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Regulatory Compliance and Factors that Influence Compliance with the Nile Perch Slot Size Regulation among Fish Traders in Nairobi County - Kenya.

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Abstract

Purpose: Effective management of fisheries resources can be significantly undermined by non-compliance with regulations. This study sought to determine compliance with the Nile Perch slot size regulation among fish traders in Nairobi County, explore their perceptions on the regulation and determine factors that influence compliance.

Method: The research adopted a combination of both quantitative and qualitative research methods. A semi-structured questionnaire was administered to fish traders to determine compliance, obtain a general picture of their attitudes towards compliance and determine factors that influence compliance with the fisheries regulation on Nile Perch slot size requirements. A total of 148 fish traders were enumerated by simple random sampling. Only fish traders dealing with Nile Perch trade were included in the study, three fish traders declined to participate in the study leaving an average response rate of 98%. The questionnaire was followed up with more in-depth semi-structured key informant interviews with 14 stakeholders consisting of fisheries staff deployed to the fish markets and the County fisheries office as well as leaders in the fish market committees in order to obtain a thorough understanding of the factors leading to non-compliance. The average duration of interviews was half hour and were conducted at their places of work. Two focus group discussions (FGDs) were also conducted with fish traders from the two main fish markets in the city in order to provide a deeper understanding of the drivers of non-compliance among fish traders. The FGDs comprised of 12 and 8 members from Gikomba and City markets respectively. **Results:** The results revealed 87% levels of non-compliance among fish traders. The study revealed that weak enforcement, poverty and lack of knowledge of the importance of the regulation as significant factors for non-compliance.

Policy recommendation: It is recommended that capacity building programmes are necessary to increase voluntary compliance and an effective enforcement is recommended to help deter fish traders from engaging in illegal fish trade.

Key words: *Compliance, Fisheries regulation, Nile perch, Fish traders, Under size fish*

1.1 INTRODUCTION

Small scale fisheries is widely recognized globally for its importance in the contribution to food security and poverty alleviation (Berkes, 2001). While this is the case, a majority of fishery resources worldwide are either exploited or over exploited. The management of fisheries presently not only has biological objectives but also institutional, political and social objectives. If fisheries are governed responsibly, the sector has great potential to poverty reduction, economic growth, biodiversity conservation, sustainable livelihoods and peace and security (USAID, 2006). The main challenge however, in the management of fisheries is finding better ways of enforcement of regulations in order to sustainably protect resources and to promote economic efficiency. Lack of compliance with many fisheries regulations despite increased enforcement activities has drawn the attention to the importance of legitimacy of fisheries management thus the main concern of management authorities according to (Hauck & Kroese, 2006) is compliance to fisheries regulations. This is because non-compliance to fisheries regulations undermines efficiency of the regulation (Pieccini *et al*., 2016). To understand non-compliance, it is important that managers of fisheries resources understand the drivers to non-compliance behaviour (Jagers *et al*., 2012; St. John, 2011; Cox, 2010).

The fisheries sub sector in Kenya plays a significant role in employment, wealth creation and income generation. The sector supports about 1.2 million people directly and indirectly working in the industry as fishers, fish processors, fish traders, suppliers, merchants of fishing accessories and their employees and dependants. Currently, the fisheries sector contributes 0.8% of Kenya‟s Gross Domestic Product (GDP). Furthermore, the fisheries sector not only provides a rich source of protein, but also plays a key role in the preservation of culture, national heritage and recreational purposes (Fisheries Bulletin, 2014).

Kenya‟s fish production is mainly from the inland capture fisheries which contributes over 80% of the total fish production (Fisheries Bulletin, 2014). Lake Victoria is the principal fishery accounting for 76.4% of the country‟s annual fish production. The contribution of marine fisheries is about 5.4% while that from aquaculture is 14.3% of the total fish production. Fish and fish products produced in the country are exported to international markets or sold in the domestic market. In Kenya, 70% of the fish consumed locally is from wild capture fisheries primarily from L. Victoria. However, due to factors such as pollution, over fishing, use of illegal fishing gears, there has been a decline in fresh water fisheries production (Farm Africa, 2016).

The Lake Victoria Fishery

Lake Victoria is Africa‟s largest lake and the second largest freshwater lake in the world covering an area of 68 000 km^2. It is relatively shallow with a mean depth of 40m and a shoreline of 3450 km. The lake is shared between the three East African states of Kenya (6%), Uganda (45%) and Tanzania (49%) (Njiru *et al*., 2005). It supports one of the world‟s largest inland fisheries, based primarily on three species i.e. the Nile Perch (*Lates niloticus*),

Nile tilapia (*Oreochromis niloticus*) and the widespread cyprinid (*Rastrineobola argentea*) known locally as omena. The three species are of commercial importance and contribute about 90% of the catch biomass. According to Lake Victoria Fisheries Organization (LVFO) Management Plan for Lake Victoria, 2009-2014, the Lake‟s resources is estimated to contribute directly to supporting the livelihoods of over two million people through income, food and employment generation (LVFO, 2015).

Lake Victoria Nile perch fishery is the most valuable freshwater fishery in Africa. Since the 1990s the fishery has supported an extremely valuable export-orientated fishery that generates a significant source of revenue for the population of the three riparian countries (LVFO, 2015). In Kenya, the Nile perch is the most important fishery in terms of fish exports in the country contributing 90% of the total fish and fish products exports. It is exported in the form of fillets (chilled or frozen), headless and gutted whole fish and fish maws. A downward trend has been observed in the volume of exported Nile perch each year (Fisheries Bulletin, 2014) which is a pointer to the declining wild stocks and therefore the need for robust management measures geared towards ensuring sustainability of the resource.

In the past, governments‟ decisions regarding the management of fisheries resources in the lake were the so called „top bottom‟ management systems where decisions were made with little or no involvement of resource users and other key stakeholders in the fishery (Ogwang *et al*., 2009). This however, proved ineffective and decreasing fish stocks in the lake led the three riparian states sharing the resource to rethink the management of the fishery. The concept of co-management was adopted whereby resource users and other stakeholders in the fishery were slated to be included in decisions on the management of the resource. Comanagement has been encouraged as a way of improving the effectiveness and efficiency of fisheries management cognizant of the fact that the inclusion of resource users in management promotes understanding, ownership and commitment (Berkes *et al*, 2007; Pomeroy, 2007; Berkes, 2009).

To implement the new management approach, legislation was enacted in each of the three countries that lay down structures that would ensure a shift from the top-bottom approach previously used by the governments to a co-management approach that involves stakeholders at all levels. Subsequently, all members of the fishing community, including boat owners, boat crew, managers, fish processors, fishmongers, local gear makers, and dealers in fishing equipment, were brought into the co-management through membership of local institutions called Beach Management Units (BMUs). The LVFO which was set up to coordinate fishery management across the lake, developed harmonized BMU guidelines to help govern the operations of the newly created institutions (LVFO, 2007). A total of 1,069 BMUs were formed around the entire lake and became involved in the co-management of the fishery. Although, successes have been recorded in all the three countries, the challenge of BMUs capacity to deal with members involved in illegal fishing that threatens overexploitation of the resource needs to be addressed (LVFO, 2007).

The basis of Nile perch slot size regulation

The Nile Perch slot size regulation is based on the premise that Nile perch ≤ 50 cm total length (TL) feed predominantly on the shrimp *Caridina nilotica*, thus converting invertebrates into fish flesh while larger fish are largely piscivorous, feeding mainly on the cyprinid *Rastrineobola argentea*, juvenile Nile perch, Nile tilapia (*Oreochromis niloticus*) and Haplochromines. This is ostensibly destructive to the lake‟s biodiversity and is also wasteful in terms of energy. Harvesting Nile perch ≥ 50 cm TL could arguably also lead to the recovery of the haplochromines, thus enhancing the productivity of the fisheries, especially in deep waters where only the pelagic *R. argentea* occurs. Female Nile perch grow to a larger size and mature later than males and up to the year 2006 males and females reached 50% maturity at 54-64 and 62-85 cm TL respectively. The sex ratio changed with size because males were smaller than females and most fish > 80 cm were females (Hughes, 1992; Ogutu_Ohwayo, 2004) but the removal of large fish by the fishery has resulted in a more or less equal sex ratio in the 40-60 size class (LVFO, unpublished data). Thus, the slot size of 50 to 85 cm TL sought to protect immature fish, harvest mature individuals and at the same time protect the larger females which would be expected to replenish the stocks.

The Fisheries Act Cap 378 (revised 2012) in its subsidiary legislation, Fisheries (Prohibitions) Regulations, 2003, bars the harvesting and trading in Nile perch that is less than 50cm, termed as under size because this presents a major threat to the sustainability of the Lake Victoria fishery with resultant effects on the country due to loss of employment, wealth creation, loss of foreign exchange earnings, and loss of livelihoods to fishermen, fish transporters, fish traders, input suppliers, boat builders, and fish processors who directly depend on this fishery. The Department of Fisheries in Nairobi County enforces this regulation in the fish markets to combat sale of undersize Nile Perch and contribute towards sustainable utilization of the L. Victoria fishery. This has however, not been effective as trade in undersize fish continues unabated in the country‟s main domestic fish market. This study sought to document the levels of compliance to the fisheries regulation with regard to trade on under-size Nile Perch and determine the factors that influence compliance to the Nile Perch slot size regulation in Nairobi County.

Theoretical approaches to compliance in fisheries

Understanding compliance is key to improving fishery enforcement and regulatory mechanisms. Compliance to regulations is often analyzed and understood from an economic perspective in the fisheries management literature assuming that fishers act as rational agents (Anderson & Lee, 1986; Sutinen & Andersen, 1985). The dynamics of fishers‟ behavior from a traditional microeconomics perspective is thus determined by the economic costs and the rational calculation of the economic implications of violation of regulations.

For many years, attempts have been made to understand the underlying causes that lead to non-compliance among fishers. The first formal attempt towards understanding compliance was inspired by (Becker, 1968) who developed a pure deterrence model. This instrumental model

was based on the assumption that an individual fisher mainly responds to the immediate benefits of compliance or non-compliance behavior based on the calculation of economic gains when rules are complied with and calculations of costs of non-compliance given the likelihood of being caught and the severity of the sanction.

Becker‟s pure deterrence model of regulatory compliance focuses mainly on the certainty and severity of sanctions as the key determining factors of compliance. This set of thoughts has influenced many fisheries management schemes worldwide, where increased enforcement activities have often been the policy option chosen to improve compliance behaviour among fishers. Evidence has however, shown that it does not provide a complete explanation of compliance behavior. When the rate of non-compliance is significant the first response is to increase deterrence, with an enforcement effort to violate increases. (Sutinen & Kuperan, 1999) illustrated that conventional models do not sufficiently explain observed patterns of compliance in many fisheries. The costs associated with unlawful behavior are not enough to explain the decision making by the users. From this viewpoint, penalties high enough to offset the difference between legal and illegal gains, are not feasible in most of the cases.

While increased enforcement activities can reduce or prevent non-compliance among fishers, there are however, limits to the amount of resources both human and capital that can be used on enforcement activities. While governments aim at striking a reasonable balance between the costs of enforcement activities and the profit obtainable from fishing activities, fishers on the other hand are however often very creative in finding ways to avoid getting caught by observing the activities of the enforcement agency and keeping each other informed of the same making. This makes it questionable as to whether increased enforcement essentially decreases non-compliance as (Kuperan & Sutinen, 1998) reasons.

Several empirical studies (Hatcher *et al*., 2000; Hønneland, 1998; Kuperan & Sutinen, 1998) indicate that explaining compliance behaviour in fisheries is more complex than is offered by the deterrence model. A normative approach holds as a supplement to analyze and explain the incentives among fishers for non-compliance behaviour. In this case, the influence of norms and what the fishers consider as fair and moral behaviour become important aspects. Norms are defined as the typical actions, attitudes and expectations among fishers concerning the behaviour and attitudes and expectations of peers. Furthermore, norms are seen as social pressure which creates both positive and negative sanctions (Giddens, 1984; Gould Anderson, 1998). Hoffman (1977) demonstrated that moral is usually considered to be based on a normative internalized obligation to follow what is personally considered right or wrong. Moral is thus established through interaction with other individuals and groups but differs from norms by representing individual values based on personal reflections Giddens, 1984 in (Nielsen & Mathiesen, 2001).

In summary, four factors are important in regulatory compliance and these are; content of regulations, distributional effects, making of the regulations and implementation of the regulations (Chavez, 2004). The more directly involved fishers are in installing and enforcing

regulations, the more the regulation will be accepted as legitimate. The procedural approach taken by enforcement agencies and the court towards rule breakers also has a strong influence on the legitimacy of the management system compared to how fishers perceive the actual sanction (Jentoft & Kristoffersen, 1989; Tyler, 1990).

1.2 Problem statement and Justification

With the declining fish stocks in L. Victoria, co-management of fisheries resources was embraced to prevent over exploitation of the resource whereby the government sought to involve and engage with all stakeholders in the decision making process. Nonetheless, the trade in under size *Lates niloticus* continues threatening the survival of this species and also the livelihoods of many who depend on the fishery. Nairobi is the largest domestic market for fish and although fish and fishery products are traded in the city in large volumes, no study has been conducted in this county to determine the levels of compliance with the fisheries regulation on Nile Perch slot size and understand the underlying factors that influence compliance with this regulation. In order to contribute to sustainable management of fisheries resources, more information on fishers‟ behaviour and attitudes with regard to compliance is required. Targeted interventions to address the issue of non-compliance are not possible without a better understanding the fishers‟ attitudes towards these regulations. Understanding why fishers comply with a regulation is important if the fisheries managers wish to encourage fishers to voluntarily comply with the regulations instead of being „forced to‟ out of fear of discovery and/or sanctions. This study aims to document the drivers of non- compliance with the fisheries regulation on trade on Nile perch among fish traders in Nairobi County.

1.3 Objectives of the study

The general objective of this study is to document the drivers of non- compliance with the fisheries regulation on trade on Nile perch among fish traders in Nairobi County. The specific objectives are: -

1. Determine knowledge, attitudes and perceptions of fish traders on the Nile Perch slot size regulation.
2. Investigate the level of compliance on the Nile Perch slot size regulation among fish traders in Nairobi County.
3. Determine factors that influence compliance to the fisheries regulation on Nile Perch slot size among fish traders in Nairobi County.

2.0 MATERIALS AND METHODS

2.1 Study Site

The study was conducted in Nairobi City County-Kenya covering Gikomba fish market and City Market which are the main fish markets in Nairobi. Nairobi was purposively selected for the study because besides being the country‟s capital and the largest city in East and Central Africa and an important economic hub, it is also the largest domestic fish market. Nairobi

County is one of the 47 counties in the Republic of Kenya. It borders Machakos County to the East, Kiambu County to the North and West and Kajiado County to the South. The County has a total area of 696.1 Km2 and is located between longitudes 36o 45,,East and latitudes 1o 18,,South. It lies at an altitude of 1,798 metres above sea level (CGoN, 2014). It has a population of 3.138 million people according to the Kenya population and housing census of 2009 (KNBS, 2010). The County has a fairly cool climate resulting from its high altitude. Temperature ranges from 100C to 290C. The rainfall pattern is bi-modal. The mean annual rainfall is 786.5 mm. The long rains season falls between March and May with a mean rainfall of 899 millimeters (mm) while the short rains season falls between October and December with a mean rainfall of 638 mm.

2.2 Study design

A descriptive cross sectional study design was used and utilized both quantitative and qualitative approaches in data collection. This study design was chosen since it gathers data at a particular point in time with the intention of describing the nature of existing conditions.

2.3 Target population

The target population for the study was fish traders in Nairobi County particularly traders dealing with Nile perch in Gikomba fish market and City Market. They included fish dealers who bring loads of fish to the market from various fish landing sites, wholesalers and retail traders who display fish for sale in the market. They were chosen because they are believed to have the necessary information required for the study. There were 250 Nile Perch fish traders in both markets according to the County fisheries office.

2.4 Sample size determination

A large population requires a formula to come up with the sample and a sample from a large population is assumed to be normally distributed at a confidence interval of 95% or significance interval of 5% (Mugenda, 1999). The sample for a large population is determined using the Fisher *et al.,* 1983 formula given as; $n = \frac{z^2 p(1-p)}{d_2}$

Where: n = Sample size for large population Z = Normal distribution Z value score, (1.96) p = Proportion of units in the sample size possessing the variables under study, where for this study it is set at 50% (0.5)

d = Precision level desired or the significance level which is 0.05 for the study

The substituted values in determining the sample size for a large population are as follows.

$$\frac{96^2 \times (0.5) \times (1-0.5)}{(0.05)^2} \quad 1.$$

n □□ 384

The sample size is therefore 384. However, since the target population was less than 10,000 (the population of Nile Perch fish traders in Nairobi County was 250), Fisher‟s formula was used to adjust the sample size of 384 as follows. n

$$n_0 = \frac{}{1 + n \; 1 \; N}$$

$$n_0 = \frac{384}{1 + 384 \; 1 \; 250} \; 151$$

n_0 =151

Sample size for the study was determined as 151 Nile Perch fish traders.

2.5 Sampling techniques

Simple random sampling method was used to enroll the number of respondents required for the study. A total of 148 Nile perch traders out of a possible 151 were reached, representing a response rate of 98%. This is because 3 fish traders declined to participate in the study.

2.6 Data collection

A semi structured questionnaire administered to respondents was used to collect data. The questionnaire was designed to collect information on fish traders‟ knowledge and practices on compliance with fisheries regulations and to determine the factors that influence compliance which would help determine the drivers of non-compliance with fisheries regulations. A set of questions were carefully designed per theoretical concept following formats from previous studies (Eggert & Lokina, 2010; Sutinen & Kuperan, 1999; Viteri & Chávez, 2007). The questions were adapted to the specific context of the fish markets based on experiences working in the county. Key informant interviews were also conducted among 14 stakeholders comprised of leaders from the two fish market committees and fisheries staff deployed in the fish markets to provide an in-depth understanding of factors that lead to non-compliance. Further, two focus group discussions (FGDs) consisting of Nile Perch fish traders were conducted to provide a better understanding of the drivers of non-compliance.

2.7 Data Analysis

An MS Excel® 2010 database was designed into which data was entered and subsequently cleaned. The data was exported to IBM Statistical Package for Social Sciences (SPSS) software

(version 21) for statistical analysis. Analysis included descriptive statistics mainly frequencies and percentages. The Chi-square test was used to test for association between categorical variables in the dataset.

3.0 RESULTS

3.1 Socio-demographic Characteristics of Respondents

3.1.1 Age and Gender Distribution of Respondents

A total of 148 respondents participated in the study. Specific age distribution shows that about 66.9% of the respondents were aged below 40 years. Those aged above 40 years comprised about 33.1% of the total number of respondents (Table 1).

Table 1: Age distribution of respondents

Age in years	Count	Percentage(%)
25 and below	9	6.1
26-35	34	23.0
36-40	56	37.8
41-50	44	29.7
Above 50	5	3.4
Total	**148**	**100**

The results show differences in the distribution of male and female respondents. With regard to gender, two thirds of the respondents were males (60.1%) while the females were 39.9%. This shows that more males are engaged in the lower levels of the fish value chain, a place that has traditionally been female dominated depicting a threat to the inclusion of more women in the fishing industry.

Table 2: Gender distribution of respondents

Gender	Count	Percentage (%)
Male	89	60.1
Female	59	39.9

Total	148	100

3.1.2 Distribution of Respondents According to their Level of Education

The majority of respondents (54.1%) had attained tertiary (college) level of education, 20.9% had secondary school level of education while only 6.1% had attained university education and the rest had attained primary school education as shown in table 3. **Table 3: Distribution of respondents according to level of education**

Education level	Count	Percentage (%)
University Degree	9	6.1
Secondary	31	20.9
Tertiary (College) Education	80	54.1
Primary Education	28	18.9
Total	**148**	**100**

3.1.3 Distribution of Respondents According to Level of Income & Alternative Source of Income

Almost two thirds (59.5%) of respondents‟ level of income ranged between KES10, 000 – 20,000, about a third, 29% earned 21,000 – 40,000 while the rest 11.5% earned above 40,000. Majority of the respondents (81.8%) did not have an alternative source of livelihood and depended solely on fish trade while a few (18.2%) had an alternative source of livelihood.

Table 4: Respondents distribution according to level of income

Income level (KES.)	Count	Percentage (%)
10,000-15,000	54	36.5
16,000-20,000	34	23.0
21,000-30,000	27	18.2
31,000-40,000	16	10.8
40,000-49000	11	7.4
50,000 and Above	6	4.1
Total	**148**	**100**

Most of the respondents have been in fish trade business for several years. 50% of fish traders having been in the business for a period between 5-15 years, 25% for more than 15years and 25% were new entrants with below 5years experience.

Table 5: Respondent's duration in fish trade and alternative source of income

		Count	Percentage
	Yes	27	18.2%

Any other source of income	No	121	81.8%
Number of years in Business of Fish trade	Less than 2 years	6	4.1%
	2-5 years	31	20.9%
	5-10 years	39	26.4%
	10-15 years	35	23.6%
	More than 15 years	37	25.0%

3.2 Fish Traders' Knowledge and Perceptions on the Nile Perch Slot Size Regulation

3.2.1 Respondents' Knowledge on Regulation

Almost all (98.2%) of the respondents were aware of the existence of the fisheries regulation on the size of Nile perch that ought to be traded in the markets. However, this did not translate to clear knowledge and understanding of the recommended size of fish for trade in the markets as slightly more than a third (35.1%) of the respondents were not aware of the 50cm – 85cm rule set for trade on Nile Perch. The study also sought to find out fish traders‟ knowledge of the fines charged to those who violate the regulation and found out that slightly more than half (51.4%) of the respondents were aware of the fines charged to offenders whereas almost an equal proportion (48.6%) were not aware. The study also revealed that only 24.3% of the respondents had proper knowledge on the actual amount of fines (KES 20,000) charged to offenders with almost half (49.3%) having no knowledge at all of the fines charged.

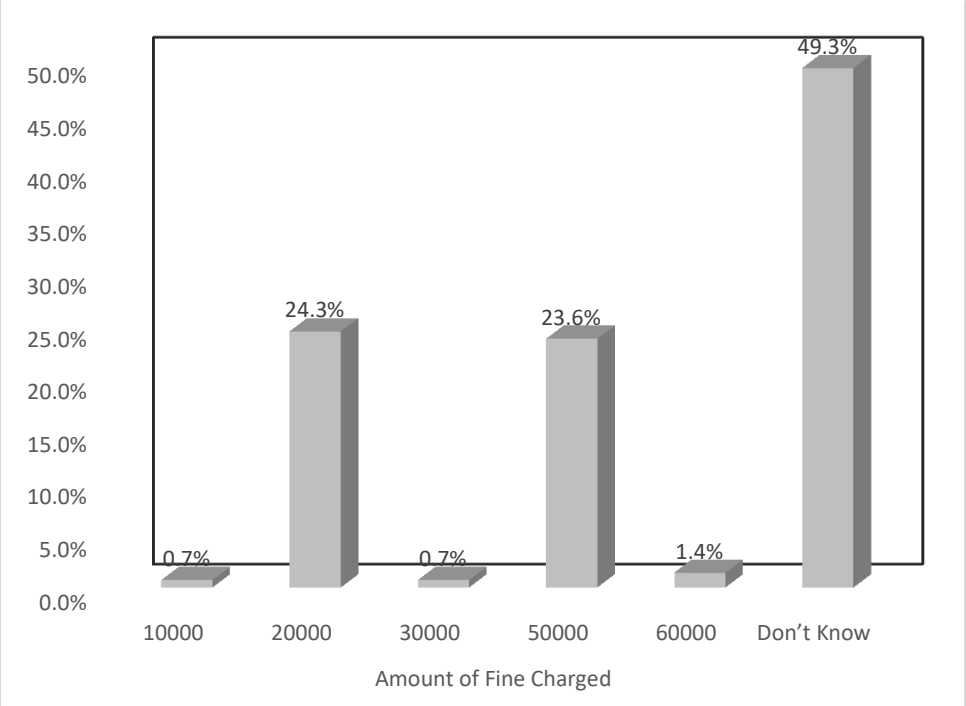

Fig 1: Knowledge of fines charged to offenders

3.2.2 Traders' Perceptions of the Regulation on Nile Perch Slot size

To understand fish traders‟ perceptions on the fisheries regulation on Nile Perch slot size, several statements using the Likert scale were provided and respondents required to either agree or disagree with the statements. With regard to fish traders‟ perception on the usefulness and legitimacy of the regulation, a high proportion (91.2%) of the respondents agreed that over-fishing of L. Victoria was a huge problem affecting the country and that continued overfishing and decline in fish stocks would affect the livelihoods of many. They further agreed that the main reason for the regulations was to protect the resource. Respondents further supported that the government was doing the right thing in imposing regulations and that if the regulations were strictly observed, L. Victoria could be sustainably managed thus to a large extent fish traders view the regulation as legitimate.

The table below provides a summary of these perceptions.

Table 6: Usefulness and legitimacy of Regulation

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
	%	%	%	%
Over-fishing of L. Victoria is huge problem affecting the country?	46.6	44.6	3.4	5.4
Overfishing and decline in fish stocks will affect the livelihoods of many?	49.3	45.3	2.7	2.7
The main reason for the regulation is to protect the source?	42.2	55.8	0	2
The government is doing the right thing in imposing these regulations?	39.9	56.1	2	2
If the regulations are strictly observed L. Victoria could be sustainably managed?	47.6	49.7	1.4	1.4

With regard to enforcement of regulations, majority (96.6%) of the respondents agreed that enforcement efforts need to be intensified at the lake to ensure fishermen do not harvest undersize fish. 98.7% of the respondents were of the opinion that the BMUs and fish market committees should be strengthened to effectively co-manage L. Victoria fishery. Additionally,

91.9% agreed that there should be increased and effective market surveillance to control trade in under size fish (Table 7).

Table 7: Traders perceptions on regulation enforcement

Statement	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Count	%	Count	%	Count	%	Count	%
Enforcement efforts should be intensified at the lake to ensure fishermen do not harvest under-size fish	79	53.7	63	42.9	5	3.4	0	0
The BMUs and fish market committees should be strengthened to effectively co-manage L. Victoria fishery	62	41.9	84	56.8	1	0.7	1	0.7
There should be increased and effective market surveillance to control trade in under size fish	41	27.7	95	64.2	9	6.1	3	2
Most people are aware of the regulations but still engage in undersize fish trade	28	19	81	55.1	30	20.4	8	5.4

Fish traders who engage in undersize fish trade get away with it	7	4.8	39	26.5	81	55.1	20	13.6
The penalties given to traders caught violating regulations is FAIR or fit for the offences	14	9.6	74	50.7	34	23.3	24	16.4

With regard to fish traders‟ perceptions on their involvement in decision making, majority (97.3%) agreed that fish traders are key stakeholders and should be involved in decisions affecting them while on the on the other hand, they held the view that their opinions were not taken into consideration in the decision making process (70.7%) (Table 8).

Table 8: Fish traders' perceptions on inclusion in decision making

Statement	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Count	%	Count	%	Count	%	Count	%
Fish traders are KEY stakeholders and should be involved in decisions affecting them	63	42.6	81	54.7	3	2	1	0.7
The Opinions of Fish Traders are NOT taken into consideration in the decision making process	29	19.7	75	51	38	25.9	5	3.4

3.3 Fish Traders Compliance with the Nile Perch slot size Regulation

Respondents were asked to self-report on their own compliance behaviour with regard to the fisheries regulation on Nile Perch slot size. Majority of the respondents (87%) violated the regulation while only a 13% complied with the regulation. Respondents also reported on the

frequency of violation by indicating the number of months they violated the law with zero indicating non-violators. 1-3 months alternating violators and 12 months persistent violators. Majority of those who violated the regulation were alternate violators (77%) with only 9.5% persistently violating the law.

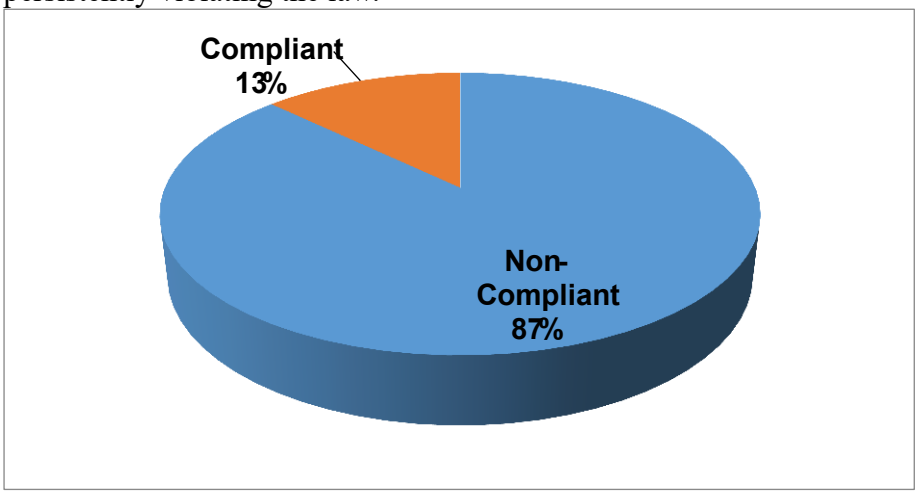

Fig 2: Self-reported compliance among fish traders

3.4 Factors that Influence Compliance to Regulation

The study sought to understand factors that influenced non-compliance behaviour among fish traders in Nairobi City County. The respondents were asked to provide reasons that compelled them to engage in the trade on undersize fish or reasons they thought led other traders to engage in illegal trade. The most stated influential factor was consumer demand for the smaller fish followed by poverty or hard economic times, 44.4% and 30.4% respectively. Other factors as enumerated by fish traders included lack of knowledge or understanding of the importance of the regulations, laxity/inadequate law enforcement, corruption, shortage of fish and availability of under size fish in the market which is cheap and affordable. Figure 3 below summarizes the factors.

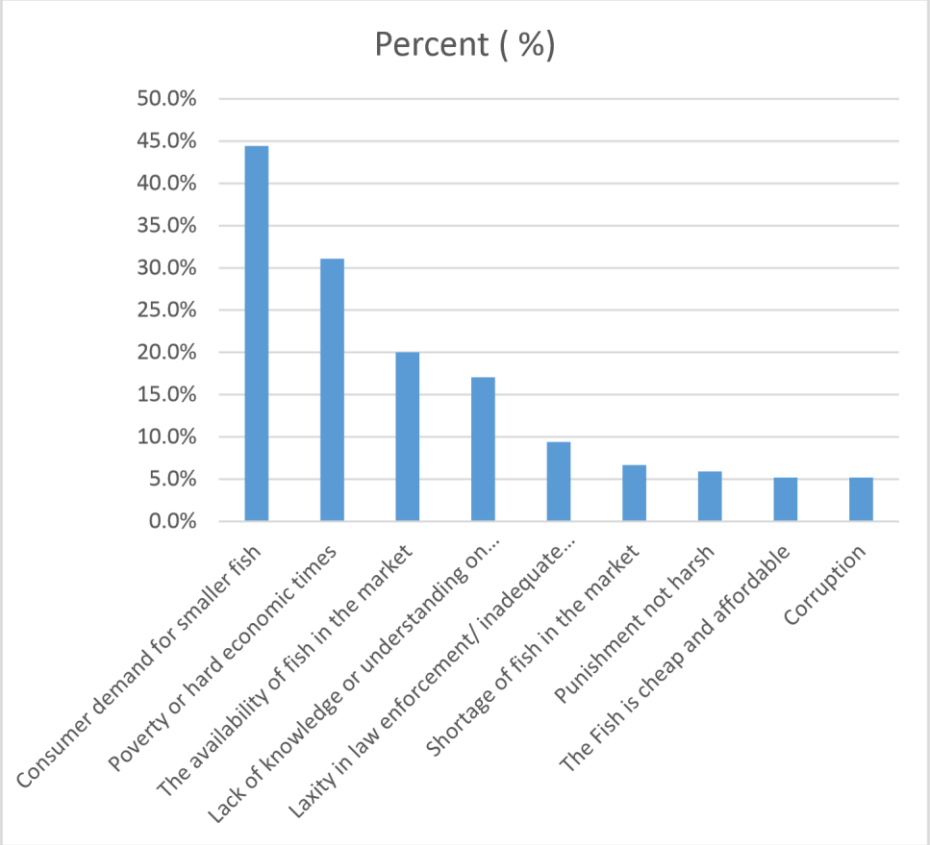

Figure 3: Factors influencing non-compliance among fish traders in Nairobi County

4.0 DISCUSSION

In well-organized systems of governance with a clear regulatory structure, common knowledge about which regulations apply is an important factor. This study focused on the knowledge of the fisheries regulation governing the size of Nile Perch harvested from Kenyan inland waters and placed on sale in the domestic markets. The results showed that while fish traders are generally aware of the Nile Perch slot size regulation, slightly more than a third (35.1%) of the respondents were not aware of the 50cm – 85cm rule set for trade on Nile Perch indicating knowledge gap. Additionally, almost half of fish traders sampled had no knowledge of the amount of fines charged to violators (49.3%), a knowledge gap which needs to be addressed. The findings of this study shows a gap in knowledge and understanding on the provisions of the regulation as a substantial proportion of fish traders are only aware of the regulation but not clear on its provisions. The study also revealed that almost half of the respondents were not aware of the fines charged to violators, while only 24% of the respondents knew the actual amount of fines charged to offenders. This clearly indicates that fish traders do not have knowledge and understanding on the provisions of the regulation which is key to compliance. There is therefore need for training of fish traders to build their capacity on the importance of the regulation in the sustainable management of the L. Victoria fishery, requirements of the regulations and the stipulated fines for violators which would aid in increasing voluntary compliance among fish traders.

The focus group discussions and key informant interviews provided an in depth understanding of the factors influencing non-compliance among fish traders. Among the key factors that led to non-compliance with the regulation were poverty, laxity in law enforcement and corruption. In order to discuss factors that influence compliance, the study utilized the analytical framework developed by Raakjær N., 2001 to provide a better understanding of the drivers to noncompliance among fish traders. The framework focuses mostly on five areas i.e. (i) industry structure; (ii) content of regulation; (iii) control and enforcement; (iv) norms within the fishing industry and morals of fishers; and (v) the decision-making procedures and thus the above factors are discussed in the context of the framework.

4.1 Industry structure

The industry structure in this case focused on factors such as economic, socio- cultural factors and demography of fish traders and these came out as some of the key factors influencing non-compliance behavior among fish traders in Nairobi County. The results showed a significant association between poverty and compliance (χ^2= 4.625, d.f = 1, P = 0.032). It was evident that fish traders engage in trade on under size fish to counter harsh economic times and this was noted to be one of the key drivers to non-compliance. Most fish traders argued that it was extremely impossible to resist trade on undersize fish because of economic challenges some acknowledging that due to harsh economic times, one could not afford to spend several days without income to meet the family financial obligations and at the same time expected to comply. This could be explained by the increased inflation rates in the country which stood at 11.70 per cent in May, 2017 one of the highest in the recent past (KNBS, 2017). The results of this study confirm the (World Bank 2002) report that poor people are commonly compelled to exploit their surroundings for immediate survival and are the group who most frequently must deal with natural resource degradation.

The non-compliance behaviour of traders was also highly influenced by consumer demand for the smaller fish, a factor that cannot be ignored as results indicated a statistical significance between consumer demand for smaller fish and compliance (χ^2= 4.617, d.f = 1, P = 0.032). Fish traders also argued that they engaged in undersize fish trade to meet the demand of their clients for smaller fish. This can be explained from a sociocultural point of view in that some households prefer to serve whole undersize fish as compared to sliced portions of the legal size which overrides the sanctions placed by the regulation, compelling fish traders to violate the law in order to meet their clients‟‟ demands.

Fish traders disclosed that in most cases they have no control of what is sent to them by their suppliers who happen to be middle men.

> *“once you make the order with your supplier you wait for the fish to be sent to you. Once it lands, you do not know what is in the „tengas" (fish baskets) until you open and find undersize fish stacked between big fish, you can"t throw them away. You hide and sell them when the fisheries staff are not within reach”*

The research showed significant influence on compliance behaviour related to age, gender and duration of doing fish business. Results of the study showed that males were more likely not to comply when compared with their female counterparts (61.2% and 38.8% noncompliance levels respectively) whereas older fish traders were more likely to violate the regulation than younger fishers. This could be explained by the fact that older fish traders have been in the trade long enough to understand ways of evasion. Results also indicated that having an alternative source of livelihood had an influence on compliance behaviour among fish traders as 82.2% of traders with lack of alternative livelihood had violated the regulation compared to 17.2% of violators with an alternative livelihood source. This shows that the government should find ways of supporting fish traders to engage in different income generating projects as well as train them on alternative livelihood sources which will play a role in creating economic incentives for compliance.

4.2 Control and enforcement

The type and dimension of control and enforcement is considered to have a great effect on the compliance behaviour among fishers. Whereas almost three quarters (74%) of fish traders reported that the probability of detection by fisheries officers and their fish confiscated was high, compliance levels were quite low in the fish markets which is a pointer to weak enforcement. Some fish traders confided that they had innovated ways of evading detection by hiding the undersize fish so that fisheries officers conducting market surveillance cannot detect them. Again some traders believed that the officers in the fish markets have been there for far too long allowing traders to master their way of work and innovate ways of evasion. Few traders agreed that they could not rule out corruption in the market while a majority denied there was corruption in the markets insisting that corruption thrived in the lakeside where the fishermen get away with harvesting of undersize fish in the presence of fisheries staff. The findings of this study are consistent with Eggert & Lokina, 2010 who found out that the probability of detection was high but the probability of being charged in a court of law was low due to bribes. This also shows that the economic gain from illegal fish trade has major impact on their compliance behavior, an indicator that economic motivations are an important driving force behind non-compliance behaviour of fish traders.

Majority of fish traders reported that enforcement of regulations in the markets was consistent in that fisheries officers are always within the market and watching over their day to day activities. On the other hand, a third (31.3%) of fish traders agreed that fish traders who engage in trade of under size fish get away with it implying that law enforcement in the markets was persistent but weak to deter traders from engaging in the vice. Allowing fish traders to get away with bypassing the rules, creates strong incentives for the other fish traders to follow their examples. Fish traders obeying the regulation are likely to watch fellow traders make a substantial black profit from illegal trade and are also determined to follow suit. Moreover, there was a significant statistical association between laxity in law enforcement as suggested by fish traders as one of the driving factors to non-compliance and compliance levels (χ^2= 4.088, d.f = 1, P = 0.043) implying its contribution to non-compliance behaviour among fish traders. Besides, majority of fish traders recorded the availability of undersize fish in the market

as a leading cause of their temptation to violate regulation which they blamed on the laxity of law enforcement at the source as well as in the markets that created avenues for undersize fish to be sold in the markets. This factor was highly statistically significant in terms of its association with non-compliance (χ^2= 15.640, d.f = 2, P = 0.000). Interactions with officers working in the markets through key informant interviews revealed lack of capacity by staff to arrest and initiate prosecution on violators. The main tool used to punish law breakers was to confiscate their fish and take it to children‟s homes within the county. This was in itself ineffective as staff further argued that it is frequently hampered by the lack of transport implying that the only available tool of punishment of law breakers was also inconsistent and therefore ineffective. The results are consistent with the findings by (Etiegni *et al*., 2011) who found out that weak enforcement in Lake Victoria (Kenyan portion) highly influenced compliance among fishermen.

It was also reported that there was inadequate staff in the markets in which they argued that sometimes fish lands in the market very early in the morning before officers have arrived or late in the evenings when they have left making it difficult to control. Stakeholders proposed recruitment of additional staff and continuous capacity building with required skills to improve compliance. Collaboration with other government agents to increase compliance is widely viewed as key in improving compliance. Key enforcement agencies in the fish markets would include the inspectorate to aid in arrest and prosecution of violators. Fish traders were however afraid that this would only create avenues for corruption while on the other hand fisheries staff maintained that this would only work well if the inspectorate are well trained and understand fisheries regulations.

4.3 Legitimacy of regulation

Acceptance of regulations (content legitimacy) is particularly influenced by whether the implementation of the regulation ensures that the distributive effects are considered fair and whether the imposed regulations are perceived as meaningful. Results of the study indicate that more than half (60.3%) of the respondents believe that penalties charged to fish traders caught violating the law are fair given the offence committed implying their agreement that the regulation is legitimate. However, a third of fish traders believe it‟s not fair in the sense that the penalties charged to a trader caught trading with only a few kilograms of undersize fish should not be equated to that of the fisherman. Fish traders further argued that when undersize fish has been harvested and is availed in the market, very little can be done at the markets since the fish is already dead arguing that fishermen had the sole responsibility by harvesting the Nile perch of recommended size.

4.4 Meaningful regulations

An important incentive for compliance is that the imposed regulations are perceived as meaningful. Fishers will not comply with regulations that are not believed to conserve the stocks. The findings of this study showed that majority (91.2%) of fish traders are in agreement

that overfishing is a huge problem affecting the country as it touches on the livelihoods of many people who directly and indirectly depend on fish for their livelihood. They also unanimously (97.3%) endorsed the idea that if the regulations are strictly observed at the source, L. Victoria could be sustainably managed. The findings further showed that almost all (98%) fish traders agree that the main aim of the regulation is to protect the resource and have stocks for future generations and improve business returns. They also agreed that the government is doing the right thing in imposing the regulation (96%). This is a very strong indication that fish traders perceive the regulations as useful to them and future generations. This however does not translate to high compliance levels and contradicts the opinion that if fishers view the regulations as meaningful this would promote compliance. This could be explained by the dilemma of choosing between obeying the law and providing for their families under harsh economic conditions.

4.5 Norms and morals among fishers

This refers to the degree to which group behaviour, social pressure, individual behaviour and individual expectations influence compliance behaviour. Axelrod, 1986 argued that norms in the sense of typical behaviour/attitudes and the expectations about the actions and opinions of others can have tremendous influence on subjects in a social setting. Similarly, the morality (personal norms), understood as the personal ethical view on what is right or wrong, affects the behaviour of the person concerned in particular situations. Young O. (1979) further explained that despite the potential economic gains to be obtained from undertaking illegal fishing, the level of compliance may remain high if there is a mutual trust (norm) among the individuals to comply.

In the case of fish trade in Nairobi County, norms seem to influence compliance behaviour among fish traders, positively as well as negatively. On the one hand, compliance with the regulation is commonly accepted among traders while on the other hand, there appears to be a strong norm not to comply with the same regulation driven by what the traders referred to as „*soko huru*" or liberalized fish marketing and also the fact that other traders are also selling undersize fish. There was a statistical association of the factor „other traders are selling undersize fish" with noncompliance (χ^2= 7.832, d.f = 2, P = 0.02) implying that those who violated were influenced by their peers meaning that if they thought many others were doing it the probability of violating was high. These results are consistent with the findings of Eggert & Lokina, 2010. Additionally, fish traders argued that liberalized fish market has provided for other avenues for landing fish in the county compared to previous year when fish could only come through the fish markets before distribution to other parts of the county. Currently there are other fish distribution channels which according to the traders has increased non-compliance. Their argument being that the insistence by the department of fisheries in the supply of recommended fish size will mean that those fish traders operating from the main fish markets will be by-passed by the middlemen in favour of the other outlets out of the main fish markets which is unfair to them as fish landed through other fish outlets in the city goes undetected by officials. One fish trader was quoted saying

„You government officers only concentrate enforcement efforts in the market where you believe most traders are, but fish also lands in other parts of the city where there is no form of enforcement".

Traders thus opt to land fish elsewhere to avoid detection leading to increased levels of noncompliance

4.6 Decision-making procedures

Previous research indicates that when fishers feel involved in the decision-making, they have a stronger incentive towards compliance (Lilburn, 1986). Young *et al*., 1996 and Jentoft & Kristoffersen, 1989 also argued that co-management may have a positive influence on legitimacy and the actual level of compliance.

Having user participation in the management decision making process is more likely that regulations will better adjusted to actual practice. Further, user participation in decision making process is expected to promote legitimacy and compliance. Further, Hanna 1995 suggested that co-management regimes in which participants are empowered to play a prominent role in decision-making, may be a means to improving compliance. The findings of this study showed that almost all (97.3%) fish traders agree or strongly agree that they are key stakeholders and should be involved in decisions affecting them. On the other hand, majority (70.7%) believe that the opinions of fish traders are not taken into consideration in the decision making process and even those who have participated in the decision making processes claim that it was an exercise in futility as they have not seen the outcome of any of their suggestions. This implies that decisions are made without real involvement of the affected users which has implications on procedural legitimacy and ultimately legitimacy of regulations. In line with the provisions of the Kenyan Constitution, 2010 and the Fisheries Management and development Act, 2016, it is important to ensure public participation in decisions that affect them and also in order to ensure sustainable development of the fishery resources.

Lack of knowledge of the importance of the regulation was suggested by fish traders as a factor they believe led fellow traders to violate regulations. Furthermore, there is a significance statistical association between lack of knowledge of the importance of the regulation and compliance (χ^2= 6.241, d.f = 2, P = 0.44). A greater involvement of fish traders in the decision-making process comprising knowledge creation regarding the importance of the regulation in conservation stocks should create incentives for compliance as traders would understand the shortage of fish in the market has been as a result of fishing out undersize fish in line with observations made by Nielsen & Vedsmand, 1999 and Kuperan *et al*., 1998.

5.0 CONCLUSION AND RECOMMENDATIONS

The findings of this study reveal gaps in knowledge and understanding among fish traders of the provisions of the Nile Perch slot size regulation. There is need to build capacity of fish traders on the provisions of the regulation and ensuring they understand the importance of the

regulation in order to increase voluntary compliance. It is also important to ensure proper understanding by fish traders on the importance of the regulation and how non-compliance would affect their business and livelihoods in future. It was also noted that consumer demand for undersize fish was high explaining the lack of knowledge also by consumers on the recommended size of fish for sale. It is also equally important that consumers are educated on the importance of conservation measures. Poor public participation in decision making was also identified as an impediment in ensuring compliance. A greater involvement of fish traders in the decision-making process comprising knowledge creation regarding the importance of the regulation in conservation stocks and soliciting their opinions would enhance ownership as well as create incentives for compliance.

This study showed that there was weak enforcement in the markets. There is therefore need for increased and effective enforcement in the markets to improve levels of compliance. As Sutinen and Kuperan 1999 express it: strong enforcement measures are an important ingredient in any compliance regime, even where a high degree of compliance is realized through the twin forces of moral obligation and social influence. In nearly any group of individuals subject to regulation, there is a core subgroup (usually small) of chronic, flagrant violators motivated largely by the direct tangible consequences of their actions. Moral obligation and social influence have little or no effect on their behavior. Only by changing the economic incentives, by reducing the potential illegal gains or by increasing the expected penalty, can their illegal activity be controlled. In the absence of incentive programs, the only control mechanism for this subgroup is enforcement.

Based on the findings of this study behavioural interventions are required to target the social norms of fish traders. There is need to emphasize more on social values with regard to the poverty challenge. Fish traders need to change their perception in choosing to do the right thing despite what their peers are engaged in. Some of the intervention strategies would for instance involve the use of respected fellow traders who comply with the regulations demonstrate the importance of compliance with regulations and also articles in the local dailies. Traders also need to be educated on alternative sources of livelihoods that they can engage in to improve compliance levels.

Collaboration with other government agents to increase compliance is widely viewed as key in improving compliance. Key enforcement agencies in the fish markets would include the inspectorate to aid in arrest and prosecution of violators as well as the Kenya police and judiciary. Training and effective collaboration of these key stakeholders is key in improving compliance with this regulation.

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