



KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

FRESH WATER SYSTEMS

Assessing the effectiveness of installed Chorkor Oven (innovative technologies) in reducing fish post-harvest losses and enhancing income of processors at Kampi ya Samaki along Lake Baringo



TECHNICAL REPORT: KMF/RS/2021/C8212(1)


JUNE, 2021

DOCUMENT CERTIFICATION

Certification by Director Freshwater Systems

I hereby certify that this report has been done under my supervision and submitted to the Director.

Name: Dr. Christopher Mulanda Aura (PhD)

Signature: 

Date: 16th June, 2021

Certification by Director KMFRI

I hereby acknowledge receipt of this Report

Name: Prof. James M. Njiru, PhD

Signature: 

Date: 18th June, 2021

Citation:

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ACKNOWLEDGEMENTS

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Abstract

Along Lake Baringo, smoking and frying are the main methods used in fish preservation. Fish smoking prolongs shelf life, enhances flavour and increases products utilization. More so, it reduces waste at times of bumper catches and permits storage for the lean season. Nevertheless, traditional smoking methods have limitations, such as limited handling capacities, inefficient procedures, low product quality and short shelf-life. In most cases the fish produced is of low quality. The low products quality contributes to the low income generated from the fishery, rejection of the products by consumers and remarkably high post-harvest losses. These conditions subsequently restrict product sales to low income consumers' and subsequently financial value loss to fishers. The activity aimed at assessing the effectiveness of installed Chorkor oven in reducing post-harvest losses and enhancing income of fishers at Kambi ya Samaki. Data was collected using questionnaire which were administered mainly in Kiswahili, since it was the most favourable dialect of interaction. The respondents reported fish smoked from Chorkor oven to take about 1 day when compared 2 days while using traditional smoking kilns to attain comparable fish moisture level. They also reported Chorkor ovens to have higher a capacity, utilize less fuel wood and produces better end products quality than the traditional one. This demonstrates the efficacy of technology in reducing post-harvest loses especially during bumper landings. As regards to enhancing income, respondents were unsatisfied as there was no price variance of fish products smoked from Chorkor oven and traditional kilns.

Key Words: Chorkor oven, traditional kiln, post-harvest losses, kiln, Kambi ya Samaki.

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1.0 Introduction

Fresh fish is highly perishable and various preservation techniques largely chilling, freezing, drying, salting and smoking are used universally to extend shelf life. Along Lake Baringo as is the case in many artisanal fisheries, lack of developed cold storage and marketing network at the landing sites makes fresh and frozen fish distribution challenging (Odoli et al., 2013). Fish landed from Lake Baringo is marketed in far-flung markets mainly in Kabarnet, Nakuru and Nairobi towns. The distance to main markets and challenges in cold chain infrastructure makes marketing of fish in fresh form impossible. In developing countries, the most affordable and widely used fish preservation methods are drying and smoking (Oduor-Odote *et al.*, 2010, Darvishi *et al.*, 2013). However, along Lake Baringo the main fish preservation methods employed is smoking, with an increasing proportion being deep fried in recent times.

Fish smoking is relevant in the artisanal fisheries in that it prolongs the shelf life of the fish, enhances flavour and increases fish utilization. It also reduces waste during bumper catches, and increases protein availability to people across the fishing seasons. Traditional smoking involves treating of pre-salted, whole, eviscerated or filleted fish with wood smoke. The smoke is produced by smoldering wood and shavings or sawdust in the kiln, directly below the fish or fillets, laid out on mesh trays (Oduor-Odote, Obiero, & Odoli, 2010; Cyprian et al., 2015). Different techniques of fish smoking exist and vary from a country to another, based on the tradition, preferred tastes and market preferences. The quality of smoked fish differs according to the smoking methods, fish species and the wood used in the smoking process, which can give a different taste to the final product. The conditions of processing and the composition of the smoke affect the quality of the product and the potential health hazards associated with smoked foods (Hitzel, Pöhlmann, Schwägele, & Speer, 2012; Viksna, Bartkevic, Kukare, & Morozovs, 2008).

Over the years, traditional fish processing by smoking has had weaknesses hence making the method unpopular with changes in time. Conventional fish smoking is commonly conducted mainly by women. It has traditionally been done in simple kilns that are not energy efficient, have low capacity and use a lot of fire wood resulting in higher carbon dioxide emissions. Besides it leads to products of low quality that are easily infested by insect among other factors, some of which produce mycotoxins which have direct effect on human health. KMFRI in attempt to reduce the quantity of fuel wood used and obtain higher quality fish products that are hygienically smoked for better income introduced an energy saving Chorkor oven. The improved energy saving Chorkor oven has a combustion chamber together with smoking unit

and a set of trays. The need for assessing the effectiveness of installed Chorkor ovens in reducing post-harvest losses and enhancing the income of processors cannot therefore be overstated. Therefore, the overall objective of this study was to assess the effectiveness of Chorkor oven in reducing fish post-harvest losses and enhancing income of processors at Kampi ya Samaki.

2.0 Methodology

2.1 Study Area

This study was conducted from 16th to 19th November 2020 and 19th – 21st April, 2021 at Kampi ya Samaki fish processing sites along Lake Baringo.

2.2 Target population

The study population comprised 30 processors (mainly women) directly involved in artisanal fish processing and 16 smoked fish consumers at Kampi ya Samaki.

2.3. Sampling Techniques

The sampling technique was based on census. According to Farooq (2013), census methods refers to the complete enumeration of a universe. A universe may be place, a group of people or a specific locality through which we collect the data. In our study we used the census method where by the population was people involved in artisanal fish processing at Kampi ya Samaki. This was to ensure a higher degree of accuracy. No other method is as accurate as census when the population/universe is small. This method is applicable for units having heterogeneous/difference. In this study the target population was small as the total number of all processors at Kambi ya Samaki fish processing site as per the BMU records was noted to be about 30, whereas a majority of Kambi ya Samaki residents preferred fried fish over smoked.

2.4. Primary data collection

Primary data was collected by a team of 5 personnel who were introduced and guided by a respective BMU executive official present. The Beach Management Unit (BMU) official aided the research team in identifying and assembling together women involved in fish processing for the questionnaire led interviews. On the other hand, consumers were interviewed while purchasing smoked fish. The questionnaire was used as the main tool for primary data collection (Hair et al., 2004). The questionnaires were administered mainly in Kiswahili, since it was the most favourable dialect of interaction. Relevant secondary information utilized included information from key informants and published journal papers or technical reports to triangulate results.



Plate 1: Questionnaire led interviews Kampi ya Samaki processing site

Direct observation mainly entailed examination of the traditional smoking kiln and installed Chorkor oven, and filming of spectacular and relevant scenery and activities during fish processing and selling. At the end of day, a recap session was held to deliberate on progress made, difficulties encountered and team member experiences during the interview process.

3.0 Results and discussion

3.1. Study sample statistics

Structured questionnaire interviews were held with all processors identified and present during sampling. A total of 42 respondents were interviewed (Female = 39 and Male = 3, Fig. 1) from Kampi ya Samaki site whose members participated in the study. Female dominance recorded in the present study (93%) was expected since artisanal fish processing and shopping for household utilities in Kenya is mainly practiced by women (Oduor-Odote et al., 2010; Cyprian et al., 2017).

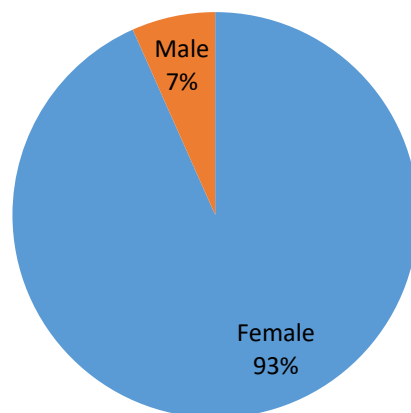


Fig. 1: Gender distribution among respondents (N= 42) at Kampi ya Samaki, KMFRI Baringo Field Data (2020)

3.2. Fish processing method employed

A majority of the respondents (41%) were preserving/processing fish by deep frying, followed by those using both deep frying and smoking methods at 31%, whereas respondents using smoking as the only processing method were at 24%, trailed by sun drying at 3% (Fig. 2). The main determinant factor to the processing method embraced was market demand with 83% of respondents approval, distantly followed by the quantity of fish landed accounting for 10% of respondents while weather condition accounted for 6% in determining the processing method used.

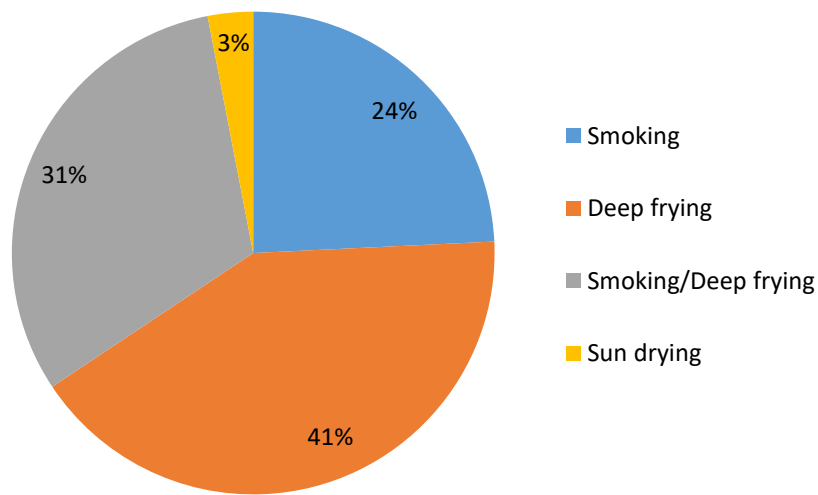


Fig. 2. Fish processing methods used along Lake Baringo

3.3. Assessment of the effectiveness of Chorkor oven intervention in reducing fish post-harvest losses

In this study a substantive number of respondents recorded to have adopted the use of Chorkor oven in fish smoking (34%); however, a significantly higher number were not using Chorkor oven (66%). This finding corresponds well earlier study where a majority of the respondents employs deep frying method (Odoli *et al.*, 2019). It's also worth mentioning that only 10% of the respondents have constructed Chorkor ovens on their own since its introduction as 24% of respondents are using the KMFRI installed ovens. The observed restricted Chorkor oven up scaling is mainly attributed to higher construction cost (55% of respondents) as well as reduced fish landing and lack of technical knowhow with approvals of 24% and 21% respectively (Fig. 3).

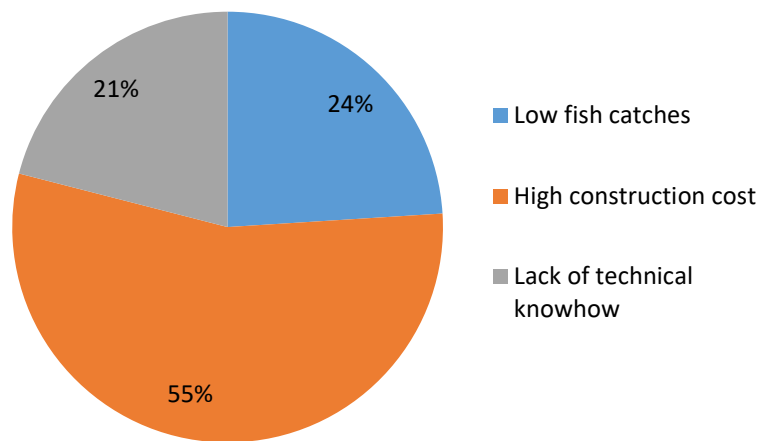


Fig. 3. Main factors contributing to low Chorkor oven up scaling

During the assessment, all the respondents (processors) employing smoking method (100%) reported Chorkor oven to utilize less fuel wood with better end products quality. It's important to note that all installed Chorkor ovens at Kambi ya Samaki were being utilized a fact mainly attributed to technologies effectiveness in reducing post-harvest losses and enhancing income.

Conclusions

The study findings showed the prominence of Chorkor oven efficiency in reducing fish post-harvest losses, but sharing similar challenges in the technology up scaling. The need for more Chorkor oven was evident in all sampled sites with the perceived support from KMFRI as the initiator of the technology. This was apparent due to the socio-economic status of the respondents. The installed Chorkor oven performs a very vital role to match the market demands for quality fish products but the sustainability was brought to question due to declining landings being recorded in all study sites. Market demand was reported to be the main driving factor in determining the processing method. It was noted that presently deep fried fish though have limited shelf life, are the consumers' preference. A factor that can be as a result of consumers changing life styles as well improved transport infrastructure in Baringo enabling fish products to access distant markets timely.

Recommendations for informed decision making

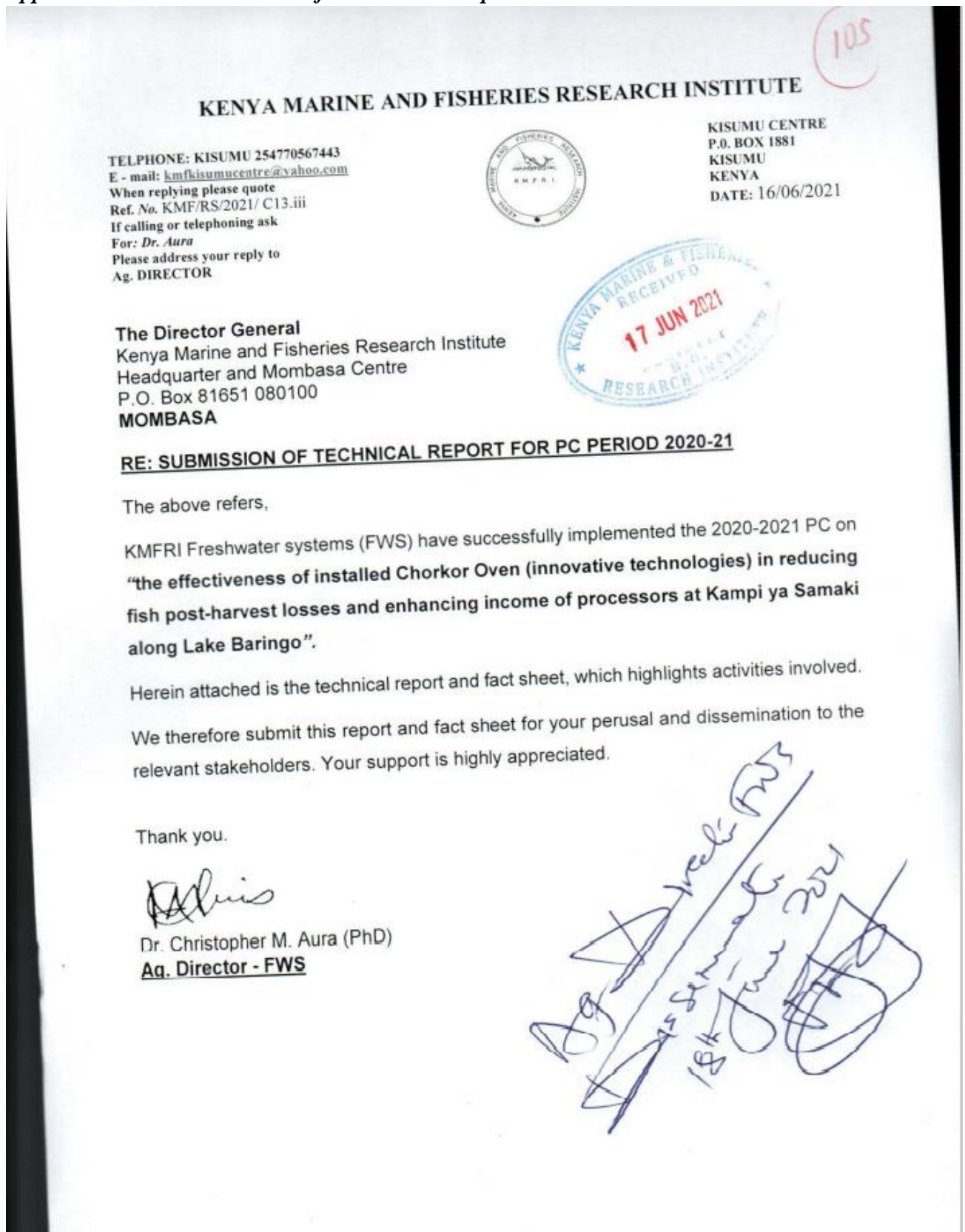
- Fish processors along Lake Baringo require more awareness creation and training to ensure fish food safety and good financial management.
- There is need to prioritize the urgent support needs emerging from the processors interviewed, especially as regards to the construction of more Chorkor ovens in Kampi ya Samaki. The involvement of other stakeholders especially the County government of Baringo is needed to ensure sustainability and successful up scaling.
- There is a need for community sensitization on alternative livelihoods as a means of diversification for enhanced income.

References

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APPENDICES

Appendix 1: Submission letter of the technical report to the Director KMFRI



Appendix 2: Submission letter of the technical report to DFWS

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

Mobile: +254 722395764
Email: cogombe@yahoo.com
If calling, ask for Dr. Odoli
Please address your reply to;
Station Coordinator.



Baringo Research Centre,
P. O. Box 231- 30403,
Margit,
Kenya.

Ref: KMF/BR/AD

Date: 14/06/2021

To Ag. DFWS,
KMFRI,
P.O BOX 1881,
Kisumu.

Dear Sir,

**RE: SUBMITON OF REPORT ON ASSESSING THE EFFECTIVENESS OF
INSTALLED CHORKOR OVEN (INNOVATIVE TECHNOLOGIES) IN REDUCING
FISH POST-HARVEST LOSSES AND ENHANCING INCOME OF PROCESSORS AT
KAMPI YA SAMAKI ALONG LAKE BARINGO KMF/RS/2020/C13.III.**

Please herein find the above report for your personal perusal and submission to the Director.

Key issues observed from preliminary results were as follows:

1. Results depicted the prominence of Chorkor oven efficiency in reducing fish post-harvest losses since it was reported to be user friendly and results in quality fish products. Despite the efficiency, challenges in up-scaling were noted.
2. Chorkor oven could perform vital role to match the market demands for quality fish products, but its sustainability may be brought to question due to price indifferent with traditional smoked fish products.

A handwritten signature in black ink, appearing to read 'C. Odoli', is written over a horizontal line.

Dr. Cyprian O. Odoli (PhD)
Station Coordinator

Appendix 3: Approved requisitions to assess the effectiveness of installed Chorkor ovens

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**KMFRI BARINGO STATION
INTERNAL MEMO**

TO: STATION COORDINATOR
FROM: RESEARCH
DATE: 12th APRIL 2021
SUBJECT: FACILITATION FOR SAMPLING TOWARDS MEETING THIS YEAR (2020-2021) PC TARGETS

- We are scheduled to sample during this dry season for the following targets:
1. Map and monitor major point sources of pollution and assess their effect on fish ecology in lake Baringo at Molo and Perkerra river mouths.
 2. Assessment of fluoride levels in Lake Baringo and its catchments and its effects on fish ecology and human life.
 3. Assess the effectiveness of installed chokor oven in reducing fish post-harvest losses and enhancing income of processors at Kampi ya Samaki along Lake Baringo.

The above named PCs have been combined because of meagre resources and I hope with dedication our team will be able to deliver. Meanwhile, all the laid down MOH guidelines on COVID 19 shall be exercised during the execution of this important activity.

The purpose of this memo therefore is to request for a 3-day night out for the following officers who are scheduled to carry out the sampling as from 13/04/2021.

S/No.	Name	Job Group	Days	Rate	Amount
1	Dr. Cyprian Odoli	D3	3	10500	31500
2	Kobingi Nyakeya	C3	3	8400	25200
3	James Mugo	D2	1	8400	8400
4	Julius Kiplagat	B3	1	4900	4900
5	Ben Rotich	B3	2	4900	9800
6	Caroline Kibet	Intern	1	4900	4900
	Total				84700

Yours sincerely,

[Handwritten signature]

Kobingi Nyakeya

② Acc approved - process immediately as the activity begins 13/04/21
 [Signature] 12/04/21

③ T.N.A [Signature] 12/4/2021

Aaron [Signature]

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KMFRI BARINGO STATION
INTERNAL MEMO

TO: STATION COORDINATOR FROM: RESEARCH SCIENTIST I

DATE: 12th Nov. 2020

SUBJECT: ASSESS THE EFFECTIVENESS OF INSTALLED CHORKOR OVEN IN REDUCING FISH POST-HARVEST LOSSES AND ENHANCING INCOME OF PROCESSORS AT KAMPI YA SAMAKI ALONG LAKE BARINGO

This is to bring to your attention that we are planning to undertake a 4 day field work activities next week to assess the effectiveness of installed Chorkor Oven in reducing fish post-harvest losses and enhancing income of processors at Kampi ya Samaki along Lake Baringo.

The purpose of this memo is therefor to request facilitation of the study.

Name	Rate	No. days	Ksh
Cyprian Odoli	1500	4	6,000
Kobingi Nyakeya	1000	2	2,000
James Mugo	1000	2	2,000
Carol Kibet	750	4	3,000
Conland Barongo	750	4	3,000
David Kayaga	750	4	3,000
Patrick Aluse	750	4	3,000
William Kapkiai	750	2	1,500
community	1000	4	4,000
Joseph Wintonye	750	3	2,250
Total			27,500

(To pay community) [Signature]
29,750/-

Yours sincerely

James Mugo

*Cashier
Facilitate
the same
12/11/2020*

*ACE
Approved as revised:
[Signature]
12/11/20*

*Action taken
[Signature]
12/11/2020*

Appendix 4: Work tickets

*These headings to be completed by Issuing Officer

REPUBLIC OF KENYA

MINISTRY OF Kenya Ministry of Fisheries Research Institute

TRANSPORT - DAILY WORK TICKET DEPT.* Kenya Ministry of Fisheries Research Institute TICKET NO. **P 139738**

PREVIOUS W.T. No.* 8890 G.K. No.* KCA 182F MAKE* Nissan Nana UNIT* Baruko STATION* MALIGAI

Driver's Name and Number		Number, Name and Designation of Authorizing Officer		Specimen Signature of Authorizing Officer	
1	<u>BEN RACHA (1928)</u>	4	1	<u>DR. CIPRIAN O. ODOL - S/C</u>	<u>[Signature]</u>
2		5	2	<u>KOBEJONGI M. M. M. - RS</u>	<u>[Signature]</u>
3		6	3	<u>MARISTO N. GISESA - FRA (1202)</u>	<u>[Signature]</u>

Date	Driver's No.	Details of journey and route in full	No. and Signature of person authorizing journey		Oil drawn (litres)	Fuel drawn (litres)	P.O.L. (S 15) Voucher No. or L.P.O. No. or Cash Voucher No.	Time		Speedo Reading at end of Journey	Kilometres of Journey
			No. (4)	Signature (5)				Out (9)	In (10)		
										145476	
<u>1/4/21</u>	1	<u>MOCHONGI - NYIMBA & BACK</u>	4	<u>[Signature]</u>		20	855	6:00 am	4:20 pm	145476	81
<u>2/4/21</u>	1	<u>MOCHONGI - NYIMBA & BACK</u>	4	<u>[Signature]</u>		20	859	6:15 am	4:20 pm	145476	76 km
<u>3/4/21</u>	1	<u>MOCHONGI - NYIMBA & BACK</u>	4	<u>[Signature]</u>		20	861	6:00 am	4:30 pm	145478	76 km
<u>4/4/21</u>	1	<u>MOCHONGI - NYIMBA & BACK</u>	4	<u>[Signature]</u>		20	868	6:00 am	4:20 pm	145814	76 km
<u>5/4/21</u>	1	<u>MOCHONGI - NYIMBA & BACK</u>	4	<u>[Signature]</u>		20	834	6:10 am	3:34 pm	145899	85 km
<u>6/4/21</u>	1	<u>MOCHONGI - MALIGAI</u>	4	<u>[Signature]</u>		20	866	8:00 pm	11:00 am	146023	124 km
<u>7/4/21</u>	1	<u>Mangot - Eldama bark</u>	1	<u>[Signature]</u>		162	10795	11:30 am	1:35 pm	146052	29 km
<u>14/4/21</u>	1	<u>Mangot - offices - Nakuru</u>	1	<u>[Signature]</u>		6272		8:30 am	4:30 pm	146195	139 km
<u>15/4/21</u>	1	<u>Nakuru - Eld-Rwen - Maligai</u>	1	<u>[Signature]</u>				9:25 am	12:30 pm	146215	28 km
<u>16/4/21</u>	1	<u>MALIGAI - KYS MALIGAI</u>	1	<u>[Signature]</u>				6:00 am	4:40 pm	146726	308 km
<u>17/4/21</u>	1	<u>MALIGAI offices - Moso - bark</u>	1	<u>[Signature]</u>				6:00 am	9:45 pm	146785	62 km
<u>17/4/21</u>	1	<u>MALIGAI offices - KYS - NAKURU</u>	1	<u>[Signature]</u>		4082		10:00 am	1:41 pm	146790	152 km
<u>18/4/21</u>	1	<u>Nakuru - KYS - MALIGAI offices</u>	2	<u>[Signature]</u>				1:45 pm	5:52 pm	146790	150 km
<u>18/4/21</u>	1	<u>MALIGAI offices - KYS MALIGAI - bark</u>	3	<u>[Signature]</u>				8:00 am	2:00 pm	146857	47 km
<u>19/4/21</u>	1	<u>Mangot - KYS - Mangot office</u>	3	<u>[Signature]</u>				8:30 am	2:57 pm	146907	72 km
<u>20/4/21</u>	1	<u>Mangot - Nakuru - Mangot office</u>	3	<u>[Signature]</u>				10:00 am	4:30 pm	147128	219 km
<u>21/4/21</u>	1	<u>Mangot - Eldama bark - Mangot office</u>	1	<u>[Signature]</u>		5152		12:00 pm	1:30 pm	147231	98 km

Date	Driver's No.	Details of Journey and Route in full	No. and Signature of person authorizing Journey		Oil drawn (Litres)	Fuel drawn (Litres)	Voucher No. or L.P.O. No. or Cash Voucher No.	Time		Speedo Reading end of Journey	Kilometres of Journey
			No.	Signature				Out	In		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
12/11/2020	1	Mangot - Kampi - Mangot	3	[Signature]				11:00 AM	2:30 PM	138156	62
15/11/2020	1	Mangot - Kampi - Mangot office	1	[Signature]				3:35 PM	5:00 PM	138274	78
16/11/2020	1	Kampi - Mangot office	1	[Signature]				6:00 AM	4:30 PM	138295	121
16/11/2020	1	office mangot - Kampi + Stomach office	1	[Signature]		40.1		4:34 PM	6:00 PM	138224	29
17/11/2020	1	mangot office - Kampi + Stomach office	1	[Signature]				11:30 AM	6:30 PM	138516	92
17/11/2020	1	mangot office - Kampi + Stomach office	1	[Signature]				6:45 PM	7:00 PM	138563	47
18/11/2020	1	Mangot office - Kampi + Stomach office	1	[Signature]				6:00 AM	8:58 AM	138609	46
18/11/2020	1	Mangot - Kabanot - Mangot	2	[Signature]				9:00 AM	3:00 PM	138764	166
18/11/2020	1	Mangot office - Kampi + Stomach office	4	[Signature]				4:00 PM	6:00 PM	138828	64
19/11/2020	1	Mangot office - Kampi - Stomach office	4	[Signature]				7:00 AM	7:00 PM	139212	384
19/11/2020	1	Mangot office - Kampi - Stomach office	4	[Signature]		60.3		7:30 PM	8:00 PM	139246	34
20/11/2020	1	office mangot - mangot office	4	[Signature]				9:00 AM	8:30 AM	139272	26
20/11/2020	1	office Mangot - Kabanot - office	2	[Signature]				9:42 AM	10:00 AM	139300	58
20/11/2020	1	Office Mangot - Kampi - office	2	[Signature]				5:30 PM	6:20 PM	139460	100
20/11/2020	1	Office Mangot - Kabanot - Mangot	2	[Signature]				7:00 AM	8:00 AM	139512	252
23/11/2020	1	Office - Kabanot - office	2	[Signature]				9:00 AM	11:00 AM	139548	96
30/11/2020	1	Office - Kabanot - office	2	[Signature]				7:52 AM	9:00 PM	140118	273
30/11/2020	1	Mangot office - Kabanot - Mangot				50.8		3:00 PM	9:00 PM	140150	32

DRIVER'S REPORT OF DEFECTS			SUMMARY OF WORK TICKETS		
Date	Defects	Action taken by Officer i/c	Totals - Fuel and Oil drawn	Ltr. (fuel)	Ltr. (Oil)
			Fuel in Tank to be carried forward	Ltr.	
			Total Distance (km)		
			Miles per litre (fuel)		
			Miles per litre (Oil)		

Certified all entries checked.
Details entered in Vehicle Log Book.

Designation
Station

Appendix 4: Fact sheet for dissemination to the key stakeholders



Kenya
VISION 2030

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

FRESH WATER SYSTEMS

FACT SHEET

KMF/RS/2021/C13.iii

Assessing the effectiveness of installed Chorkor Oven (innovative technologies) in reducing fish post-harvest losses and enhancing income of processors at Kampi ya Samaki along Lake Baringo



Chorkor Oven smoking kiln is effective in reducing post-harvest losses and enhancing income of processors if up scaled at Kambi ya Samaki along Lake Baringo.

AUTHORS

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Nyakeya, K.
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KMFRI Headquarters

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Background information

- Fish smoking is relevant in the artisanal fisheries in that it prolongs the shelf life of the fish, enhances flavour and increases fish utilization. It also reduces post-harvest losses during bumper catches, and increases protein availability to people across the fishing seasons.
- Over the years, traditional fish smoking in Baringo has had weaknesses hence making the method unpopular with changes in time. The major problems associated with traditional fish smoking have been the use of much wood fuel; low capacity; poor products quality and higher amount of smoke generated that also enters the eyes of the processors who are mainly women, and puts off the youth who are potential users.
- To overcome the aforementioned challenges, the improved energy saving that is basically “Chorkor-Oven-like” with; a combustion chamber together with smoking unit and a set of trays have been introduced along Lake Baringo (see plate below).



Plate 1. Double Chorkor Oven smoking kiln

- Improved Chorkor Oven is considered a sustainable technology that can reduce fish post-harvest losses and enhance income, since it is cost effective and safe to use for drying fish. The kiln is, made up of a smoking chamber or oven and

stackable smoking trays as well as an optional shelter house to protect against adverse weather conditions.



Plate 2. A five door Chorkor Oven smoking kilns installed by KMFRI at Kampi ya Samaki along Lake Baringo

- It is against this background that KMFRI introduced several Chorkor Ovens for fish smoking at Kampi ya Samaki which have as well been up scaled by a few fish processors.
- Thus the aim of the study was to assess the effectiveness of installed Chorkor oven in reducing fish post-harvest losses and enhancing income of processors at Kampi ya Samaki.

Methodology

- This study was conducted from 16th to 19th November 2020 and 19th – 21st April, 2021 at Kampi ya Samaki fish processing sites along Lake Baringo.
- The study population comprised 30 processors (mainly women) directly involved in artisanal fish processing and 16 smoked fish consumers at Kampi ya Samaki.
- Primary data was collected by a team of 5 personnel who were introduced and guided by a respective BMU executive official present who aided the research team in identifying and assembling together women involved in fish processing

for the questionnaire led interviews. On the other hand, consumers were interviewed while purchasing smoked fish.

- Relevant secondary information utilized included information from key informants and published journal papers or technical reports to triangulate results.

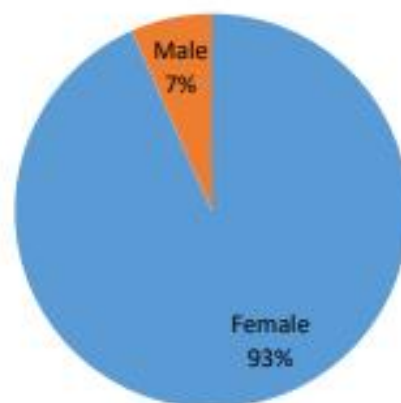


Plate 3. Questionnaire led interviews Kampi ya Samaki processing site

Results

Study sample statistics

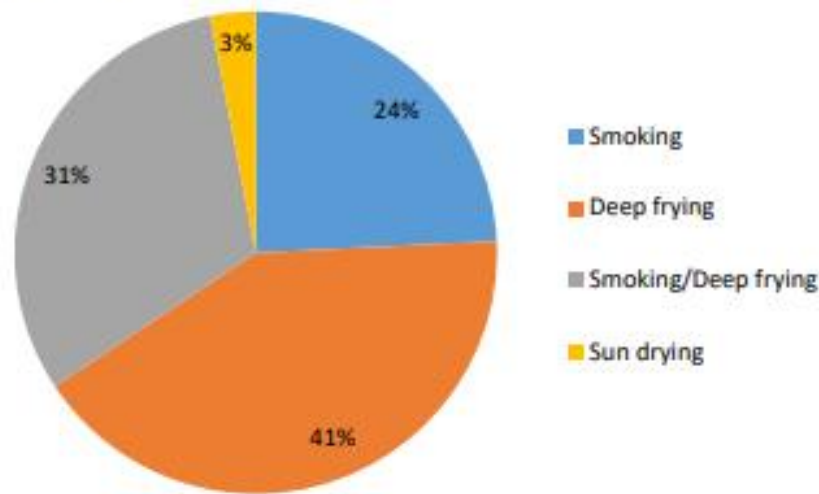
- A total of 42 respondents were interviewed (Female = 39 and Male = 3) from Kampi ya Samaki site whose members participated in the study. Female dominance recorded in the present study (93%) was expected since artisanal fish processing and shopping for house hold utilities in Kenya is mainly practiced by women.



Gender distribution among respondents (N= 42) at Kampi ya Samaki, KMFRI Baringo Field Data (2021).

Fish processing method employed

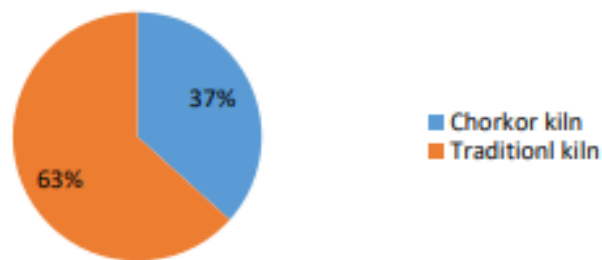
- A majority of the respondents (41%) were processing fish by deep frying, followed by those processing fish by both deep frying and smoking methods at 31%, whereas respondents using smoking as the processing method employed were 24%, trailed by sun drying.
- The main determinant factor for the processing method embraced was market demand with 83% of responds approval.



Fish processing methods used at Kampi ya Samaki site

Effectiveness of Chorkor oven intervention in reducing fish post-harvest losses

- In the current study a substantive number of respondents processing fish by smoking have adopted the use of Chorkor Oven method introduced by KMFRI for fish processing (37%). However, up-scaling the technology remains a challenge since a significantly higher number of processors smoking fish (63%) along Lake Baringo were still utilizing traditional smoking kilns.
- It's also worth mentioning of the 37% artisanal processors using Chorkor Ovens, 12% have constructed Chorkor Oven on their own whereas, 25% were using the Chorkor ovens installed by KMFRI.
- This finding depicts Chorkor Oven technology adoption and upscaling along Lake Baringo contributing to reduced post-harvest losses as well as enhancing the processors income.



Smoking methods employed by artisanal processors at Kambi ya Samaki

Conclusion and Recommendations

- ❖ The study findings showed the prominence of Chorkor Oven efficiency in reducing fish post-harvest losses, but sharing similar challenges in the technology up scaling.
- ❖ Its therefore recommended that if the technology is fully adopted, it can reduce post-harvest losses in the fishery along Lake Baringo especially during bumper catch.
- ❖ The need for community sensitization on alternative livelihoods as a means of diversification for enhanced income in the wake of declining fishery cannot be overstated.

Appendix 8: Dissemination to Beach Management Unit

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

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Mobile: 0712062853
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E-mail: director@kmfri.co.ke
When replying please quote
Ref. no:
and date:
If calling or telephoning ask
For:
Please address your reply to:
The DIRECTOR GENERAL



HEADQUARTERS
P.O. Box 81651
MOMBASA
KENYA

KMF/RS/2021/C13.iii

Date: 21st June 2021

**To: Beach Management Unit (BMU) Chairman
Kambi ya Samaki**

Dear Sir/Madam,

RE: SHARING 2020-21 FY FACT SHEET/BRIEF

Kenya Marine and Fisheries Research Institute (KMFRI) is a state corporate body, established in 1979 under the Science and Technology Act (Cap 250), which has since been repealed by the Science, Technology and Innovation Act No. 28 of 2013. KMFRI is under the Ministry of Agriculture Livestock and Fisheries. The institute is empowered to carry out research in marine and freshwater fisheries, aquatic biology, aquaculture, environmental chemistry, ecological, geological and hydrological studies, socio-economical as well as chemical and physical oceanography.

In this regard, KMFRI conducted a number of research expeditions in 2020-2021 financial year on "*Assess the effectiveness of installed Chorkor Oven (innovative technologies) in reducing fish post-harvest losses and enhancing income of processors at Kambi ya Samaki along Lake Baringo*" and came up with technical report and Fact sheet/brief.

The purpose of this letter is to share the findings in a summarised fact sheet/brief as information for possible management and conservation measures of the aforementioned systems.

Attached herewith please find the technical reports and Fact sheet/brief for your perusal and further action.

Yours Sincerely,

Dr. Christopher M. Aura (PhD)
For: Director General/KMFRI

**COUNTY DIRECTOR
FISHERIES BARINGO.**
for [signature]
21st June 2021

Appendix 9: Dissemination to County Director of Fisheries

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

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020-2353984
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E-mail: director@kmfri.co.ke
When replying please quote
Ref. no:
and date:
If calling or telephoning ask
For:
Please address your reply to:
The DIRECTOR GENERAL



HEADQUARTERS
P.O. Box 81651
MOMBASA
KENYA

KMF/RS/2021/C13.iii

Date: 21st June 2021

To: County Director of Fisheries
Baringo

Dear Sir/Madam,

RE: SHARING 2020-21 FY FACT SHEET/BRIEF

Kenya Marine and Fisheries Research Institute (KMFRI) is a state corporate body, established in 1979 under the Science and Technology Act (Cap 250), which has since been repealed by the Science, Technology and Innovation Act No. 28 of 2013. KMFRI is under the Ministry of Agriculture Livestock and Fisheries. The institute is empowered to carry out research in marine and freshwater fisheries, aquatic biology, aquaculture, environmental chemistry, ecological, geological and hydrological studies, socio-economical as well as chemical and physical oceanography.

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The purpose of this letter is to share the findings in a summarised fact sheet/brief as information for possible management and conservation measures of the aforementioned systems.

Attached herewith please find the technical reports and Fact sheet/brief for your perusal and further action.

Yours Sincerely,

A handwritten signature in black ink, appearing to read 'Chris'.

Dr. Christopher M. Aura (PhD)
For: Director General/KMFRI

COUNTY DIRECTOR
FISHERIES BARINGO,
24 June 2021

Appendix 10: Dissemination and sensitisation to the key stakeholders

KENYA MARINE AND FISHERIES RESEARCH INSTITUTE
FRESHWATER SYSTEMS



Assess the effectiveness of installed Chorkor Oven (innovative technologies) in reducing fish post-harvest losses and enhancing income of processors at Kampi ya Samaki along Lake Baringo

SENSITIZATION/OUTREACH MEETING WITH STAKEHOLDERS HELD ON 24th June, 2021

NO.	NAME	ORGANIZATION	EMAIL	PHONE NO.	SIGN
1.	GRACEMARY WANERU	FISHERIES	Gracemarywaneru	0722598240	
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4.	JAMES MUGO	KMFRI	mugojames@kmfri	0702173562	
5.	CYPRIAN O. ODOLI	KMFRI	Cogumbere@kmfri	0703825872	
6.	William Chepkir	Chair Kya Bmu		071128256	
7.	Leah Koro	Bmu - member		0724226237	
8.	Valany Nakwestu	Bmu - member		0729520617	
9.	Euanice Chappo	Bmu VYS		0711234056	
10.	Selma Kulgat	Fisheries		0727561133	
11.	Kobingi Mpolony	KMFRI		0715218114	