table 19 – How affordable is tilapia on this market/area? (Consumer survey, percentage of respondents)[45]

		Intervention market	Control market	POS	p-value
Rainy season	Number of respondents	191	143	26	-
	Affordable	93%	90%	98%	0.001
	Not affordable	7%	10%	2%	
Dry season	Number of respondents	195	143	44	-
	Affordable	68%	49%	89%	<0.001
	Not affordable	32%	51%	11%	

[44] Pioneer prices per piece were calculated by using the following prices and sizes: 150g at 280 KES/kg, 300g at 280 KES/kg, 400g at 360 KES/kg, 500g at 360 KES/kg, 600g at 400 KES/kg. Average prices for tilapia in the dry and rainy seasons come from the respondents' answers do the question: "in the dry/rainy season, how much do you pay per piece of tilapia?".

[45] This table excludes the "Does not know" answer.

While more than two thirds of consumers in intervention (67%) and control (71%) markets consider that tilapia prices have increased since the same time last year, only one fourth (25%) of POS consumers have noticed this change.

Table 20 – Perceived evolution of tilapia retail prices (Consumer survey, percentage of respondents)[46]

		Intervention market (N=195)	Control market (N=142)	POS (N=44)	p-value
Thinking about the same time last year, how have the prices of Tilapia evolved on this market/area?	Increased	67%	71%	25%	<0.001
	Stayed the same	20%	11%	50%	
	Decreased	13%	18%	25%	

Pioneer's lower prices can partly be explained by Pioneer's decision to limit the number of intermediaries. While Pioneer fish is transported from the cages to the outlet and directly sold to end consumers, wild tilapia generally goes through two to three intermediaries before reaching end consumers. Retailers that sell fish to end consumers either buy it from wholesalers – who operate in Kisumu's fresh fish market or who sometimes deliver to local markets – or from middlemen dealing with the fishermen at the lake.

Figure 26 – Chain of intermediaries for a 400g piece of non-Pioneer tilapia, June 2017[47]

[46] Excludes "does not know".

[47] Source: Value Chain interviews.

Focus Box 4 – Insights from Martha, a vendor of fresh and fried tilapia[48]

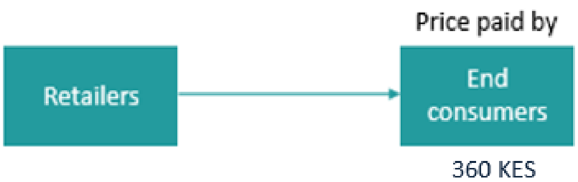
Martha Achieng Onyimbo is a 42-year-old mother of two children. She has been selling tilapia, Nile perch, mudfish, omena, potato chips/fries, tomatoes and onions since 2002.

Figure 27 – Martha's stand at Chulaimbo Market

She buys fish from middlemen directly at the lake (the middlemen are the ones buying fish from the fishermen). She buys the medium size tilapia at 100 KES each, the small ones cost her between 70 and 80 KES each and the very small between 15 and 25 KES. She then sells the medium size at 150 KES a piece fresh (200 cooked), the small size for 100 KES each fresh (150 cooked), and the very small at three pieces for 100 KES fresh (50 per piece cooked). Her selling prices has to factor in her transportation costs, the cooking material and her eventual loss of stocks (because of the fish spoiling on the way from the lake).

She generally goes to the lake once a week. It costs her 600 KES return for the matatu (a minibus), 50 KES for the *Boda boda* (motorcycle taxi), and 50 KES as a levy (for people who get fish from the lake) and it takes her three hours and a half. The other days of the week, she communicates by phone with the middlemen and they send her stock. It costs her 300 KES, regardless of the quantity. Even if the supply is less expensive, she has to go every week to the lake to renegotiate the prices. Otherwise, the middlemen send the stock at higher prices.

Figure 28 – Chain of intermediaries for a 400g piece of Pioneer tilapia, June 2017



Not dealing with intermediaries allows Pioneer to offer a lower price to its end consumers.

[48] Source: Key informant interview with Martha, June 2017.

"*The fish I used to buy at 500 KES I now get for 380 KES and it will still be enough for my family. It has reduced my expenditure.*"

Milka Ochieng, Focus Group Discussion held at Pioneer shop

Milka Ochieng is a 35-years-old mother of five children (she lives with all of them plus a nephew). She lives in Karateng. She buys her tilapia from Pioneer. She heard about the Pioneer farm through some of her consumers (she has a food kiosk). These consumers bought about 7 big pieces of Pioneer tilapia and asked her to fry them. While she was preparing the fish (removing the scales and frying it), she saw Pioneer's receipt with prices and weight. Her clients offered her a piece of the fried fish and she was very impressed with the taste. This made her want to try Pioneer herself. She came the following day and bought the four small-size pieces at 400 KES. She cooked it fresh, without deep frying it first, because she says that is the easiest way to determine the quality of fish. In addition, she heard Pioneer's owner's marketing on the radio. It really increased her interest. Since she started buying fish from Pioneer (in April 2017), her fish expenditure has decreased.

About three quarters (73%) of POS consumers claim to have increased their fish consumption since they started buying fish from Pioneer thanks to the affordability of Pioneer tilapia (vs. 45% of random consumers). Only 9% of POS consumers have decreased their fish consumption vs. almost one third (31%) of consumers in intervention and control markets).

Table 21 – Evolution of tilapia consumption per type of respondent (Consumer survey, percentage of respondents)[49]

		Intervention market (N= 193)	Control market (N=141)	POS (N=45)	p-value
Thinking about the same time last year, how has your consumption of tilapia evolved?	Increased[50]	46%	46%	73%	<0.001
	Stayed the same	23%	23%	18%	
	Decreased[51]	31%	31%	9%	

"*I have increased my fish consumption. I now buy 4 to 5 pieces. I used to buy only 2 pieces.*"

Lilian Awuor, Focus Group Discussion held at Pioneer shop

Lilian Awuor is a 39-years-old mother of nine children. She lives in Karateng. She likes fresh tilapia and buys it from Pioneer shop because she finds it tasty. She also appreciates the vendor's consumer relations and the proximity of the shop to her home. Thanks to Pioneer's affordability, she has been increasing her fish consumption.

"*I eat a lot of fish nowadays because I know the prices are affordable. I used to buy Tilapia maybe once or twice a week but now I buy it 3 times a week.*"

Dorothy Ogonda, Focus Group Discussion held at Peacock Resort

Dorothy is a 62-years-old mother of six children. She lives in Rabuor and started buying tilapia at Pioneer when they started selling last year. Thanks to their low prices, she now buys more fish.

[49] Question asked to tilapia consumers only, excludes "do not know".

[50] The percentage here includes both 'Dramatically increased' and 'Increased' answers.

[51] The percentage here includes both 'Dramatically decreased' and 'Decreased' answers.

Focus Box 5 – Change in Filgona's diet since she started buying fish from Pioneer (ethnographic interview)

Filgona explains how, thanks to Pioneer, she is now consuming tilapia more often than before. Early in 2017, she was paying up to 250-300 KES for kadogo, while she can now get the same amount for 150-200 KES at Pioneer. She also notes that there has been a general improvement in the availability and quality of fish on the market. Fish tends to be more available than last year because there are more suppliers. The overall quality has also increased because there is more competition between vendors and they try to offer more fresh fish, which requires the product to be in good conditions.

For Filgona, Pioneer represents a benefit from several points of view: affordability, good customer service (they replace the fish in case of complaint, they can fry it on request) and an ideal location. Before the introduction of Pioneer, she used to buy fish only on special occasions and she often had to go to Luanda market (8km away) to get it, whereas now she buys it once a week because it is more affordable and the shop is walking distance from her home.

Figure 29 – Filgona buying fish at Pioneer shop

"*My diet has changed: last year I used to buy fish mostly on special occasions but now I eat fish once a week because they are more affordable compared to last year. Right now, I don't have to go to Luanda to get fish."*

5.5. AVAILABILITY AND EASE OF ACCESS

KEY TAKEAWAYS

- Compared to wild fish, the availability of which decreases in the dry season, cage fish is constantly available as the harvests do not depend on the seasons;
- In the past year, consumers have perceived an increase in the availability of tilapia. This can partially be explained by the increasing quantity of imported Chinese fish and by the delivery of commercially viable quantities of cage fish (cage fish is quite a new product, and large quantities have started to appear on local markets at the end of 2016 and beginning of 2017).

5.5.1. VARIATION IN AVAILABILITY OF FISH DEPENDING ON SEASONS

One major advantage of cage fish is its regular supply as the harvests do not depend on the seasons. This advantage is not valid for pond fish as pond farmers need to drain the water to catch the fish: they must therefore harvest all their fish at once.

Focus Box 6 – Perceived advantages of cage fish

"*We like lake fish because of the taste, but cage fish is more popular because you are sure you will find it.*"

Sylvia Abonyo, Focus Group Discussion held at Pioneer shop

Sylvia Abonyo is a 70-years-old mother of five children. She lives with six grandchildren in Kisiani. She likes fish because she used to live on Lake Victoria. Her children mostly eat omena and other types of fish. She generally buys the medium size tilapia that she can cut in two. She buys it fresh and cooks it with tomatoes. While Chinese fish is most available nowadays, she does not like it because she does not know where it comes from. She prefers lake fish but sometimes get frustrated because she will waste time looking for it. Cage fish can therefore be a good alternative for her.

"*I prefer cage fish because I cannot find lake fish easily.*"

Lilian Awuor, Focus Group Discussion held at Pioneer shop

Lilian Awuor is a 39-years-old mother of nine children. She lives in Karateng. She buys tilapia from Pioneer shop. She finds lake fish tastier than pond fish. Pond fish is black while lake fish is reddish with big scales.

"*I like cage fish because it is easy to get.*"

Benea Odhiambo, Focus Group Discussion held at Pioneer shop

Benea Odhiambo is a 30-years-old father of two children. He lives in Lela. According to him, to find lake fish, you need to have a connection with a friend or fisherman. Doctors recommend fresh fish compared to fried fish because it is more nutritious so there is more demand for fresh fish. He buys cage fish because it is fresh and he can get it easily at Pioneer.

While tilapia is available in all types of markets (intervention, control and POS) during the rainy season (more than 90% of the respondents consider that tilapia is available then), responses diverge more for the dry season: availability remains high for POS consumers (84%) but is much lower for control market consumers (54%). The perception of availability in control markets decreases by 42% between the rainy and the dry season (94% to 54%), by 27% in intervention market (94% to 70%) and only by 16% in POS (100% to 84%). This represents an average decrease of 34% for both intervention and control markets. The lower decrease of availability in intervention markets might be explained by the proximity of the Pioneer shop and the availability of fish at all times of the day. Some vendors are known to sometimes go to Pioneer when they are in a hurry or when they do not have enough stock.

Table 22 – How available is tilapia on this market? (Consumer survey, percentage of respondents)[52]

		Intervention market	Control market	POS	p-value
Rainy Season	Number of respondents	194	143	44	-
	Available	96%	94%	100%	0.006
	Not available	4%	6%	0%	
Dry season	Number of respondents	196	143	44	-
	Available	70%	54%	84%	<0.001
	Not available	30%	46%	16%	

"*Pioneer is close to my shop and I only take a few minutes to go and come back. Sometimes I can rush even at 12 pm and come back. One can get fish at any convenient time: morning, afternoon and even evening.*"

Jane Monica, Vendor in Lela

Jane Monica is a 59-years-old mother of three children. She has been selling fish in Lela market for 6 years. She used to sell Pioneer fish. She finds it very convenient and even if she does not sell it on a regular basis anymore, she sometimes buys it.

5.5.2. PERCEPTIONS OF INCREASE IN AVAILABILITY

73% of the intervention markets' consumers and 65% of the control markets' consumers think that availability of tilapia has increased on their market while the large majority of POS consumers also noticed an increase (96%). This increase in availability for both intervention and control markets' consumers might be explained by the diversification of fish sources. Cage fish and Chinese fish have indeed become more largely available this year:

- Chinese fish imports have been increasing significantly since 2013 (2,200 T in 2013, 7,100 T in 2014 and 10,300 T in 2015) and they now represent 54% of the fish Kenya imports[53];
- Cage fish being a quite new product, commercially viable quantity of fish only arrived on the market in late 2016/at the beginning of 2017. The impact of cage farming therefore starts to become visible on the market. Pioneer is contributing to this impact as a medium scale cage fish producer in the Kisumu area.

[52] Question asked to tilapia consumers only, excludes "do not know".

[53] Source: Resourcetrade.earth: https://resourcetrade.earth/data?year=2015&importer=404&category=63&units=weight.

Table 23 – Perceived increase in tilapia availability (Consumer survey, percentage of respondents)[54]

		Intervention market (N=195)	Control market (N=136)	POS (N=45)	p-value
To what extent do you agree with the following statement? Availability of tilapia on this market/area has increased compared to the same time last year.	Agree	73%	65%	96%	0.001
	Disagree	27%	35%	4%	

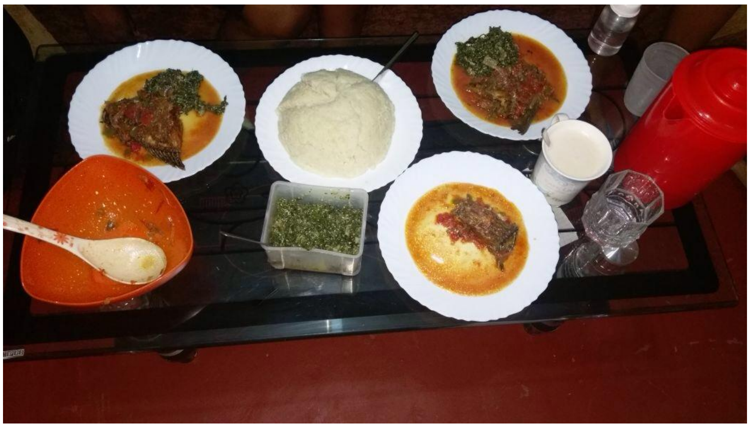
5.6. DESIRABILITY

KEY TAKEAWAYS

- As one of the preferred types of fish of respondents, tilapia is a desirable product. Kadogos are desirable for lower income people because they are less expensive;
- Price and freshness are very important criteria for Pioneer consumers for choosing fish. Most consumers appreciate the cleanliness/freshness of Pioneer fish, the availability of different sizes, the cleanliness of the shop and the good customer service. Two thirds of POS consumers do not report any source of dissatisfaction.

Most people like fish, local vegetables such as kale and ugali. They drink mostly tea.

Figure 30 – Common meal in Kisumu county



On the picture, one piece of tilapia is split in three smaller cuts (one per plate). It is served with local vegetables and ugali (in the plate in the middle of the picture).

As one of the preferred types of fish of respondents, tilapia is a desirable product and kadogos even more so. For both random and POS consumers, more than half of the respondents prefer buying pieces of less than 350g. Demand for large fish is low as most people think in terms of pieces: for instance, with 600 KES, they prefer buying 6 small fishes rather than 2 pieces of a large fish.

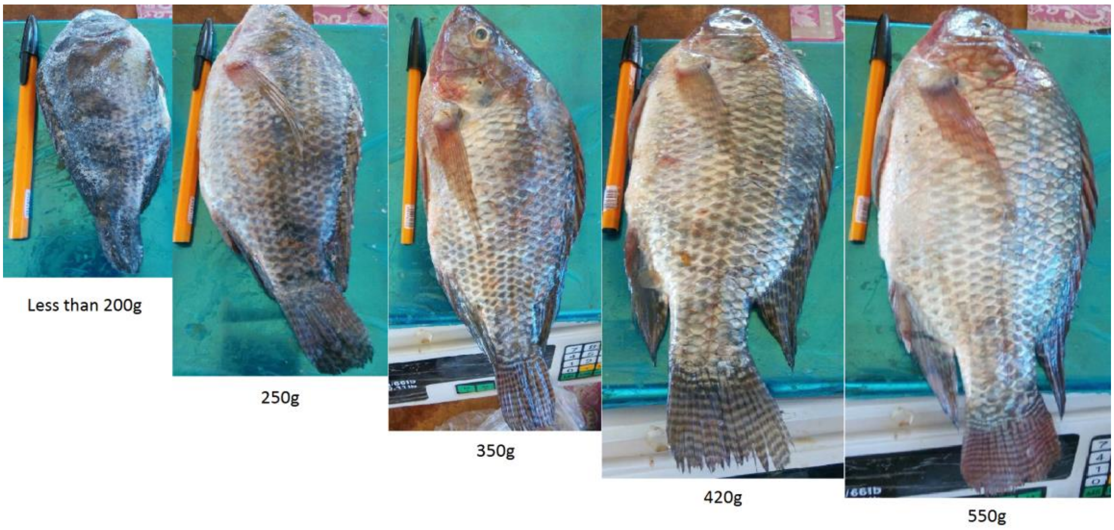
Table 24 – Preferred sizes of fish (Consumer survey, percentage of respondents)

	Intervention	Control	POS	p-value

[54] Question asked to tilapia consumers only, excludes "does not know".

		market (N=196)	market (N=143)	(N=45)	
What size of tilapia do you generally buy?	Pieces of less than 250g per fish	24%	15%	0%	<0.001
	Pieces between 250g and 350g per fish	38%	30%	56%	
	Pieces between 350g and 450g per fish	26%	30%	29%	
	Pieces between 450g and 550g per fish	7%	17%	16%	
	Pieces of more than 550g per fish	5%	8%	0%	

Figure 31 – Different sizes of Pioneer fish



Around one fourth of respondents having a monthly income below 15,000 KES prefer buying smaller kadogos (less than 250g) while 16% or less of respondents above 15,000 KES prefer buying this size.

The Kendall's correlation coefficient between the monthly income and the size of tilapia generally bought by consumers is 0,065 and the Spearman's correlation coefficient between these two variables is 0,079. The correlation of these variables is therefore very low. The p-value for these variables is 0,111. This small correlation is therefore not significant.

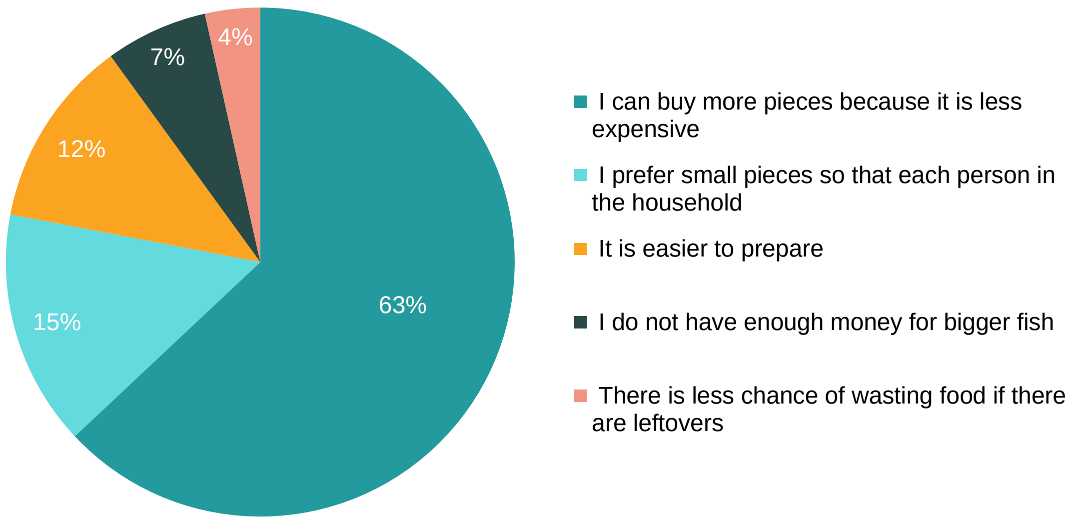
Table 25 – Preferred sizes of fish per income (Consumer survey, percentage of respondents)

	Less than 5,000 KES	5,0001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 – 50,000 KES	More than 50,000 KES
Number of respondents	107	130	98	88	50	66	28
Pieces of less than 250g per fish	25%	24%	23%	13%	16%	9%	0%
Pieces between 250g and 350g per fish	23%	31%	45%	42%	41%	32%	42%
Pieces between 350g and 450g per fish	35%	26%	17%	27%	31%	39%	33%
Pieces between 450g and 550g per fish	17%	10%	14%	9%	12%	16%	17%
Pieces of more than 550g per fish	0%	9%	1%	9%	0%	4%	8%

Around two thirds of the respondents (63%) buy kadogos because they are less expensive. Lower income consumers like them because they are a size they can afford with their income (4%). The second invoked reason is the fact that kadogos are enough for one person and people therefore prefer buying them so that each person in the household has his or her own fish (15%).

Figure 32 – Why do you prefer buying kadogos? (Consumer survey, percentage of consumers who buy kadogos)[55]

N (consumers that prefer buying kadogos, excluding answer "other") = 200



Focus Box 7 – Reasons for which people prefer buying kadogos (focus group discussions)

"*It's enough for everyone to have one piece.*"

Truphosa Okore, Focus Group Discussion held at Peacock Resort

Truphosa Okore is a 49 years-old widow with nine children. She lives in Eluobe. She likes tilapia and prefer lake and cage fish compared to pond fish. While pond fish shows bones when fried (because of its thin layer of flesh), cage and lake fish do not.

"*I like kadogos because that is the size I can afford due to my low income.*"

Rose Atieno, Focus Group Discussion held at Pioneer shop

Rose Atieno is a 24 years-old mother of three children. She lives in Chulaimbo. She likes buying tilapia. The size of tilapia she buys depends on her income. If she gets the ones costing 75 KES or 80 KES each, she will buy two pieces. If she gets the 120 KES sizes, she will take one piece. Her low income is the main reason why she buys the smaller sizes (so that she is able to share with her family). If she had enough income, she would buy bigger sizes.

"*It's easy to prepare, remove scales and it's sweet.*"

Dorothy Ogonda, Focus Group Discussion held at Peacock Resort

Dorothy Ogonda is a 62 years-old mother of six children (only 5 people are at home at the moment). She lives in Rabuor. She likes buying kadogos because one is enough for each of her children.

[55] Details available in appendix.

11% of the respondents like kadogos because they consider them easier to prepare (it is easier to remove the scales and the cooking is faster). Some mothers, however, do not like them because they say the bones are more dangerous for the children.

"*I do not like kadogos because they have a lot of bones when cooked fresh, hence they are not friendly for small children. Only adults can manage to eat fish with bones.*"

Sylvia Abonyo, Focus Group Discussion held at Pioneer shop

Sylvia Abonyo is a 70 years-old mother of five children. She lives with six grandchildren. She lives in Kisiani. She likes buying tilapia because it has few bones and even children like it (but this is not the case for kadogos so she prefers avoiding them).

5.7. AWARENESS AND IMAGE OF PIONEER

When they are aware of Pioneer, some people do not understand the origin of the fish sold at the farm. Some of them think that Pioneer tilapia is pond fish (which is not very popular in the area). This wrong image might be explained by the fact that before selling cage fish, Okello used to grow kadogos in ponds near his house and in the farm's greenhouses.

"After eating [Pioneer fish] I found out that they were tasty so I started buying there on a regular basis."

Phenny Atieno, Ethnographic interview held at Lela

Phenny Atieno is a 26 years-old mother of three children. She lives in Mbala Wandu. She buys tilapia, omena and mbuta. For tilapia, she buys the medium size, around 4-5 pieces. She buys tilapia from Pioneer once a week because she feels sure about the freshness of their fish. She started buying from Pioneer in April 2017 because she had some visitors who told her about Pioneer. Before, she used to buy tilapia in Lela and Daraja Mbili. She particularly values the freshness of Pioneer fish, the affordable prices, the good customer relations, and the fact that there are no delays when they are serving you, everything is done faster and their fish has good

Focus Box 8 – Perception of Pioneer fish

"Their fish has not been marketed well. Many people still think Pioneer fish is pond fish."

Milka Ochieng, Focus Group Discussion held at Pioneer shop

Milka Ochieng is a 35 years-old mother of five children (she lives with all of them plus a nephew). She lives in Karateng. She buys tilapia from Pioneer and sometimes from Busia market. She likes buying it from Pioneer farm because it is close from her home, they have pocket-friendly prices and because the taste is close to lake fish.

"Pond fish is muddy and, when you cook it, it has a muddy taste."

Celine Ochieng, Focus Group Discussion held at Pioneer shop

Celine Ochieng is a 35 years-old mother of five children. She lives in Karateng. She likes tilapia and buys it from Pioneer farm. To prepare it, she dries and deep fries it. She buys Pioneer fish because of the taste, the cleanliness, the good customer care and competitive prices they offer. She learned about Pioneer fish when she went to do casual work at Okello's home. His mother gave her a piece of fish to try. She prepared it and found it tasty. She then decided to come regularly to the farm to buy fish.

"People think that they [Pioneer fish] are from a pond but I always explain to them that they are not. Those who have tasted them say that they are sweet and good."

Jane Monica, vendor in Lela

Jane Monica is a 59 years-old mother of three children. She has been selling fish in Lela market for 6 years. She used to sell Pioneer tilapia (she stopped because it was difficult for her to make a profit after washing it, removing scales and frying it). Her consumers liked its good taste.

Figure 33 – Fish pond near Lela

When tasting Pioneer fish, consumers are generally happy and tend to come back.

Focus Box 9 – Insights from a non-Pioneer consumer (ethnographic interview)

Helen Adhiambo is a 28 years old gardener and maid. She lives with her husband and their two sons close to Lela. She buys fish every two days, mostly tilapia and *omena*, but she doesn't consume Pioneer products. She is very loyal to her vendors, because she knows she can trust the quality and convenience of the products they offer. For these reasons, she prefers to stick to them rather than to experiment with new ones. In general, trustworthiness and customer relations seem to be strong drivers for consumers when choosing where to buy their products, as well as deterrents to switch to new vendors. Moreover, consumers prefer to stick to their routines.

Helen also appears not to have a clear idea of the Pioneer offer: since Pioneer is not sold in the market, she only has a vague perception of the brand. She thinks that they only sell big quantities and that, for this reason, if she goes to the Pioneer shop with a low budget, like 200 KES, she will not be able to buy anything. Raising more awareness among market consumers, especially the ones in Lela, which is very close to the Pioneer shop, could help improve understanding of the business.

Figure 34 – Helen shopping at Lela market

5.8. PURCHASES AT PIONEER

Most of the POS respondents (87%) buy fish at least once a week during the rainy season. During the dry season, 57% of them buy fish at least once a week (2 times a week on average) and 34% buy fish at least once a month (three times a month on average). Detailed results are available in appendix. Compared to random consumers (in both intervention and control markets), POS consumers tend to be more loyal to one vendor (Pioneer vendor in this case).

Table 26 – Do you always buy fish from the same vendor? (Consumer survey, percentage of respondents)

	Intervention market (N=304)	Control market (N=282)	POS (N=47)	p-value
Yes	45%	38%	72%	<0.001
No	55%	62%	28%	

Focus Box 10 – A day with a Pioneer consumer (ethnographic interview)

Asbeta Atieno, 45 years old and mother of four, lives with her family in Kawuor. She is a teacher at a local primary school. She is a Pioneer customer since April 2017 and she buys fish from them two or three times a week. What she values about Pioneer is the fact that their products are always available, affordable and tasty.

"*I started buying [fish at Pioneer] when they started selling their products early this year [2017]. Their products are readily available anytime you need them, the fish are sold at a cheaper price compared to the market, and they also have good taste.*" Asbeta talking about Pioneer

During the day, she either works at school or rests at home. In the late afternoon, she goes to Lela market to buy food for her family. There, she visits different stalls where she buys vegetables, sugar, charcoal, *sukuma wiki* (colewort) and Pioneer fish. When shopping at Pioneer, she usually buys two to three pieces (300 to 500g worth of fish) for 130 to 230 KES. She buys fresh tilapia, boils it and makes a stew that she serves with vegetables and *ugali*.

"*The prices have dropped since last year, I was buying the 300g fish at 250 KES but now I buy it at 130 KES*".

Asbeta with her daughter Beryl at the Pioneer POS

5.8.1. REASONS TO BUY PIONEER FISH

According to the quantitative survey, price and freshness are important criteria for Pioneer consumers when buying fish. 47% of Pioneer consumers mention the price as the most important reason for buying fish at the Pioneer shop (23% of random consumers mention price as the most important reason to choose one market over another to buy fish) and 28% of Pioneer consumers mention freshness as the most important reason for buying fish at Pioneer shop (23% of random consumers mention freshness as the most important reason to choose one market over another to buy fish). Detailed results are available in appendix.

Qualitative interviews provide deeper insights in the reasons for which consumers like Pioneer fish. They appreciate:

- the freshness and the cleanliness of the fish (the fish is carefully transported from the cages to the outlet with ice to preserve the freshness and then well preserved in a freezer);

Figure 35 – Pioneer packaging of fish for transportation, June 2017

- the availability of different sizes. They can buy smaller sizes (which are more affordable) on a weekly basis and bigger sizes when they have events;
- the cleanliness of the shop (it is cleaned every day by Mary, one of the Pioneer vendors);
- the nice staff and the proposed services. The fish can for example be cleaned by Mary (she will remove the scales and empty the inside of the fish) for an additional cost of 10 KES per piece.

"*I have noticed Pioneer has all sizes, including my preferred sizes, and it is affordable, so I will come to buy here.*"

Rose Atieno, Focus Group Discussion held at Pioneer shop

Rose Atieno is a 24 years-old mother of three children. She lives in Chulaimbo. She eats tilapia once a week and used to buy it from retailers that bought from Pioneer (those retailers stopped selling Pioneer fish in Chulaimbo). At the beginning, she did not know it was fish from Pioneer. She bought it because of the availability of different sizes, the good taste and the low prices.

"*I buy Pioneer fish because of the cleanliness, good customer care and competitive prices they offer.*"

Celine Ochieng, Focus Group Discussion held at Pioneer shop

Celine Ochieng is a 35 years-old mother of five children. She lives in Karateng. She likes tilapia and buys it from Pioneer farm. Thanks to Pioneer, she thinks her children are healthier. Since she started to buy tilapia from Pioneer, she has reduced her expenses on fish. In a month, she used to spend 400 KES on fish but now she spends 300 KES.

Focus Box 11 – Insights from Angelina, a Pioneer consumer (ethnographic interview)

Angelina is a 65 years old widow who lives with two of her grandchildren. She is a poor farmer with a very low income, around 2,800 KES per month. She buys food at Lela market, where she has some trusted vendors that can give her goods on credit when she does not have money. For the last three years, she has only been consuming omena, which she buys twice a week for around 60 KES each time. This is because she does not eat Nile perch and, in her opinion, the tilapia from the market is tasteless.

In April 2017, Angelina found out about Pioneer and thanks to it, she can now enjoy a tasty tilapia at an affordable price. She usually buys the big size tilapia for around 200-300 KES twice a month, and she eats it in two times, for lunch and for supper, together with her grandchildren. What she especially values in Pioneer is the fact that it is tasty, affordable and that the shop is close to her.

Figure 36 – Angelina cooking with her grandchildren

"I used to buy fish from the lake and when I stopped buying that, 3 years ago, I stopped eating fish until I started buying it from Pioneer. This is because most of the fish at the market are Nile perch and I don't eat them, while the tilapia that is available in the market is tasteless. Pioneer tilapia has a good taste and a nice aroma when cooking."

5.8.2. REASONS NOT TO LIKE PIONEER

Two thirds of the respondents are satisfied with the Pioneer shop. Amongst the rest, the main causes of dissatisfaction are:

- The price: 5 respondents (among 57 answers given[56]) find Pioneer fish too expensive;
- The non-diversity of products sold: 6 respondents (among 57 answers given) regret that they cannot buy other food products at the Pioneer shop.

None of the respondents mentions the fact that fish is not always available as a cause of dissatisfaction with Pioneer.

[56] The question had a multiple-choice answer. A total of 57 answers were given by the 47 POS consumers.

Figure 37 – What do you like least about the Pioneer shop? (Consumer survey, number of answers)[57]

While interviewees from the qualitative survey did not mention any concerns about the Pioneer POS itself, some of its characteristics might be daunting for some consumers, especially the poorer and less educated:

- It is located on a major road, outside Lela village and might be not easily accessible for those who do not own a car;
- There is no clear advertising outside, including on the pricing of fish, so people may not know that fish I sold there (several consumers did mention that, despite walking past it, they were not aware of it. All of those who did know of Pioneer and its products had heard of them through someone else or word of mouth;
- The whole farm installation is quite large and modern-looking, well-fenced and with a gate that is often closed, all of which could be impressive and could put off poorer consumers;
- Finally, the store is located on the first floor of an open building (no walls) which could discourage older consumers. In fact, in the qualitative survey, several consumers complained about the stairs they had to climb to get to the store.

In summary, while consumers tend to generally walk a few hundred meters and corresponding few minutes to get to the market where they buy everything they need, at small stalls set on directly on mud, managed by people they have known for a long time and who are of their same social background, the purchase experience at Pioneer is very different: they would have to walk further, to the farm which is very much on its own to buy only fish, walk in through a solid metal gate (which would hopefully be open when they get there), and then go up a flight of stairs to the shop where their purchase would be weighed (that is never the case on local markets), priced without the possibility of a bargain and sold to them.

[57] Question asked to POS consumers only. The 'Other' answers are not displayed. Multiple answers were allowed.

6. VENDOR BASED STUDY

6.1. CHARACTERISTICS OF RESPONDENTS

KEY TAKEAWAYS

- There is a high predominance of female vendors among interviewees;
- Almost all the vendors interviewed at intervention markets know about Pioneer. Less than half of those interviewed at control markets do. None of them sells Pioneer products in either markets.

A total of 54 vendors were interviewed, 14 of whom work in intervention markets where Pioneer tilapia used to be sold, 39 in control markets and one is the Pioneer vendor. Since only two intervention markets could be identified (Lela and Maseno), the number of vendors for these markets was limited and is for this reason consistently lower than for control markets. Most respondents are between 30 and 40 years old, with a great prevalence of women.

Age

The average age of the vendors is around 38 years old. More than one third are between 30 and 39. All male respondents are under 40.

Gender

Females are predominant among respondents, they are 49 out of 54 (91%) of the vendors.

Education

The overall level of education of the respondents is rather low. Thirteen respondents, all of whom are women, have not completed any education degree. Of these thirteen, twelwe cannot read and one can read with help. This level of literacy (75%) among women is in line with the country's female literacy rate of 74.9%[58].

One out of two vendors has only completed primary school and one out of four has completed secondary school. Only one of the vendors has a higher education degree.

Revenue

The income level of the vendors is generally quite low. Looking at the total monthly income of their households, it can be assumed that over one third of them[59] (i.e. those belonging in the "Less than 5,000 KES" bracket) are surely living below the poverty line. Indeed, 5,000 KES a month is below the poverty line of 5,925 KES a month per person (1.90 USD a day) as of July 2017. For those above the 5,000 KES a month threshold, conclusions cannot be taken since the number of household members is unknown.

Fourteen of the 39 people who provided their income (more than a third) make less than 5,000 KES per month, while 23 (more than the half) are below 10,000 KES per month. Overall, 15 respondents (all of which from control markets) did not provide information about their household income: 13 of them because they did not know, and 2 because they refused to answer the question.

[58] UNESCO, 2015.

[59] Excludes "do not know" and "do not want to answer".

For the vendor survey, since the target of the interview was very specific (fish vendors), none of the characteristics of respondents (not even gender nor age) were controlled.

Table 27 – Key characteristics of respondents (Vendor survey, number of answers and percentage of respondents)[60]

		Characteristics of Vendors						
		# in intervention markets	**% in intervention markets**	**# in control markets**	**% in control markets**	**Pioneer POS vendor**	**p-value**	**Total #**
Number of respondents		14	26%	39	72%	1		54
Age		N=14		N=37		N=1	0.009	
	20-29 years old	4	28%	4	11%	1		**9**
	30-39 years old	5	36%	15	40%	0		**20**
	40-49 years old	5	36%	10	27%	0		**15**
	Over 49 years old	0	0%	8	22%	0		**8**
Age, average years		36	SD=8.26	43	SD=9.96	20		
# of women		13	93%	36	92%	0	0.007	**49**
Education		N=14		N=39		N=1	0.018	
	None	1	7%	12	31%	0		**13**
	Primary	5	36%	22	56%	0		**27**
	Secondary	7	50%	5	13%	1		**13**
	Higher	1	7%	0	0%	0		**1**
Household income		N=14		N=24		N=1	0.545	
	<5,000 KES	3	21%	11	46%	0		**14**
	5,001 - 10,000 KES	3	21%	5	21%	1		**8**
	10,001 - 15,000 KES	3	21%	5	21%	0		**8**
	15,001 - 20,000 KES	2	15%	2	8%	0		**4**
	20,001 - 25,000 KES	1	7%	1	4%	0		**2**
	25,001 - 50,000 KES	2	15%	0	0%	0		**2**

[60] Excludes "do not know" and "do not want to answer".

6.2. VENDORS' BUSINESS

The only Pioneer vendor is male[61] and he is the youngest of all respondents, at twenty years of age. He only sells tilapia, whereas 59% of the respondents sell Nile perch as well. In total, there are ten vendors who sell solely tilapia, four from intervention markets, five from control markets and the Pioneer vendor. Detailed results are available in appendix.

Focus on tilapia[62]

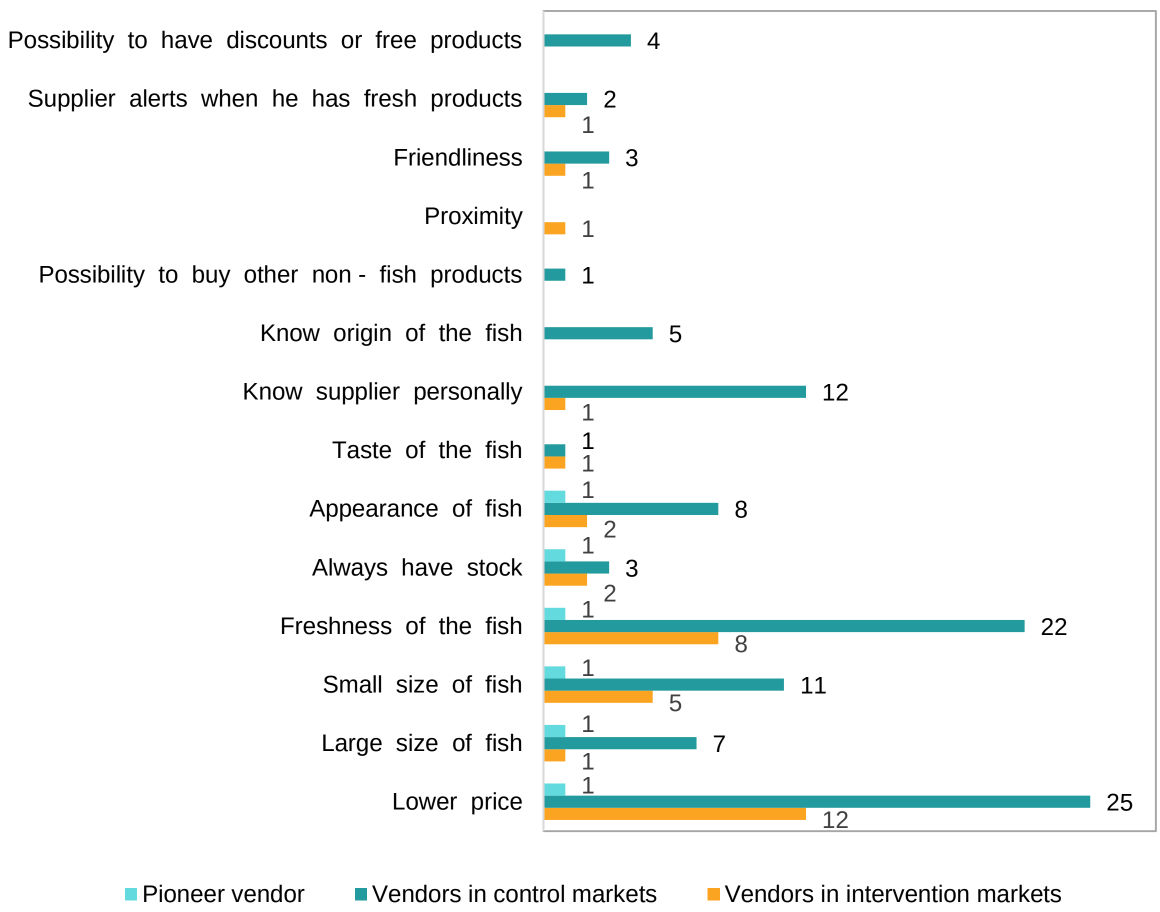
Most respondents have more than one supplier of tilapia (64% in intervention markets and 67% in control markets).

Three-quarters of the vendors state that selling tilapia is profitable for their business (93% in intervention markets and 72% in control markets).

When choosing their suppliers, vendors value most of all the price and the freshness of the fish. For many vendors, it is also important to have a personal acquaintance with the supplier.

Figure 38 – What criteria do you consider when choosing your supplier(s) of tilapia? (Vendor survey, number of answers)[63]

N (intervention market) = 14; N (control market) = 39; N (POS) = 1



[61] There are two Pioneer vendors in the outlet: Mary and Swaleh. At the time of the interview, Swaleh was the one present.

[62] Detailed tables are available in appendix.

[63] Respondents could choose more than one answer. Details are available in appendix.

"*When choosing the supplier, I look for the one who has fish of good quality, size and shape. I also check the freshness of the fish.*"

Agnes Onyango, Key Informant Interview, Vendor at Maseno Market

Agnes sells Nile perch, mudfish and tilapia.

Awareness of Pioneer

Of all intervention and control market vendors, 42% knows about Pioneer, but no one buys from them. Awareness is much higher in the intervention markets (93% of vendors), where only one of the vendors does not know of Pioneer, in comparison to the control markets, where the awareness is at 23%.

Half of those who know Pioneer found out about it by walking past the farm. The others heard about it from friends, family or from other vendors.

Two vendors from intervention markets used to sell Pioneer fish. Some vendors mentioned that they sometimes went to Pioneer when a client asked for their fish specifically.

The main reason for vendors not to source their products from Pioneer is that they are satisfied with their current supplier(s), whom they know personally and trust. As emerged in some qualitative interviews, vendors used to sell wild fish may be skeptical about the type of fish Pioneer offers, and they may also have preconceptions about the taste and or quality of their products.

"I haven't tried selling these products [from Pioneer] because I am used to lake fish, wild fish. But I would be interested, depending on the prices, which should be pocket friendly."

Mercy Atieno, Vendor, Lela Market (Ethnographic interview)

Mercy Atieno is a 28 years-old vendor in Lela. She sells tilapia (all sizes). She has several suppliers (fishermen at the lake) that generally send her the fish by public means.

"I don't buy their products because some people who tried them say they are tasteless."

Agnes Onyango, KII vendor at Maseno Market

Agnes Onyango is a 45 years-old fish vendor in Maseno (intervention market). She has been running her business since 2007. She sells tilapia, Nile perch, mudfish and omena. She sources all her products from the Lake Victoria. She has heard about Pioneer but does not buy fish from the farm.

Figure 39 – Why don't you (currently) sell Pioneer fish? (Vendor survey, number of answers)[64]

N (intervention market) = 13; N (control market) = 9

6.3. SEASONALITY

KEY TAKEAWAYS

- All vendors sell tilapia in both seasons;
- More than half of the vendors sell kadogos of less than 250g in intervention markets and around two third of vendors sell them in control markets. Sold quantities of kadogos are higher in the dry season. People tend to buy more of them in this season, when prices are higher;
- According to vendors, sales prices are mostly the same for dry and rainy seasons in intervention markets. There are lower in control markets in the rainy season (as observed by consumers). However, margins are higher in the dry season (in both types of markets) when fish is considered more expensive.

[64] Question was only asked to vendors who were aware of Pioneer. Respondents could choose more than one answer. Details are available in appendix.

All vendors sell tilapia in both dry and rainy seasons. The type of pieces sold barely depends on the season. Kadogos are the most sold size: 57% of vendors in intervention market and 67% of vendors in control markets sell kadogos of less than 250g in the dry season while 57% of vendors in intervention market and 62% of vendors in control markets sell kadogos of less than 250g in the rainy season. 43% of vendors in intervention market and 39% of vendors in control markets sell kadogos between 250g and 350g. Few vendors sell pieces of more than 450g (21% in intervention markets and 13% in control markets).

Table 28 – Types of pieces sold per season (Vendor survey, percentage of respondents)

		Intervention market		Control market		p-value	
		Dry season	Rainy season	Dry season	Rainy season	Dry season	Rainy season
Number of respondents		14	14	39	39	-	-
Types of pieces sold							
	Less than 250g	57%	57%	67%	62%	0.618	0.693
	Between 250g and 350g	43%	43%	39%	39%	0.457	0.457
	Between 350g and 450g	7%	7%	28%	31%	0.057	0.052
	Between 450g and 550g	0%	0%	8%	8%	0.001	0.001
	More than 550g	21%	21%	5%	5%	0.004	0.004

While seasonality clearly affects fishing (from January to March there is plenty of fish, from April to August there is a shortage of fish and from September to November there is plenty of fish again), the survey indicates that similar quantities of fish are sold regardless of the season. While the quantities sold per vendor in both intervention and control markets are higher in the dry season for kadogos of less than 250g, quantities sold per vendor are higher in the rainy season for pieces between 350g and 450g in both markets. Prices are generally higher in the dry season. This confirms that people tend to buy smaller tilapia in the dry season as the price per piece is more affordable to them.

In the following table, results for fish above 450g have been removed from the table due to low sample sizes (N<5). Other results with sample size below 5 have been removed. It appears that quantities sold are higher in control markets, although with differences among control markets: while quantities sold in Otonglo (control market) are similar to those in Lela and Maseno (intervention markets), quantities sold in Kisiani and Daraja Mbili are higher.

Table 29 – Quantity of tilapia sold by season (Vendor survey, number of answers)

	Intervention market		Control market	
	Dry season	Rainy season	Dry season	Rainy season
Quantity sold per day				
Less than 250g	21 (N=8)	15 (N=8)	54 (N=26)	49 (N=26)
Between 250g and 350g	15 (N=6)	15 (N=6)	32 (N=15)	29 (N=15)
Between 350g and 450g	n.r.	n.r.	26 (N=11)	33 (N=11)

Prices at which vendors buy fish do not seem to vary much between the dry and rainy seasons in both intervention and control markets.

While the sale prices are mostly the same in intervention markets for both seasons (except for pieces of more than 550g which are sold 470 KES/piece in the rainy season and 550 KES/piece in the dry season), prices are lower in control markets in the rainy season. When comparing these results with those on fish consumption by seasons from the consumer survey we see that 33% of consumers in control markets vs 45% of consumers in intervention markets eat the same quantity of fish in the dry and rainy seasons. It therefore seems that the difference in prices between the seasons, which is more visible in control markets, has a stronger impact on purchasing and consumption habits in control markets.

However, it is difficult to draw a more definite conclusion on the differences in pricing between intervention and control markets: while kadogos weighing between 250g and 350g are less expensive in intervention markets (for both dry and rainy seasons), pieces of more than 550g are more expensive (for both the dry and rainy seasons).

In the following tables, results for fish above 450g have been removed from the table due to low sample sizes (N<5). Other results with sample size below 5 have also been removed.

Table 30 – How much do you pay and charge for fish during the dry and the rainy seasons? (Vendor survey, number of answers)

		Intervention market		Control market	
		Dry season	Rainy season	Dry season	Rainy season
Price bought (KES/piece)					
	Less than 250g	42 (N=8)	55 (N=8)	43 (N=26)	41 (N=26)
	Between 250g and 350g	83 (N=6)	83 (N=6)	96 (N=15)	75 (N=15)
	Between 350g and 450g	n.r.	n.r.	132 (N=11)	137 (N=11)
Price sold (KES/piece)					
	Less than 250g	86 (N=8)	89 (N=8)	81 (N=26)	78 (N=26)
	Between 250g and 350g	123 (N=6)	122 (N=6)	156 (N=15)	132 (N=15)
	Between 350g and 450g	n.r.	n.r.	208 (N=11)	190 (N=11)
Margin (KES/piece)					
	Less than 250g	44	34	38	37
	Between 250g and 350g	40	39	60	57
	Between 350g and 450g	n.r.	n.r.	76	53

In both types of market, margins are mostly higher in the dry season when fish is less available and therefore more expensive.

6.4. VENDORS' VIEW OF THE FISH MARKET AND ITS RECENT EVOLUTION

When asked about the fish market's evolution in the past year, vendors identify similar trends in both types of markets:

- in intervention markets, 6 out of 14 vendors say they sell more tilapia than a year ago, 4 that they sell the same and 4 that they sell less;
- in control markets, 14 out of 39 vendors say they sell more tilapia than a year ago, 12 that they sell the same and 12 that they sell less.

Results are quite similar for kadogos:

- in intervention markets, 5 out of 14 vendors say they sell more tilapia than a year ago, 2 that they sell the same and 7 that they sell less;

- in control markets, 18 out of 39 say they sell more tilapia than a year ago, 13 that they sell the same and 7 that they sell less (one does not know).

With regards to the price they pay for fish, more than two thirds of vendors in intervention markets and about half in control markets say they pay more than this time last year: 10 out of 14 in intervention markets and 19 out of 39 in control markets. This points out that the presence of Pioneer has not helped vendors in intervention markets to find less expensive fish.

“Initially we were buying the very small sizes of tilapia for 15 KES, now they are being sold at 25 KES.”

Martha Achieng, KII vendor at Chulaimbo market

Martha Achieng is a 40 years-old fish vendor in Chulaimbo. She has been running the shop since 2002 and she sells tilapia, Nile perch, mudfish, omena, fries, tomatoes and onions. She buys all the fish from middlemen at the lake (she gets fish from the lake three times a week). She buys the medium sizes of tilapia at 100 KES each, the small ones cost me between 70 and 80 KES each and the very small sizes between 15 and 25 KES.

Figure 40 – Small tilapia on Martha's stand

Regarding selling prices, half of the vendors in intervention markets (7) have increased them since last year while only a third of vendors in control markets (13) did the same. Half of the vendors (20) in control markets have kept the same prices as last year. Only a few vendors in both markets (2 in intervention markets and 5 in control markets) claim they have decreased their prices since the same time last year.

Vendors in intervention markets generally agree that the number of vendors selling fish in their area has decreased (9 of 14). In control markets, on the opposite, half of the vendors (30) claim that the numbers of vendors selling fish in their area has increased.

“The number of vendors in Maseno has decreased since last year, we were 6 and now we are 4, because the business is down and there is no profit after all the costs you have to support: frying, scaling and transport.”

Agnes Onyango, KII vendor

Agnes Onyango is a 45 years-old fish vendor in Maseno (intervention market). She has been running her business since 2007. She sells tilapia, Nile perch, mudfish and omena. She gets fish from the lake (directly from fishermen) and has one supplier per type of fish. Compared to last year, she feels her business has worsened. Last year, she used to make a profit of 500-600 KES most days of the week. Now, most of the days, she does not make any profit. She feels that the number of consumers has decreased because they have less money.

“Fish vendors in Lela have decreased since there is plenty of fish in the market, hence competition among vendors.”

“There are less tilapia vendors than last year. There used to be five and now there are three because tilapia are too expensive and people cannot afford them.”

Lillian Juma, KII vendor

Lillian Juma is a 38 years-old fish vendor in Lela (intervention market). She has been running her business since 2012. She sells omena and very small tilapia (fulu). She gets fish from the lake (from large scale fishermen). She has two suppliers and buys from them daily (her sister picks the fish at the lake and send it to her through public transport). She tried selling other types of fish like Nile perch and tilapia but she did not make enough profit to compensate her capital so she decided to stop selling them (the associated expenses of frying oil, firewood, removing scales and scaling were very high).

Table 31 – Average number of tilapia vendors in the different markets (Vendor survey)

	Average number of tilapia vendors
Lela (intervention market)	10
Maseno (intervention market)	4
Kisiani (control market)	13
Otonglo (control market)	7
Daraja Mbili (control market)	21

Focus Box 12 – Lela market observation (intervention market)

According to market observations, 16 out of around 280 vendors on Lela market sell fish. Of these 280 vendors, 40 are vendors without stalls (mostly located beside the main road) while 240 are vendors with stalls inside and around the market.

Products	Number of vendors
Vegetables	50
Fruits	25
Grains and cereals (rice, wheat, maize, etc.)	30
Meat	6
Fish	16
Eggs	20
Dairy products (milk, butter, yoghurt, etc.)	30
Other basic food products (oil, sugar, salt, pasta etc.)	85
Other more sophisticated food products (cans, cookies, sweet etc.)	35
Non-food products	50

Lela is found along the Kisumu - Busia highway between Chulaimbo and Maseno. This road is in good condition. It is tarmacked and has access to public transport.

Lela is a fairly clean and open market. The floor is a mixture of earth and cement. The market is not organized, so there are no specific sections, entrances or exits, except a small section for fish. Vegetables and fruits are also sold in this section. It has approximately 50 movable stalls and some permanent shops. They use natural light during the day and artificial light (fluorescent tubes) at night. There is no running water or waste disposal system. Each vendor is responsible for the cleanliness of his or her stall.

Figure 41 – Stalls in Lela market

In the market, there are tailors making dresses and shoe cobblers. There are also two offices for a community based organization in a stone building within the market.

The market is open every day at the same hours and its activity is the same throughout the year.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Opening Hours	4.30pm	4.30pm	4.30pm	4.30pm	4.30pm	4.30pm	4.30pm
Closing Hours	8.30pm	8.30pm	8.30pm	8.30pm	8.30pm	8.30pm	8.30pm

Within four hours, approximately 100 women and 10 children visited the market. There were also about 7 men on their way back home from work. The crowd was predominantly made up of women of the dholuo tribe. The consumers were mostly low and middle-income women who came to the market alone.

The main fish sold in the market are the following: tilapia, Nile perch, okoko, omena and wiu.

Figure 42 – Fish vendors in Lela

Only 3 vendors in the market sell tilapia. They display the tilapia on a table on top of polythene bags at the forefront of the stall. When a customer makes a purchase, the vendors pack the fish in clear polythene paper bags. The tilapia appears to be fresh fish from Lake Victoria. No Chinese tilapia was found in this market.

All 3 vendors buy fish from Osiri beach. One vendor also buys from the fish market in Kisumu town while another sometimes buys it directly from fishermen in Bondo or Usenge.

Figure 43 – Display of tilapia in the market

Focus Box 13 – Kisiani market observation (control market)

According to market observations, only 4 vendors out of 126 sell fish in Kisiani. Of the 126 vendors, 76 have stalls while 50 do not have stalls.

Figure 44 – Vendor without stall beside the main road

Kisiani market is at the junction of Kisumu - Busia Highway and Kisumu - Bondo highway. The road is in good condition and is tarmacked. Being on a highway, public transport is easily

Product	Number of vendors
Vegetables	30
Fruits	12
Grains and cereals (rice, wheat, maize, etc.)	26
Meat	4
Fish	4
Eggs	15
Dairy products (milk, butter, yoghurt, etc.)	6
Other basic food products (oil, sugar, salt, pasta etc.)	17
Other more sophisticated food products (cans, cookies, sweets, etc.)	8
Non-food products	12

Vendors in Kisiani market sell fresh, good quality products which are rather clean. Although there is a wide variety of products being sold, there are some empty stalls in the market. There are also a few tailors and a shoe cobbler.

Kisiani is a fairly clean open market with an earth floor. It is made up of makeshift wooden stalls. The market is not organized so there are no specific sections for certain types of products nor are there clear entrances and exits. Compared to other markets, Kisiani is known for products like clothes and plastic household goods. Kisiani is also popular for sweet bananas, which are sold by hawkers around the market.

Figure 45 – Makeshift wooden stalls in the market

The market is open every day at the same hours and its activity is the same throughout the year.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Opening Hours	9.30am	9.30am	9.30am	9.30am	9.30	9.30am	9.30am
Closing Hours	9.30pm	9.30pm	9.30pm	9.30pm	9.30pm	9.30pm	9.30pm
Busiest Hours	6.00pm-7.30pm	6.00pm-7.30pm	6.00pm-7.00pm	6.00pm-7.00pm	6.00pm-7.00pm	6.00pm-7.00pm	6.00pm-7.00pm

Within 3 hours of observation, there were approximately 80 women, 20 men and 10 children in the market. The crowd is predominantly low and middle-income women from the dholuo tribe aged between 25 and 50. A few of them came with their children. The male consumers in the market were mostly passing by the market on their way back home from work

Kisiani market is a relatively small market with few fish vendors. It is near the lakeside so most people prefer purchasing their fish from the lakeside area, where it is slightly cheaper. The fish sold are the following: tilapia, Nile perch, okoko, omena, mgongo wazi and wiu.

Figure 46 – Omena and vegetables vendor

Of the 4 vendors selling fish, 3 sell tilapia. The tilapia appears to be fresh fish from Lake Victoria. No Chinese tilapia was found in this market.

All tilapia in Kisiani is bought directly from the fishermen at Osiri beach which is approximately 3km from Kisiani market. The vendors use public transport to get the fish.

7. QUALITATIVE INSIGHTS

Through the eight ethnographic interviews of consumers, the two focus group discussions, the four KII with vendors and the two ethnographic interviews with vendors, several themes emerged and confirmed the previously presented results from the quantitative survey.

7.1. FREQUENCY OF PURCHASE

While consumers seem to buy starch & cereals (such as sugar, maize flour and rice) on a weekly basis (they generally prefer going to markets where there can buy them in larger quantities at a cheaper price), they tend to buy milk, vegetables, meat and fish more regularly. They indeed generally buy the latter daily when they need them for the meals of the day. Most of them do not have fridges and can therefore not stock these products for long. For the daily grocery shopping, women tend to go to the closest food market, which is generally situated at a walkable distance. It generally takes them between 5 and 25 minutes to get there. They spend 10 to 30 minutes at the market, depending on the number of items they need. These estimations are based on the 8 consumer ethnographic interviews (activity 1: visit the local food market with the respondent).

"I go to the market every day to buy food, mostly groceries or any other food needed for the day that I don't have in the garden."

Filgona Auma Oluoch, Ethnographic interview held in Lela

"I buy food daily: fish, tomatoes, cabbage, eggs, omena and onions. If I have money I buy onions that last for a whole week."

Cheryl Achieng Oduor, Ethnographic interview held in Chulaimbo

"I buy tomatoes, onions, sugar and tea leaves weekly and I buy vegetables, meat and fish daily."

Phenny Atieno Oguso, Ethnographic interview held in Mbala Wandu

"I buy some food weekly, like sugar, maize flour and rice, other daily like milk, bread, mandazi, chapatti and vegetables and others every 3 days like tomatoes and onions."

Lucy Anyango, Ethnographic interview held in Riat-Otonglo

"I buy milk, fish and beef on a daily basis, onions and tomatoes once a week, charcoal occasionally. I plant vegetables during the rainy season, so I buy them maybe once a week during the rainy season while in the dry season I buy them daily. I buy beans twice a month and rice once a month."

Asbeta Atieno, Ethnographic interview held in Kawour village

"I buy milk every morning for my breakfast since we don't have a fridge for storage. Vegetables I get from my stall or the farm daily. Fish or beef I buy once a week in small quantities, just enough for the day. I buy cereals mostly during the weekends at the market. I buy eggs twice a week. I also buy wiu once a week and omena three times a week."

Mercyline Akinyi, Ethnographic interview held in Chulaimbo

7.2. IMPACT OF THE SEASONS

It clearly appears that the seasons have a real impact on food purchasing and consumption, especially when it comes to vegetables and fish. In the dry season, there are less vegetables and fish is scarcer than in the rainy season. Prices go up. Therefore, people tend to reduce the quantities they buy and eat or change their diet (they eat less vegetables and fish).

"In the rainy season, there are plenty of vegetables and food is available, while in the dry season there is scarcity of food, hence we reduce the quantities we buy because we cannot afford the same quantities as in the rainy season. Sometimes we even lack them in the market or even skip meals and reduce the portions we take."

Filgona Auma Oluoch, Ethnographic interview held in Lela

"In the dry season, there is a shortage of vegetables and fish that results in high prices. For instance, a bunch of vegetables that is sold for 5 KES during the rainy season is sold at 10 KES during the dry season and for fish, the ones at 100 KES during the rainy season are sold at 150 KES during the dry season. These changes force us to reduce the quantity of food we buy and the frequency at which we eat fish."

Cheryl Achieng Oduor, Ethnographic interview held in Chulaimbo

"During the rainy season, I plant vegetables so we eat more of them and I use the money to buy other products. In the dry season, vegetables are scarce and they are sold at a high price and found in low quantities so we eat less vegetables."

Phenny Atieno Oguso, Ethnographic interview held in Mbala Wandu

"During the dry season, we have less vegetables: the quantity reduces and the price increases. Therefore, we use more money to buy food. For example, what costs 30 KES we buy at 60 KES during the dry season."

Lucy Anyango, Ethnographic interview held in Riat-Otonglo

"In the dry season, there is no food in the market. I don't get most of the traditional vegetables so we eat more sukuma wiki, since that is what is available. Fish is also scarce. Right now, you can get fish because of the fish ponds and cages. When fruits, like mangoes, are in season in August to December, we eat more of them. During the rainy season, there is plenty of food and we eat more."

Asbeta Atieno, Ethnographic interview held in Kawour village

"During the rainy season, in April, there are plenty of fish, especially mud fish. Even tilapia is abundant, but most people prefer mud fish because the price is low, even for a big fish, and in the dry season in January and September, there is scarcity of fish and the few there are are always expensive."

Mercyline Akinyi, Ethnographic interview held in Chulaimbo

"In the rainy season, the price of fish is affordable and we eat fish even four times a week. In the dry season, the price of fish is high since there are few fish in the market, so we eat more vegetables."

Helen Adhiambo, Ethnographic interview held in Kaluoch village

7.3. LOYALTY TO VENDORS

When asked about the vendors they are buying food from, people generally answer that they have specific vendors they go to. To choose them, two interesting criteria are generally mentioned (in addition to the price and the quality of the fish):

- The importance of good customer relations: consumers look for vendors they can trust and who offer good services. Based on the first activity from the ethnographic interview (visit the local food market with the respondent), it can be noticed that women generally like exchanging some news. They will then discuss sizes and prices of products and prefer doing it with a vendor they know and that will help them find their preferred items.
- The possibility of obtaining credit: most of the respondents mentioned it as an important reason for choosing one vendor rather than another. Availability of money can be an issue for these families where most of the women do small labor or farm work and earn very little money on a day by day basis. Dealing with a vendor they know and they are loyal to allows these women to buy the necessary items daily even if money is not available on a specific day.

"I consider good customer relations, the cleanliness of the products, the personal hygiene and I also look at the quality of the products being sold."

Filgona Auma Oluoch, Ethnographic interview held in Lela

"I have specific vendors, because their products are clean and of good quality, especially for fish. They serve me well too and can give me credit on food."

Cheryl Achieng Oduor, Ethnographic interview held in Chulaimbo

"I have favourite vendors who know me and can give me their products on credit when I don't have money. […] I look at the personal relations, the good quality and physical appearance of the products being sold."

Angelina Nyabera, Ethnographic interview held in Marera village

"I consider good customer relations, price and freshness of the products being sold."

Phenny Atieno Oguso, Ethnographic interview held in Mbala Wandu

"I look at personal relations: I like the vendors who can give me goods on credit, have clean stalls and good customer relations."

Lucy Anyango, Ethnographic interview held in Riat-Otonglo

"I have favourite vendors who can sell me goods on credit."

Asbeta Atieno, Ethnographic interview held in Kawour village

"I have favourite vendors, mostly those who give me a discount and those who can send the food to me through public transportation if I cannot be there in person, for instance if I'm not feeling well."

Mercyline Akinyi, Ethnographic interview held in Chulaimbo

"I consider the freshness of the products, how the vendors are handling them in terms of hygiene and preparation, the customer relations they show, whether they allow bargaining or not and if they are friendly and willing to offer goods on credit and also if they are someone I can trust."

Helen Adhiambo, Ethnographic interview held in Kaluoch village

7.4. FRESHNESS OF THE FISH

Freshness of the fish is almost always mentioned by the consumers as one of the most important factors when buying fish. Some prefer buying fresh fish (rather than fried) to be able to control the freshness of the fish. When fish is less fresh, vendors sometimes fry it to be able to still sell it. Vendors selling Chinese fish also tend to fry it to hide its origin. Knowing this, vendors generally try to buy fresh fish at the lake in the morning to then sell it to their consumers during the day. They generally fry whatever fish is leftover for the next day.

"I look at the quality of the fish they are selling; my vendors have clean and fresh fish."

Cheryl Achieng Oduor, Ethnographic interview held in Chulaimbo

"The quality has also improved: now you can be sure of the freshness of the fish because they are kept in a freezer after fishing. Last year, the vendors would take fish home from the lake and take them to the market the next day and the storage was not good, so you could buy the ones that were already spoiled."

Asbeta Atieno, Ethnographic interview held in Kawour village

"I buy them fresh then I fry myself. I can know the freshness (if its spoiled or not); that's why I prefer the fresh ones."

Jacinta Awino, Focus group discussion held at Peacock resort

"I consider the freshness of fish because some vendors sell spoilt fish."

Truphosa Okere, Focus group discussion held at Peacock resort

"I consider good price and the freshness of the fish."

Mercy Achieng, Focus group discussion held at Peacock resort

"I look at the supplier who has fish that are of good quality, size and shape. I also check the freshness of the fish."

Agnes Onyango, KII vendor

"I look at the freshness of the fish since some fishermen leave their nets to trap fish during the night and in the morning some fish end up dead so I try to get those fish that are still alive and still fresh."

"Most of my customers check the freshness of the fish."

Jane Monica, KII vendor

7.5. COOKING HABITS

Most respondents like making stew with tilapia, whether they buy it fresh or fried. If they buy the fish fresh, they need to start preparations by removing the scales, the intestines and washing the fish. At the same time, onions and tomatoes will be chopped, put into a cooking pan and stirred until they form a paste. The fish will then be added, as well as some water. The preparation is then covered and heated for about 45 minutes. The stew can then be served with vegetables and/or ugali. Some consumers prefer fresh fish and others fried fish, for reasons linked to both logistics and taste.

"I buy the fresh ones, fry them and make stew because my grandchildren like soup."

Angelina Nyabera, Ethnographic interview held in Marera village

"I buy the fresh fish (not fried), sometimes I boil it and make a stew and sometimes I fry it and then make a stew. I serve it with vegetables and ugali."

Phenny Atieno Oguso, Ethnographic interview held in Mbala Wandu

"I prefer fried to fresh because it sweeter and tastier."

"To prepare tilapia, if it's fresh, I wash it, remove the dirt, boil it for a while and then I make the stew. For the fried ones, I just make the stew."

Lucy Anyango, Ethnographic interview held in Riat-Otonglo

"I buy fresh fish, I boil it and then make a stew and serve it with vegetables and ugali for all family members."

Asbeta Atieno, Ethnographic interview held in Kawour village

"I like cooking it [tilapia] fresh. To prepare it, I boil it for a while then I make stew and serve it with ugali."

Beatrice Adoyo, Focus group discussion held at Peacock resort

"I prepare it by removing the scales and cutting it. Sometimes I deep fry it before making a stew. At times, I make the stew when it's fresh and I serve it with ugali."

Jacinta Awino, Focus group discussion held at Peacock resort

"I also buy deep-fried tilapia and omena and stew them to make soup for my grandchildren."

Joyce Olango, Focus group discussion held at Pioneer shop

7.6. AVAILABILITY OF FISH

Most of the respondents agree that fish is now more easily available than before. Last year, people had to go to specific markets early in the morning to buy fish. Fish is now available on most local markets at any time of the day. This can be partially explained by the appearance of new sources of fish: Chinese fish, pond and cage fish. Last year, there was little fish available from these sources and, since fish from the lake is becoming scarcer, fish was difficult to find on the markets. Thanks to Chinese, pond and cage fish, the overall fish supply is now more regular and the quantity of fish on markets seems to have increased.

"There is a major difference in the market. Last year, whenever you had visitors you had to take public cars to go to Kisumu fish market and get fish. Now, in Chulaimbo, we have something like three vendors selling tilapia."

Joyce Olango, Focus group discussion held at Pioneer shop

"Last year, sometimes there was no fish or it was expensive. Fishermen and vendors would tell you they could not get fish at the lake. Now there is plenty in the market."

Emily Olang, Focus group discussion held at Pioneer shop

"I think there has been a change in availability compared to last year. In 2016, tilapia was for wealthier families only. Personally, I had forgotten about tilapia. But now, I can also afford fish as a low-income person. We get it directly from Pioneer without going to the market."

Benea Odhiambo, Focus group discussion held at Pioneer shop

"There are more fish this year compared to last year because there were no fish ponds or Chinese last year but now there are different sources of fish like cages, ponds and Chinese fish."

Salome Atieno, Focus group discussion held at Peacock Resort

"There are many fish in the market compared to last year. Last year, you had to go to the market early to buy fish so that you could get them but now you can go to the market anytime and find fish."

Monica Ochieng, Focus group discussion held at Peacock Resort

"There has been an improvement in fish availability at the market. There was a time last year when you could not get fish in the market if you went late in the evening. There are more fish in the market compared to last year."

Lucy Anyango, Ethnographic interview held in Riat-Otonglo

"Last year there were three fish vendors. Now there are four: the new one is selling tilapia and omena. There is more fish available in the market, due to the increased number of vendors."

Cheryl Achieng Oduor, Ethnographic interview held in Chulaimbo

7.7. PIONEER TILAPIA

Respondents who have tested Pioneer fish recognize its affordability (they have noticed that it is less expensive than tilapia on local markets) and its quality. They have also noted that Pioneer fish is fresh and available throughout the year (the supply does not depend on the seasons) and at all times of the day (the fish is kept fresh in a freezer). Most of the respondents claim that they have increased their fish consumption since they started buying from Pioneer (they tend to buy more tilapia now) and have reduced their fish-related expenses (they buy the same quantity but because the fish is less expensive, they spend less than they used to).

"Since the emergence of cage fish, you can get fish for less money and eat it more often. If you were eating fish once a week, you can now have it three times. Our fish budget has decreased."

Sylvia, Focus group discussion held at Pioneer shop

"I eat a lot of fish nowadays because I know the prices are affordable. I used to buy tilapia maybe once or twice in a week but now I buy 3 times in a week."

Dorothy, Focus group discussion held at Peacock Resort

"I buy Pioneer fish products because of the freshness of their fish. I can also get the fried one on request. Their prices are fair."

"They have good customer relations and they can replace your fish if you have complaints."

Filgona Auma Oluoch, Ethnographic interview held in Lela

"I prefer to buy tilapia at Pioneer farm because I am sure the fish I buy is fresh."

Angelina Nyabera, Ethnographic interview held in Marera village

"I buy fish from Pioneer because I am sure about their products being fresh."

Phenny Atieno Oguso, Ethnographic interview held in Mbala Wandu

"Their products are readily available anytime you need them, the fish are sold at a cheaper price compared to the market and they also taste good."

Asbeta Atieno, Ethnographic interview held in Kawour village

8. CONCLUSIONS

In this case study, the impact of GAIN's MNF investment on increasing the availability, affordability, convenience and desirability of fish was assessed using exploratory quantitative and qualitative methods. These methods were applied in two types of markets - intervention and control markets - as well as at the Pioneer outlet, defined as the POS.

The following key findings emerged from the study:

- Fish is a much-liked product and most people in the area buy it at least once a week. Fish consumption, however, depends on the season as availability of fish decreases in the dry season and prices therefore go up, sometimes prohibitively;
- Cage fish can bypass this issue as harvests do not depend on the season. Cage farmers can therefore ensure a constant supply at a regular price throughout the year;
- When buying fish, people mostly value the price, the freshness & cleanliness of the fish, and the proximity of the shop:
    - They often enquire about the fish origin to ensure that they are buying fresh and clean fish. They avoid Chinese and pond fish, which are considered as thorny and tasteless. Pioneer fish is often seen as pond fish by people who have never tasted it. However, after buying it a first time, people like it and often come back to the shop. It is therefore important to develop Pioneer's image as 'Lake Victoria fresh fish';
    - People buy fish (and other food products) at the closest food market (they buy food very regularly, often several times a day). Proximity is therefore a key issue in purchasing habits. 99% of the Pioneer consumers live within a 25 km radius area;
    - The current reach of kadogos stands up to nearly 3,900 households since December 2015 (when Pioneer started pond farming). The opening of new outlets could surely increase this reach;
- The consumer survey as well as the value chain work confirmed that Pioneer fish is affordable in both dry and rainy seasons. Pioneer fish should therefore be marketed as high quality and affordable fish to target more lower income people. In addition, Pioneer fish is available in various sizes, which allows consumers flexibility to buy the quantity they can afford. Lower income consumers generally prefer buying kadogos;
- Most POS consumers (96% vs. 69% of random consumers) have noticed an increase in tilapia's availability compared to the same time last year. During this period, Pioneer has been increasing its stocks – the first harvest occurred at the end of December 2016 and the quantity of fish harvested has been increasing since then. By well managing the fingerlings inflow in the cages to ensure regular harvests (on a weekly basis), this availability could continue to increase and become stable during the whole year;
- The Pioneer fish farm is earning most of its revenues from its sales of full-size tilapia in Nairobi and in restaurants (sales in Nairobi and restaurants represent 80% of its total sales). Kadogos and medium-size tilapia are sold to end consumers at the Pioneer outlet, located in front of the farm. The outlet is located 1 km away from Lela market;
- Kadogos do not seem very profitable for Pioneer. Given its current business model, sales of full-size fish in Nairobi and in restaurants are necessary to ensure the profitability of the farm. Interviews with cage farmers buying fingerlings from Pioneer confirm that distribution channels are more profitable in Nairobi – higher demand of full-size fish which allows a greater income per fish – and most of them sell their harvests to clients in Nairobi.

While wild fish from the lake have become scarcer (due to over-fishing and over-consumption of very small tilapia that have not reached maturation), cage fish stands as a good opportunity to supply fresh fish to local markets in the Kisumu area. However, farmers who want to start in the business face some challenges: cage farming requires an important working capital, and training, so that the fish are constantly fed during their whole growth. If not, they will not reach maturation at a normal pace (and this will result in losses for the farmers as the fish will not be sold at the expected period) or will even die.

Pioneer has asserted itself on the market and has developed an expertise on the overall production chain thanks to its production of fingerlings and tilapia. Through its sales of fingerlings, it can encourage farmers to develop their business to reach more households at a local level. Operational trainings could be envisaged to help people that buy fingerlings start and maintain their business.

9. APPENDIX

9.1. LIST OF POND & CAGE FARMERS GIVEN BY PIONEER

NO	NAME	CONTACT	LOCATION	Destination
	Cage Farmers			
1		0716520261	Anyanga beach (Bondo)	Cages
2	David	0723999693	Usenge	Cages
3	Dola	0724169143	Uhanya (bondo)	Cages
4	Patrick Omondi	0724159255		Cages
5	Peter Wangira	0723319527	Usenge	Cages
6	Ohanga	0728270351	Anyanga beach	Cages
7	Dennis	0724649274	Oele beach (bondo	Cages
8	Philip	0720865563	Uhanya	Cages
9	Mr Dan	0725836052	Uhanya	Cages
10	Mark	0708235082	Usenge	Cages
11	Dan Yugi	0727757842	Usenge	Cages
12	Mr Fredrick	0724927003	Mageta	Cages
13	Mrs Linet	0723919818	Uhanya	Cages
14	Mr Awando	0717328236	Uhanya	Cages
	Pond Farmers			
1	Ananda Joel	0714733383	Luanda	Pond
2	Benedict	07001783334	Lela	Pond
3	Okwemba	0723495850	Luanda	Pond
4	Peter	0725324540	Yala	Pond
5	Simon	0736899814	Siaya	Pond
6	Odera	0776254197	Ebusakami	Pond
7	William	0720647897		Pond
8	Mrs Gladys	0713939760	Bungoma	Pond

9.2. PREFERRED FISH

Table 32 – What types of fish do you prefer to eat? (Consumer survey, number of answers)

	Values per type of consumer			
	Intervention market	Control market	Pioneer POS	p-value
Number of respondents	304	282	47	
Tilapia	280	235	47	<0.001
Nile perch	168	178	23	0.063
Okoko	50	69	5	0.014
Omena	189	177	27	0.784
Mgongo Wazi	46	40	6	0.89
Wiu	81	100	13	0.062

9.3. DIFFERENCES IN FISH CONSUMPTION ACCORDING TO SEASONS

Table 33 – How does your consumption of fish differ during the rainy season compared to the dry season? (Consumer survey, percentage of respondents)

	Values per type of consumer			
	Intervention market	Control market	Pioneer POS	p-value
Number of respondents	304	282	47	-
I eat more fish in the rainy season	43%	56%	26%	<0.001
I eat less fish in the rainy season	14%	8%	4%	0.021
I eat different types of fish in the rainy season	10%	11%	17%	0.341
I purchase my fish from different shops/markets	4%	3%	2%	0.429
My consumption of fish is the same during the dry and rainy seasons	45%	33%	72%	<0.001

9.4. REASONS TO CHOOSE ONE MARKET AREA RATHER THAN ANOTHER TO BUY FISH

Table 34 – What are the main reasons for which you choose this market/area rather than another to buy fish? (Consumer survey, number of respondents)

	Values per type of consumer			
	Intervention market	**Control market**	**Pioneer POS**	**p-value**
	289	268	47	
Fish are cheaper here	156	128	38	<0.001
Fish are bigger here	19	13	11	<0.001
There are smaller portions/sizes available	19	13	4	0.515
Fish are fresher here	133	118	34	0.001
Fish are easier to find/more available here	43	19	13	<0.001
I know vendors personally	50	63	11	0.17
I know the origin of fish sold here	14	6	9	<0.001
I can buy products other than fish	22	8	3	0.054
This place is easily accessible	133	156	21	0.01
This market/ place is cleaner	20	10	16	<0.001
There is more variety in fish here	18	13	4	0.557
I can bargain	22	27	4	0.589

9.5. DIFFERENCES IN CONSUMPTION PER LEVEL OF INCOME

Table 35 – How does your consumption of fish differ during the rainy season compared to the dry season? (Consumer survey, percentage of respondents)

	Intervention market							Control market						
	< 5,000 KES	5,001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 - 50,000 KES	> 50,000 KES	< 5,000 KES	5,001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 - 50,000 KES	> 50,000 KES
Number of respondents	48	62	55	43	31	29	12	59	66	46	33	15	28	8
I eat more fish in the rainy season	38%	44%	49%	28%	65%	45%	42%	56%	58%	52%	61%	53%	68%	38%
I eat less fish in the rainy season	17%	11%	4%	16%	7%	14%	33%	7%	14%	7%	3%	0%	4%	0%
I eat different types of fish in the rainy season	8%	13%	4%	9%	7%	10%	25%	10%	14%	11%	15%	0%	11%	0%
I purchase my fish from different shops/markets	4%	3%	2%	2%	10%	10%	0%	2%	2%	9%	0%	0%	0%	0%
My consumption of fish is the same during the dry and the rainy season	46%	48%	44%	58%	36%	38%	58%	34%	30%	33%	36%	47%	21%	63%

Table 36 – What is the most important reason for you when buying fish? (Consumer survey, percentage of respondents)

	Intervention market	Control market

	< 5,000 KES	5,001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 – 50,000 KES	> 50,000 KES	< 5,000 KES	5,001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 – 50,000 KES	> 50,000 KES
Number of respondents	48	62	55	42	31	29	12	59	66	46	33	15	28	8
Price	38%	42%	42%	43%	51%	38%	42%	34%	38%	50%	55%	40%	36%	25%
Size of the fish: large	11%	6%	13%	7%	0%	3%	8%	17%	4%	4%	0%	7%	4%	0%
Size of the fish: small	2%	2%	0%	2%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
Freshness	33%	35%	27%	29%	29%	28%	25%	36%	42%	24%	33%	47%	28%	50%
Easy to find/availability	2%	0%	0%	0%	0%	3%	0%	3%	0%	0%	0%	7%	7%	0%
Taste	4%	2%	7%	2%	0%	0%	0%	2%	2%	2%	0%	0%	11%	0%
Nutritional value/good for health	4%	3%	4%	5%	10%	7%	17%	5%	3%	9%	3%	0%	7%	13%
Origin of the fish	2%	2%	2%	0%	0%	0%	0%	0%	0%	2%	3%	0%	0%	0%
Cleanliness/appearance of the fish	4%	8%	4%	12%	10%	21%	8%	3%	11%	7%	6%	0%	7%	12%

Table 37 – In the last two weeks, how often did you buy fish? (Consumer survey, percentage of respondents)

	Intervention market							Control market						
	< 5,000 KES	5,001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 - 50,000 KES	> 50,000 KES	< 5,000 KES	5,001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 - 50,000 KES	> 50,000 KES
Number of respondents	48	62	55	42	31	29	12	59	66	46	33	15	27	8
Every day	11%	6%	13%	10%	19%	3%	8%	5%	8%	2%	9%	0%	7%	0%
At least once per week	83%	90%	84%	79%	74%	90%	92%	81%	86%	98%	88%	100%	89%	100%
Less than once per week	4%	2%	2%	7%	7%	7%	0%	12%	4%	0%	3%	0%	4%	0%
I only buy on special occasions	2%	2%	0%	2%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
I don't buy fish during the rainy season	0%	0%	0%	2%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%

Table 38 - During the dry season, how often do you buy fish? (Consumer survey, percentage of respondents)

	Intervention market							Control market						
	< 5,000 KES	5,001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 - 50,000 KES	> 50,000 KES	< 5,000 KES	5,001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 - 50,000 KES	> 50,000 KES
Number of respondents	48	62	55	42	31	29	12	59	66	46	33	15	28	8
Every week	65%	57%	60%	58%	74%	69%	67%	70%	65%	70%	82%	67%	82%	88%
Every month	35%	43%	31%	37%	26%	31%	33%	22%	35%	26%	15%	33%	18%	12%
I only buy fish on special occasions	0%	0%	7%	2%	0%	0%	0%	3%	0%	2%	3%	0%	0%	0%
I don't buy fish during the dry season	0%	0%	2%	2%	0%	0%	0%	5%	0%	2%	0%	0%	0%	0%

9.6. Reasons to Prefer Kadogos

Table 39 – Why do you prefer to buy smaller tilapia? (Consumer survey, number of respondents)

	Values per type of consumer			
	Intervention market	Control market	Pioneer POS	p-value
Number of respondents	114	62	24	
I can buy more because it is less expensive	73	45	8	<0.001
I do not have money for bigger fish	6	6	1	
It is easier to prepare	19	4	1	
Small pieces can feed more household members	13	5	12	
Less chance of wasting food	3	2	2	

9.7. Purchases at Pioneer

Table 40 – In the last two weeks (corresponding to the rainy season)/during the dry season, how often did you buy fish? (Consumer survey, number of respondents)

	Values per type of consumer			
	Intervention market	Control market	Pioneer POS	p-value
Number of respondents	304	282	47	-
Frequency of fish purchase in the rainy season				
Every day	11%	6%	4%	0.083
At least once per week	84%	89%	83%	0.303
Less than once per week	4%	4%	6%	0.744
I only buy fish on special occasions	1%	0%	6%	0.001
I do not buy fish in the rainy season	0%	1%	0%	0.708
Frequency of fish purchase in the dry season				
Every week	64%	71%	57%	0.053
Every month	34%	26%	34%	0.066
I only buy fish on special occasions	1%	1%	9%	0.003
I do not buy fish in the dry season	1%	1%	0%	0.500

Table 41 – In the last two weeks (corresponding to the rainy season)/during the dry season, specify how often you generally bought fish? (Consumer survey, number of respondents)

	Values per type of consumer					
	Intervention market		Control market		Pioneer POS	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Average quantity of fish purchase in the rainy season for those buying…						
Every day	3 (N=32)	2	3 (N=17)	2	2 (N=2)	0
At least once per week	2 (N=256)	1	2 (N=249)	1	2 (N=39)	1
Less than once per week	2 (N=12)	1	2 (N=12)	1	3 (N=3)	2
I only buy fish on special occasions (numb. of times a year)	17 (N=3)	6	20 (N=1)	-	1 (N=3)	1
I do not buy fish in the rainy season	-	-	-	-	-	-
Average quantity of fish purchase in the dry season for those buying…						
Every week	2 (N=193)	1	2 (N=201)	1	2 (N=27)	1
Every month	2 (N=105)	2	2 (N=73)	1	2 (N=16)	1
I only buy fish on special occasions (number of times during the dry season)	2 (N=4)	1	2 (N=4)	1	2 (N=4)	1
I do not buy fish in the dry season	-	-	-	-	-	-

9.8. REASONS TO LIKE PIONEER FISH

Table 42 – What are the main reasons for which you chose this vendor rather than another to buy your tilapia? (Consumer survey, number and percentage of respondents)[65]

	Number of respondents	Percentage of respondents
Total number of respondents	47	-
Fish are cheaper here	40	85%
Fish are bigger here	7	15%
Fish are fresher here	35	75%
Fish are more readily available	15	32%
Fish are cleaner here	26	55%
Fish taste better here	16	34%
I know this vendor personally	6	13%
I know the origin of the fish sold by this vendor	7	15%
I can buy other products from this vendor as well	2	4%
This vendor is the closest to my home	18	38%
This shop is cleaner than elsewhere	14	30%
Sales staff is nice/friendly	9	19%
I can bargain to get a good price	3	6%

[65] This question was asked to POS consumers only.

Table 43 – Among the reasons you just mentioned, which one is the most important to you? (Consumer survey, number and percentage of respondents)

	Number of respondents	Percentage of respondents
Total number of respondents	47	-
Fish are cheaper here	22	47%
Fish are bigger here	0	0%
Fish are fresher here	13	28%
Fish are more readily available	3	6%
Fish are cleaner here	3	6%
Fish taste better here	1	2%
I know this vendor personally	0	0%
I know the origin of the fish sold by this vendor	0	0%
I can buy other products from this vendor as well	0	0%
This vendor is the closest to my home	3	6%
This shop is cleaner than elsewhere	1	2%
Sales staff is nice/friendly	1	2%
I can bargain to get a good price	0	0%

9.9. PERCEPTIONS OF AVAILABILITY AND AFFORDABILITY AMONG POS CONSUMERS (PER LEVEL OF INCOME)

Table 44 – Thinking about the same time last year, can you please tell me how your consumption of tilapia has evolved? (Consumer survey, number of POS consumers)

	Less than 5,000 KES	5,0001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 – 50,000 KES	More than 50,000 KES
Number of respondents	0	2	7	12	4	9	7
Dramatically increased	0	0	1	6	1	4	1
Increased	0	2	3	5	1	4	2
Stayed the same	0	0	2	0	2	1	3
Decreased	0	0	1	1	0	0	1
Dramatically decreased	0	0	0	0	0	0	0

Table 45 – Thinking about the same time last year, can you please tell me how tilapia prices on this market/area have evolved? (Consumer survey, number of POS consumers)

	Less than 5,000 KES	5,0001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 – 50,000 KES	More than 50,000 KES
Number of respondents	0	2	7	12	4	8	7
Dramatically increased	0	0	1	0	0	1	0
Increased	0	0	2	2	1	0	2
Stayed the same	0	1	4	7	3	5	2
Decreased	0	1	0	3	0	2	3
Dramatically decreased	0	0	0	0	0	0	0

Table 46 – Can you please tell me how affordable tilapia is on this market/area? (Consumer survey, number of POS consumers)[66]

		Less than 5,000 KES	5,0001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 – 50,000 KES	More than 50,000 KES
Number of respondents		0	2	7	11/12	4	9	7
Dry season	**Very affordable**	0	0	2	3	0	1	1
	Affordable	0	1	5	7	2	7	6
	Not affordable	0	1	0	1	2	1	0
	Not affordable at all	0	0	0	3	0	0	0
Rainy season	**Very affordable**	0	1	3	6	0	6	4
	Affordable	0	1	4	6	4	3	3
	Not affordable	0	0	0	0	0	0	0
	Not affordable at all	0	0	0	0	0	0	0

Table 47 – Can you please tell me how available tilapia is on this market/area? (Consumer survey, number of POS consumers)

		Less than 5,000 KES	5,0001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 – 50,000 KES	More than 50,000 KES
Number of respondents		0	2	7	12/11	4	9	6/7
Dry season	**Very available**	0	0	1	5	1	4	2
	Available	0	1	5	5	2	4	4
	Not available	0	1	1	2	1	1	0
	Not available at all	0	0	0	0	0	0	0
Rainy season	**Very available**	0	1	3	5	1	6	4
	Available	0	1	4	6	3	3	3
	Not available	0	0	0	0	0	0	0
	Not available at all	0	0	0	0	0	0	0

[66] Question excludes the 'Do not know' answer.

Table 48 – How has your frequency of fish purchasing evolved since you started to buy fish from this shop? (Consumer survey, number of POS consumers)

	Less than 5,000 KES	5,0001 – 10,000 KES	10,001 – 15,000 KES	15,001 – 20,000 KES	20,001 – 25,000 KES	25,001 – 50,000 KES	More than 50,000 KES
Number of respondents	0	2	7	11	4	9	6
Dramatically increased	0	1	5	8	0	6	1
Increased	0	0	2	3	3	1	3
Stayed the same	0	1	0	0	1	2	2
Decreased	0	0	0	0	0	2	0
Dramatically decreased	0	0	0	0	0	0	0

9.10. TYPES OF FISH SOLD IN THE DIFFERENT MARKETS

Table 49 – Details of products sold by interviewed vendors (Vendor survey, number and percentage of respondents)

	Values per type of vendor				
	# in intervention markets	% in intervention markets	# in control markets	% in control markets	Pioneer vendor
Types of fish sold					
Tilapia	14	100%	39	100%	1
Nile perch	7	50%	25	64%	0
Okoko	2	14%	11	28%	0
Omena	7	50%	16	41%	0
Mgongo wazi	0	0%	2	5%	0
Wiu	5	36%	17	44%	0
Number of fish types sold over time					
Stable	6	43%	28	72%	1
Increased	6	43%	11	28%	0
Decreased	2	14%	0		0
Best-selling product					
Tilapia	11	79%	27	71%	1
Nile perch	3	21%	7	18%	0
Wiu	0	0%	4	11%	0

9.11. VENDORS BUSINESS

Table 50 – Do you have one or several suppliers of tilapia? (Vendor survey, percentage of respondents)

	Intervention market (N=14)	Control market (N=39)	p-value
One	36%	33%	0.386
Several	64%	67%	

Table 51 – Do you consider it profitable for you to sell tilapia? (Vendor survey, percentage of respondents)

	Intervention market (N=14)	Control market (N=39)	p-value
Yes	93%	72%	0.230
No	7%	28%	

Table 52 – Are you aware of Pioneer? (Vendor survey, percentage of respondents)

	Intervention market (N=14)	Control market (N=39)	p-value
Yes	93%	23%	<0.001
No	7%	77%	

Table 53 – How do you know about Pioneer? (Vendor survey, percentage of respondents)

	Intervention market (N=13)	Control market (N=8)	p-value
I have seen the shop	54%	50%	0.772
Family/relatives/friends told me about it	15%	38%	
Other vendors who get their fish from there	15%	0%	
Clients who have mentioned it or have shopped there	15%	12%	

9.12. VENDORS' VIEW OF THE FISH MARKET AND ITS RECENT EVOLUTION

Table 54 – Compared to the same time last year, can you please tell me how the following have evolved...? (Vendor survey, percentage of respondents)

		Intervention market (N=14)	Control market (N=39)
		Count	Count
The amount of tilapia you sell	Increased	6	14
	Stayed the same	4	12
	Decreased	4	12
	Do not know	0	1
The amount of kadogos you sell	Increased	5	18
	Stayed the same	2	13
	Decreased	7	7
	Do not know	0	1
The price you pay to suppliers of tilapia	Increased	10	19
	Stayed the same	1	17
	Decreased	3	2
	Do not know	0	1
The price at which you sell tilapia to consumers	Increased	7	13
	Stayed the same	5	20
	Decreased	2	5
	Do not know	0	1

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