

ASSESSMENT OF FISH HANDLING PRACTICES IN MOGADISHU FISH MARKETS AND SUGGESTIONS FOR IMPROVEMENT

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Abstract: The main purpose of this study was to Assessment of fish handling practices in Mogadishu fish markets and suggestions for improvement, Somalia. The research design used was descriptive research also the target population of this study were 90 respondents. The researcher selected 73 with the help of Slovene's formula. The research instrument used was questionnaire to collect the data of the respondents and the sample procedure this study was employed purposive sampling that is part from non-probability sampling techniques. purposive sampling was used to select a participant from the target population. The required information for this study was gathering through questionnaire. And then the data was analyzed by using (SPSS); the findings of the study indicates that the majority of the respondents disagreed that fish handling have a negative impact on Mogadishu fish markets. The researchers recommended: Improve Market Premises Cleanliness such as regularly clean and disinfect floors, walls, and equipment in the fish markets to maintain a hygienic environment, Implement Cold Chain Management such as ensure the availability of sufficient ice or refrigeration facilities in the fish markets to maintain proper temperature control throughout the supply chain, Training on Fish Quality Assessment such as conduct training programs for fish market workers to educate them on how to assess fish quality based on appearance, texture, and odor, Strengthen Regulations such as review and update existing regulations related to fish handling practices in Mogadishu fish markets to align with international standards and best practices.

Keywords: fish handling, market hygiene, cold chain management, quality assessment, regulations, Mogadishu fish markets.

1. INTRODUCTION

Background:

Evaluating fish handling practices in fish markets is essential to ensuring the quality and safety of seafood products for consumers. Fish markets serve as a key link between fishermen and buyers, playing a vital role in the seafood supply chain. The handling methods used in these markets significantly affect the freshness, safety, and overall quality of fish (Einarsson & Eypórsdóttir, 2005).

Since fish is highly perishable, its quality begins to deteriorate immediately after harvest. Proper handling techniques are crucial in minimizing post-harvest losses, preserving freshness, and preventing bacterial growth that may lead to foodborne illnesses. Additionally, appropriate handling maintains the sensory attributes and nutritional value of fish, enhancing its

market appeal. Inadequate fish handling can result in spoilage, undesirable odors, and texture degradation. To evaluate fish handling practices globally, it is necessary to examine various stages of the supply chain, including harvesting, transportation, storage, processing, and market display (Markets, n.d., 2003). Compliance with established handling standards—such as maintaining optimal temperature control, implementing sanitary measures, and using appropriate packaging and labeling—is monitored by regulatory bodies and researchers. Evaluations also involve assessing adherence to national and international food safety guidelines set by organizations like the World Health Organization (WHO) and the Food and Agriculture Organization (FAO), with the aim of establishing best practices for improved fish handling (Ward, n.d., 2003).

On a global scale, maintaining fish quality remains a challenge. In Vietnam, for example, the quality of raw fish directly influences the final product. Once freshness and nutritional value are lost, they cannot be restored through processing. Although substandard raw materials may not always pose safety risks, they significantly reduce product shelf life and quality. A major challenge in Vietnam's fishing industry is the difficulty in maintaining low temperatures during transport and storage, leading to rapid decomposition and product rejection due to quality concerns (Einarsson & Eypórsdóttir, 2005). Post-harvest losses occur at various points in the fish supply chain, resulting in both economic and nutritional losses. Improper handling and processing, coupled with inadequate cold storage facilities, further contribute to these losses. High-value markets, such as the European Union, Japan, and the United States, have stringent regulations to ensure food safety and quality. Developing countries are also prioritizing food safety to meet international import standards (Markets, n.d., 2003).

Regionally, the demand for food safety and quality assurance in the seafood industry has risen significantly due to evolving regulations and global market requirements. In the Southwest Indian Ocean (SWIO) region, traditional fishing practices and post-harvest handling methods present challenges in meeting food safety standards. Post-harvest losses in this region are estimated to range from 30% to 70%, severely affecting household incomes and contributing to poverty in fishing communities (SOUTH WEST INDIAN OCEAN TUNA FORUM (SWIOTUNA), n.d.). The fishing industry's ability to compete in international markets depends on improved handling and compliance with quality standards. For instance, Uganda faced an export ban in 1997–1998 due to poor handling practices, which resulted in economic losses of approximately \$100 million. Consequently, the government and development partners implemented a quality assurance program across the entire supply chain to restore market access (Uganda Government, 2023).

In Somalia, addressing quality and hygiene concerns is vital for enhancing regional fish trade. Establishing unified quality standards can increase market access and ensure better fish products for consumers. Challenges in the Somali fish industry include inadequate handling and storage facilities, limited access to cold storage, and the high cost of electricity in inland areas like Zeylac and Berbera. Fishmongers often handle fish without gloves or proper sanitation measures, raising contamination risks. Fishermen and traders in various Somali regions, including Burao, Berbera, and Bulahaar, have called for improved fishing equipment, modernized markets, and greater community awareness regarding fish consumption (Consumption, 2011).

In Mogadishu, Somalia's capital and a key coastal hub, fish markets play a significant role in local trade and food security. However, no prior studies have examined fish handling practices in Mogadishu's fish markets, highlighting a research gap. Assessing the existing practices and conditions in these markets can provide valuable insights for improving fish handling, reducing losses, and ensuring food safety. The study aims to identify challenges in fish landing, sorting, storage, transportation, processing, and marketing. Through data collection and analysis, stakeholders can develop targeted strategies to enhance handling techniques, establish policies, and implement capacity-building initiatives. Improved fish handling can contribute to the economic growth of the fishery sector, support sustainable practices, and increase market competitiveness, ultimately ensuring the availability of safe and nutritious fish products for the local population (District, 2018).

Statement of the Problem:

The fish markets in Mogadishu should adhere to top-notch fish handling practices, which encompass the implementation of robust infrastructure, advanced cold storage facilities, stringent hygiene measures, and the dissemination of widespread knowledge regarding best practices.

The methods used at Mogadishu's fish markets for handling fish are essential for guaranteeing the quality and security of fish products. But there could be serious difficulties and flaws in the way things are handled right now that need to be fixed.

The specific problems or gaps in fish handling procedures are identified and evaluated. The study's problems are Mogadishu fish markets may face various challenges that affect fish handling practices.

These challenges include limited infrastructure e, inadequate cold storage facilities, suboptimal hygiene and sanitation practices, and gaps in knowledge and awareness of best handling practices.

These factors can contribute to fish spoilage, product degradation, and potential health hazards, fish surplus, low market customer satisfaction.

The evaluation of fish handling procedures in Mogadishu's fish markets will concentrate on locating the gaps and difficulties Somalia currently has with regard to fish handling in Mogadishu fish markets. This entails looking at elements including hygiene, preservation methods, and general adherence to food safety requirements.

General Objectives:

To determine the assessment of fish handling practices in Mogadishu fish markets and suggestions for improvement

Specific Objectives:

- 1) To investigate the hygiene and sanitation practices in Mogadishu fish markets
- 2) To examine the extent to which fish markets in Mogadishu comply with quality standards for fish .
- 3) To identify areas where improvements can be made in the training of fish handlers in Mogadishu.

2. LITERATURE REVIEW

Hygiene and sanitation practices in fish markets:

Maintaining environmental cleanliness is crucial in food manufacturing to prevent contamination. Food production should not occur in areas with high contamination risks, and careful consideration must be given to primary production operations to ensure food safety. This includes managing contamination from air, soil, water, fertilizers, insecticides, and other agents, along with proper waste management and hazardous material storage (Tamba & Parade, 2016).

Hygiene regulations extend to individuals handling food along the supply chain, from harvesting to consumption. Items that come into contact with food products (FP) must be cleaned regularly. Freshwater is necessary for cleaning, but purified seawater may also be used. Water from municipal supplies or boreholes should be chlorinated by a qualified individual, ensuring that chlorine levels remain within national drinking water standards. Ice used for FP preservation should be made from potable water and handled hygienically. Only government-approved ice vendors should be used to minimize contamination risks (Technologies & Control, n.d.).

Proper hygiene practices can make seafood safe for consumption even when sourced from bacteria-rich waters. Fish should be stored at or below 45°F (7°C) before filleting and then refrigerated or frozen. Protective gloves should be worn when handling fish, and those with open wounds should avoid direct contact. Internal organs should be removed and discarded immediately after harvest to prevent contamination. Cooking fish to an internal temperature of 145°F (63°C) ensures the elimination of harmful microbes (Dec, n.d.).

Sanitation improvements correlate with better growth outcomes in children. Research in low- and middle-income countries (LMICs) found that better sanitation increased height-for-age scores (Esrey, 1996). A study in Peru showed that inadequate water and sewage disposal caused 24-month-old children to be 1 cm shorter than those with better access to these services (Checkley et al., 2004). Furthermore, sanitation and water services were responsible for 40% of stunting cases, whereas diarrhea accounted for only 16% (Dangour et al., 2013).

Despite awareness, implementing hygiene practices remains challenging in certain environments. For example, USAID Comfish's Hygiene and Quality training program trained 70 women, but environmental conditions, such as fish carcasses and high humidity, hinder proper hygiene. These factors contribute to the presence of pests, making hygiene control difficult (Consultant & Sall, 2020).

Comply with quality standards for fish market:

Adhering to public standards is crucial to avoiding financial penalties and market losses. During the 1990s, new standards were enforced, and businesses or nations that failed to meet these regulations faced market exclusion. For instance, the European Union (EU) imposed bans on fishery imports from Bangladesh (1997), Kenya (1997–2000), and Malaysia (1998),

while the United States restricted raspberry imports from Guatemala (1997–1998). These prohibitions led to significant financial losses, forcing some companies out of business due to high compliance costs. In some cases, governments provided financial support to help businesses meet compliance requirements and regain market access, albeit at lower profitability levels. Even in countries that maintained export access, compliance costs were higher than expected, as seen in Brazil and the Philippines, where the additional expenses affected both production and trade. Some governments view compliance as a strategic priority to access high-income markets, highlighting the role of the public sector in ensuring adherence to regulations (Ronchi, n.d.).

Strict standards exist to prevent spoilage and decomposition of fishery products. The term "fresh" applies only to fish that have undergone refrigeration, ice storage, or freezing immediately after being caught. Quick-frozen fish, lobsters, fish fillets (breaded or battered), and minced fish are subject to specific regulations. Water used for glazing must be of drinking quality, and if seawater is used, this must be clearly stated on the label. Additionally, labels must indicate that frozen seafood should be stored at or below -18°C to maintain quality (Ii et al., 2009).

The National Fisheries Policy of 2004 (which replaced the Fish and Crocodile Act of 1964) and the Fish (Quality Assurance) Rules of 1998 provide the legal basis for fisheries management. The 2004 policy emphasizes sustainable resource management, environmental impact assessments, aquaculture, fish marketing, and food safety. It also clarifies the roles of central regulatory bodies, local organizations, and communities. The Fish (Quality Assurance) Rules of 1998 outline requirements for inspections, business certification, landing areas, Hazard Analysis and Critical Control Points (HACCP) systems, proper manufacturing practices, storage, transport, and packaging. (Ponte, 2005).

National food control programs and international trade rely on compliance with food standards. The Sanitary and Phytosanitary (SPS) Agreement and the Technical Barriers to Trade (TBT) Agreement outline global standards to prevent the misuse of regulations as trade barriers. While countries can establish measures to protect public health and ensure fair trade, they must adhere to internationally recognized norms. The SPS Agreement defines measures such as laws, regulations, certification procedures, testing, inspection, quarantine treatments, and sampling methods. Compliance with these regulations is necessary to facilitate trade while safeguarding consumer safety (UNESCAP, 2018)

Improvements in the training fish handlers fish market:

Proper training of food handlers is essential to maintaining food safety and hygiene. Before starting employment, all food handlers must complete training provided by an authorized institution approved by the Competent Authority. The Competent Authority determines the level of training required and directs accredited trainers on the curriculum. Additionally, it compiles and distributes information about authorized training programs upon request. Food handlers already employed at the time of regulatory changes must complete the required training within a year of implementation (Ii et al., 2009).

Food hygiene training ensures that employees understand their role in preventing food contamination and degradation. They must be equipped with the knowledge and skills necessary to handle food safely, including the proper use of cleaning agents and hazardous chemicals. The level of training should be determined based on factors such as the food's susceptibility to microbial growth, handling and packaging methods, processing steps, storage conditions, and the expected time before consumption (Tamba & Parade, 2016).

Fish market employees should be trained in proper fish handling, pathogen control, and storage techniques. Training programs must be regularly updated and evaluated to ensure effectiveness. Market authorities should establish mechanisms to keep fish handlers informed of best practices, implement oversight measures, and conduct periodic evaluations to identify hazards and take corrective actions. Supervisors and managers in fish markets should have in-depth knowledge of food hygiene principles to oversee these processes effectively (Tamba & Parade, 2016).

The adoption of improved fish handling and processing techniques relies heavily on awareness campaigns. Research shows that organizations like the Lagos State Agricultural Development Agency (LASADA) played a significant role in educating fish processors about new technologies, with 36.63% of processors learning through LASADA's initiatives. Additionally, 31.25% gained knowledge through the Federal Institute of Industrial Research, Oshodi (FIIRO), while others learned through the Nigerian Institute for Oceanography and Marine Research (NIOMR) or word of mouth. Government agencies at both state and federal levels have contributed to raising awareness of improved fish processing methods (Odediran & Ojebiyi, 2017).

To ensure high-quality fish products suitable for export, all stakeholders—including fishermen, suppliers, processors, and distributors—must adhere to proper handling guidelines. In Uganda, for instance, best practices (Amos, 2007).

Fish markets:

Fish marketing encompasses the entire process of delivering fish and fish products from producers to consumers. The primary objective of fish marketing is to bridge the economic disparity between areas with abundant fish supplies and those facing shortages. Effective fish marketing requires specific skills such as packaging, labeling, storage, transportation, sorting, grading, and assembling. Various stakeholders, including producers, fishing cooperatives, and wholesalers, play a crucial role in this process (Hassan & Hussain, 2023).

At the local level, fish markets operate under competitive conditions, with prices influenced by multiple factors. These include seasonal variations in fish availability, the freshness of the catch, infrastructure conditions, consumer demand, distance to landing sites, marketing channels, handling and transportation costs, and the initial prices set by fishermen (Prayitno, 1996).

Fish marketing transactions typically involve direct interactions between buyers and sellers. Research indicates that in some regions, fish sellers purchase their stock directly from fishermen, wholesalers, or fishing cooperatives. The pricing of fish is influenced by supply and demand dynamics, with around 50% of traders adjusting prices accordingly, while 33% set their own prices. Additionally, 17% of merchants negotiate prices with suppliers before finalizing purchases (Mebrate & Worku, 2019).

Wholesale markets serve as a critical link between fishermen and retailers, facilitating the movement of fish from surplus regions to areas with high demand. These markets help aggregate fish from multiple producers and enable bulk purchases by wholesalers, thereby reducing the need for retailers to engage in multiple small-scale transactions. Wholesalers handle essential functions such as sorting, reassembly, storage, and distribution, allowing retailers to focus on selling fish to consumers efficiently (Qatan & Knútsson, 2010).

3. RESEARCH METHODOLOGY

Research Design:

The study employed a descriptive research design, aiming to accurately and systematically describe a population, situation, or phenomenon. It can answer what, where, when and how questions, but not why questions. To collect quantitative data, researchers utilized a specifically designed questionnaire tool, chosen for its convenience and efficiency in gathering relevant information. For subsequent data analysis, the team utilized the Statistical Package for the Social Sciences (SPSS), version 22.0. SPSS facilitated the generation of a comprehensive frequency distribution table, enhancing the analytical process and providing a robust framework for interpreting collected data.

Target Population:

The target population refers to the total number of elements from which the sample is selected (Babbie & Mouton, 2011). The target population refers to the total number of subjects or the total environment of interest to the researcher. Hence, this study was conducted with four stockholders that are currently used and their operations in Mogadishu fish markets, which estimated 90 respondents, including fishermen, fishmongers, fish market officers, and fish students. These stockholders were chosen because of their operation in fish markets.

Table 3.1: Target population

NO	Categories	Population Size	Percentage
1	fishmongers	35	39%
2	fishermen	31	34%
3	fish market officers	7	8%
4	fish students	17	19%
5	Total	90	100%

Sample size

The sample size of the study was involved of 73 respondents of the target population.

This is so because the nature of data to be generated required different techniques for better understanding of the research problem under investigation. Besides, the approach is also commonly known for achieving higher degree of validity and reliability as well as eliminating biases as per Amin (2012).

Slovenes' formula was used in order to determine sample size.

$n = n = \text{required sample size}$

$N = \text{Target population}$

$e = \text{sampling error } n = 90 \frac{1+90(0.05)^2}{1+90(0.05)^2}$

$n = 73$

Table 3.2: Sample Size

No	Categories	Target Population	Percentage
1	Fishmongers	30	41%
2	fishermen	29	40%
3	Fish market officers	4	5%
4	Fish students	10	14%
5	Total	73	100%

Sampling Technique:

he researcher used a number of samplings which include; stratified sampling, simple random sampling and purposive sampling.

The researcher used Stratified sampling method to divide the members of the population into homogeneous subgroups before sampling like fishmongers', fishermen fish market officers and fishery students.

The study based on simple random sampling. is a sampling technique where in every item of the population has an equal and likely chance of being selected in the sample. Fish mongers and fishermen will be selected using simple random sampling, to ensures that each individual or member of a population has an equal and fair chance of being chosen and to avoid bias and other undesirable effects.

Purposive sampling is a non-probability method for obtaining a sample where researchers use their expertise to choose specific participants that will help the study meet its goals Fish market officers and fishery students will be purposely selected because the respondents are considered to be very knowledgeable.

Data Collection Instrument:

A questionnaire is a type of research tool used to gather data from respondents and consists of a series of questions or other prompts. Typically, a research questionnaire consists of closed-ended inquiries. With a survey questionnaire, you can gather a lot of data in less time, there is less chance of any bias creeping if you have a standard set of questions to be used for your target audience. You can apply logic to questions based on the respondents' answers, but the questionnaire was remained standard for a group of respondents that fall in the same segment Questionnaire was collected research data. Respondents were briefed about the study and its objective. The content of the questionnaire was explained for them and was also requested to answer the questions as honest as possible.

Data Analysis:

Data analysis is the process of organizing and cleaning data from errors made during data collection. Descriptive statistics used to summarize the data in a way that enables a researcher to meaningfully describe a distribution of Measurements or values using a few indices or statistics, frequency distributions and percentages generated from the data collected. A frequency distribution table shows the distribution of scores in a sample for a specific variable. It therefore gives a record

of the number of times a score or a response occurs for each variable, the researcher tabulated the findings and calculated the 32 frequencies and percentages, then made interpretations from the research findings. The data analyzed with the aid of the Statistical package for science version (SPSS).

4. PRESENTATION AND DISCUSSION OF FINDINGS

Table 4.1: Demographic Characteristics

Category	Subcategory	Frequency	Percentage (%)
Gender	Male	57	78.1
	Female	16	21.9
Education Level	Post-graduate	5	6.8
	Illiterate	30	41.1
	Bachelor's Degree	24	32.9
	Diploma	2	2.7
	Secondary Level	2	2.7
	PhD	2	2.7
Age Group	18 – 28 years	18	24.7
	29 – 39 years	41	56.2
	40 – 50 years	10	13.7
	51+ years	4	5.5
Work Experience	No experience	6	8.2
	1 – 3 years	22	30.1
	4 – 7 years	36	49.3
	8+ years	9	12.3

Table 4.2: Investigate the hygiene and sanitation practices in Mogadishu fish markets

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Disposal of waste and fish offal in a designated area	28 (38.4%)	26 (35.6%)	4 (5.5%)	12 (16.4%)	3 (4.1%)
Availability of handwashing facilities for workers and consumers	25 (34.3%)	35 (47.9%)	5 (6.8%)	4 (5.5%)	4 (5.5%)
Use of sanitizing agents in fish markets and boats	27 (37.0%)	22 (30.1%)	16 (21.9%)	4 (5.5%)	4 (5.5%)
Impact of improper sanitation facilities on market value	4 (5.5%)	2 (2.7%)	1 (1.4%)	29 (39.7%)	37 (50.7%)
Importance of cleanliness and hygiene in fish markets	8 (11.0%)	6 (8.2%)	5 (6.8%)	34 (46.6%)	20 (27.4%)

Table 4.3: Examine the extent to which fish markets in Mogadishu comply with quality standards for fish

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Regulatory authorities have established quality standards for fish markets	5 (6.8%)	33 (45.2%)	19 (26.0%)	14 (19.3%)	2 (2.7%)
Compliance with fish safety standards is essential to avoid penalties and market losses	1 (1.4%)	8 (11.0%)	6 (8.1%)	37 (50.7%)	21 (28.8%)
Fishmongers often cut and prepare fish for sale with gloves or other safety equipment	23 (31.5%)	20 (27.4%)	19 (26.0%)	7 (9.6%)	4 (5.5%)
Ice production for fish preservation uses fresh water meeting grade standards	13 (17.8%)	29 (39.7%)	9 (12.3%)	11 (15.1%)	11 (15.1%)
Fish kept in insulated containers should not be exposed directly to the sun or wind	12 (16.4%)	27 (37.0%)	13 (17.8%)	12 (16.4%)	9 (12.3%)

Table 4.4: Identify areas where improvements can be made in the training of fish handlers in Mogadishu

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
New employees in Mogadishu fish markets must complete training for fish handlers	17 (23.3%)	33 (45.0%)	8 (11.0%)	11 (15.0%)	4 (5.5%)
Employees should be trained on proper fish handling techniques and storage practices	8 (11.0%)	8 (11.0%)	13 (17.8%)	25 (34.2%)	19 (26.0%)
Government and NGOs provide training for fish market handlers	17 (23.3%)	30 (41.0%)	13 (17.8%)	8 (11.0%)	5 (6.8%)
Training programs for fish handlers improve cleanliness and safety	8 (11.0%)	7 (9.6%)	14 (19.1%)	27 (37.0%)	17 (23.3%)
Awareness and acknowledgment improve fish handling and processing technology	1 (1.4%)	1 (1.4%)	4 (5.5%)	38 (52.1%)	29 (39.7%)

5. DISCUSSION OF THE FINDINGS

Demographic characteristics:

The survey sample primarily consisted of male respondents (78.1%). A large portion of participants were aged between 29-39 years. Educational attainment was low, with 41.1% being illiterate and only 6.8% holding postgraduate degrees. Most respondents had 4-7 years of work experience.

Discussion investigate the hygiene and sanitation practices in Mogadishu fish markets :

The study on hygiene and sanitation in Mogadishu fish markets reveals critical issues. A significant 74% of respondents opposed proper waste disposal in designated areas, while 82.2% reported a lack of handwashing facilities. Additionally, 67.1% disagreed with using sanitizing agents in markets and boats. Poor sanitation was widely acknowledged as a major factor in market value loss, with 90.2% agreeing on its impact. However, 74% of respondents recognized the necessity of maintaining cleanliness to ensure seafood safety, public health, and industry standards.

Discussion examine the extent to which fish markets in Mogadishu comply with quality standards for fish:

The survey results indicate that 71.2% of respondents expressed negative views regarding the presence of quality standards for fish in Mogadishu markets, with 45.2% disagreeing and 26% remaining neutral. However, 79.5% agreed that adhering

to fish safety standards is essential to prevent financial losses, penalties, and health risks. Concerns were raised about hygiene practices, as 58.9% disagreed that fish is handled with gloves or protective equipment. Additionally, 57.5% disagreed that ice used for preservation should meet safety standards, and 53.4% disagreed that insulated fish containers should be shielded from sun and wind to prevent rapid ice melting.

Discussion identify areas where improvements can be made in the training of fish handlers in Mogadishu:

The survey revealed mixed opinions regarding fish handling training. A majority (68.5%) opposed the requirement for new employees to undergo training by authorized officers. However, 60.2% agreed on the necessity of training in proper fish handling and storage. Additionally, 64.3% disagreed that government and NGOs play a vital role in providing such training. Regarding the benefits of training in maintaining cleanliness and safety, 60.3% supported this view. Most notably, 91.7% of respondents strongly agreed on the importance of awareness and acknowledgment in improving fish handling techniques and processing technology.

6. CONCLUSION AND RECOMMENDATION

Conclusions:

The fish market in Mogadishu plays a crucial role in the local economy and food supply chain. However, a recent study sheds light on key aspects of the market, highlighting both positive and concerning findings. The research explores demographics, hygiene practices, compliance with quality regulations, and the training of fish handlers, revealing critical areas that require urgent attention.

A significant demographic observation from the study is the overwhelming participation of men in the fish market. Many of these individuals have low literacy levels and lack formal education, which poses a challenge to implementing best practices in fish handling. The study suggests that tailored support programs, including literacy and vocational training, could enhance their knowledge and improve market operations.

Hygiene and sanitation emerged as major concerns among respondents. Many fish handlers and buyers expressed dissatisfaction with waste management, the inadequacy of handwashing stations, and the lack of sanitizing agents. Poor sanitation not only diminishes the market's value but also poses serious health risks. The study underscores the urgent need for better sanitation strategies, such as designated waste disposal areas, regular cleaning schedules, and the provision of handwashing and sanitizing facilities. Addressing these concerns would significantly enhance the safety and reputation of the market.

Another critical finding is the lack of confidence in the enforcement of quality standards. While many respondents recognize the importance of quality regulations in preventing financial losses and safeguarding public health, they doubt their proper implementation. This calls for stronger regulatory oversight and the establishment of standardized guidelines to ensure compliance. The government and relevant authorities must take proactive steps to enforce regulations and educate market participants on their benefits.

Furthermore, the study highlights a considerable gap in the training of fish handlers. Many participants acknowledged the importance of education in improving fish handling practices but lacked clarity on the role of government and non-governmental organizations (NGOs) in facilitating such programs. Strengthening training initiatives and ensuring that fish handlers are equipped with proper skills will contribute to a safer and more efficient market.

Recommendations:

Basing on the findings of the study the researcher made the following recommendations;

- **Education and Training Programs:** Develop and implement targeted education and training programs for fish market workers, focusing on hygiene, sanitation, and quality standards. Collaborate with authorized officers to ensure comprehensive training for new and existing employees.
- **Regulatory Oversight:** Strengthen regulatory oversight to enforce quality standards and hygiene practices. Consider targeted interventions to address specific concerns raised, such as the use of safety equipment during fish preparation.
- **Public Awareness Campaigns:** Launch public awareness campaigns to emphasize the importance of proper sanitation practices in fish markets. Engage the community to foster a sense of responsibility towards maintaining cleanliness and adhering to standards.

- Partnerships with Government and NGOs: Foster collaboration between the government, non-governmental organizations (NGOs), and the private sector to provide essential training for fish market handlers. Pool resources and expertise to create sustainable training initiatives.
- Regular Inspections: Reevaluate and enhance the effectiveness of regular inspections by relevant authorities. Address concerns raised by respondents and ensure that inspections contribute positively to the adherence of quality standards.
- Promote Research and Innovation: Encourage research and innovation in fish handling techniques and processing technology. Support initiatives that aim to improve efficiency, quality, and safety within the fish market ecosystem.
- Temperature Control: Implement Cold Chain Management and Ensure the availability of sufficient ice or refrigeration facilities in the fish markets to maintain proper temperature control throughout the supply chain, establish temperature monitoring protocols and train workers on the proper use of monitoring devices.
- Fish Quality and Freshness: Conduct training programs for fish market workers to educate them on how to assess fish quality based on appearance, texture, and 53 odor and Train workers to identify signs of spoilage or deterioration, such as sliminess, discoloration, or off-putting odors, establish protocols for removing and disposing of fish with undesirable sensory characteristics to prevent their sale to consumers.
- In implementing these recommendations, it is essential to consider the unique demographic characteristics of the fish market community in Mogadishu to tailor interventions effectively and ensure long-term sustainability.
- Infrastructure and Equipment: Improve the infrastructure of fish markets, including the construction or renovation of market buildings, stalls, and storage areas, to meet sanitary requirements, ensure adequate space and ventilation in fish markets to minimize the risk of cross-contamination and promote airflow. In implementing these recommendations, it is essential to consider the unique demographic characteristics of the fish market community in Mogadishu to tailor interventions effectively and ensure long-term sustainability.

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