

SOCIO-ECONOMIC RESEARCH REPORT 6
LAKE VICTORIA ENVIRONMENTAL MANAGEMENT PROJECT

**SANITATION, FISH HANDLING AND ARTISANAL
FISH PROCESSING WITHIN FISHING COMMUNITIES:
*SOCIO-CULTURAL INFLUENCES***



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PREFACE

The Lake Victoria Environment Management Project (LVEMP) is a Regional Project being implemented in the three East African Countries (Uganda, Kenya and Tanzania). The primary goal of the project is to introduce environmentally and socially sustainable economic development to the region with a long-term purpose of enhancing growth and reducing poverty.

In Uganda the project is implemented under 11 components. All the components are mandated to provide information for effective management of the Lake Victoria basin. The Fisheries Research Component is mandated to provide scientific information about the fisheries of Lake Victoria and its catchment area.

The Social cultural study was conducted under the Socio-economics Sub-component of the Fisheries Resources Research Institute. The study established perceptions of fishers on the levels and use of sanitary facilities, fish handling facilities and artisanal fish processing techniques, and the social cultural factors that influenced the persistence of social cultural practices in the fishing communities of Lake Victoria.

The study provides information as a basis to both fishers and Fisheries Policy Makers to improve sanitation, fish handling and artisanal fish processing through advocating and mobilizing.

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EXECUTIVE SUMMARY

Introduction

1. Positive transformation of the Fisheries Sector in Uganda has of recent been scathed by failure to maintain fish quality and safety, a key prerequisite for retaining and gaining fish markets.
2. The social cultural study established the extent to which social cultural practices had affected the levels and use of sanitation facilities, fish handling facilities and artisanal fish processing techniques and the factors that influenced these practices in the fishing communities of Lake Victoria.
3. This information is of significance for purposes of advocacy and mobilization of fishers in order to improve the sanitation, fish handling and artisanal fishing processing situation in the fishing communities.

Methodology

4. The study was conducted in Mukono, Mayuge and Wakiso districts between June 2001 and May 2002.
5. Both qualitative and quantitative methods of data collection were used.
6. The latter method of data collection yielded 507 responses.
7. Qualitative methods involved the use of Focus Group Discussions, literature surveys and observations.
8. Qualitative data were analyzed using content analysis.
9. While quantitative data were analyzed using Statistic Package for Social Scientists, and summarily presented using pie charts and tables.

Results

10. On the issue of sanitation in communities, 82.6% of the respondents agreed that some fishers did not possess or use waste disposal sites, 17% disagreed and an insignificant proportion did not know.
11. Key factors that reportedly influenced the possession or use of waste disposal sites were: lack of awareness (59% of respondents), Lack of space (13.2% of the respondents) and inability to afford constructing waste disposal sites (11% of the respondents).

12. On the same issue, 90.4% of the respondents agreed that some fishers did not possess or use latrines, 8.8% disagreed.
13. Outstanding factors that reportedly influenced possession or use of latrines included: nature of the soils (19% of respondents), inability to construct latrines (17% of the respondents), habit of some fishers (12% of the respondents) and cultural beliefs of some fishers (10% of the respondents).
14. Concerning fish handling, at the lake, a majority (96.9% of the respondents) agreed that some fishermen exposed fish to the sun and 2.3 % disagreed to the practice.
15. At the landing sites, some 95.3% of the respondents agreed that some fishers drag fish along shoreline ground, 3.5% of the respondents disagreed and 1.2% of the respondents did not know.
16. During distribution of fish, 97.3% of the respondents agreed that some fishers stack fish poorly in transit, 1.9 disagreed.
17. Finding from both qualitative and quantitative data revealed Lack of awareness, lack of facilities, poor community leadership, inadequate means of transport, poverty, nature of the boats and inaccessibility of ice and containers as the major factors that influenced these handling practices.
18. On the aspect of artisanal fish processing, of the 417 respondents, 85% agreed that some fishers processed spoiled fish, 1.7% disagreed and 1.4% did not know.
19. The majority of the respondents (64%) attributed this practice to limited incomes of the fishers involved in fish smoking, 20% to scarcity of fresh fish and 13% to lack of awareness.
20. Further more, concerning smoking, 96.1% of the 415 respondents agreed that some fishers spread fish in dirty environments while preparing to smoke, 2.4% disagreed and 1.4% did not know.
21. Poor community leadership (37% of the respondents), lack of awareness (31% of the respondents) and Negligence (29% of the respondents) were the major influencing factors.
22. Under the sun drying technique, of the 421 respondents, 93.3% agreed that some fishers spread Mukene on bare ground, 5.7% disagreed and 1.0% did not know.

23. The major factors that influenced this practice included: lack of spreading facilities (62% of the respondents), Fish dries fast (17% of the respondents) and lack of alternative means to sun drying (13% of the respondents).
24. More so, 98.3% of the fishers agreed that some fishers exposed *Mukene* to environmental contaminants (Runoff water and bird droppings) while 1.0% disagreed to this practice.
25. The key factors that reportedly influenced this practice were: Lack of alternative to sun drying technique (64% of the respondents), lack of storage facilities (14.5% of the respondents) and flexibility of the markets (12.9% of the respondents).

Conclusions

26. Social cultural practices of fishers have greatly affected the levels and use of sanitation facilities, fish handling facilities and artisanal fish processing techniques in the fishing communities of Lake Victoria.
27. Social cultural factors notably: lack of awareness, lack of facilities, poverty, poor community leadership and lack of alternatives to fish processing techniques like sun drying have influenced the persistence of these practices in the fishing communities.

Recommendations

28. A preventive approach, which takes in account advocacy and mobilization of members of the fishing communities should be devised by both fishers and responsible authorities. The approach should include such strategies like:
- a. Sensitisation of fishers on the effects of these social cultural practices, primarily on fish quality and safety. This will make them responsible in their work and to be aware of the effects of their actions.
 - b. Planning and gazetting landing sites. Planning should cater for all the basics of a homestead. By this, basic sanitary facilities like waste disposal sites and latrines would be easily constructed.
 - c. Able community leadership. Community leaders should be empowered with knowledge and leadership skills. This will make them committed inspirational. This can be done through workshops and seminars and/or through Fisheries Extension Workers. More so, Fisheries extension workers who have become “native”, efforts should be made to remind them of their work.

- d. Provision of facilities. Responsible authorities like the Local Government and industrial fish processors should provide facilities, especially those facilities that are expensive for fishers. Facilities may include: echosan toilets, Slabs, ice and fish drying racks although some instances it should be a collective effort between responsible authorities and the fishers themselves.
- e. Improvement of transport to fishing communities. This should involve improving of the road networks to fishing communities.
- f. Provision of alternative means to sun drying of fish. The alternative should cater for the aspirations of fishers.
- g. Research should be conducted to examine the material and economic losses of fish to fishers.

SECTION ONE

1.0 INTRODUCTION

1.1 Back ground to the problem

The fisheries sector plays an important role in the economy of Uganda, as it has become an important source of animal proteins. Presently, it accounts for an estimated 50% of total animal proteins in take. It is also a major source of foreign exchange to the Government projected at US\$ 30 million (FMP, 1998) and key source of employment and incomes to an estimated 1 million Ugandans. The benefits highlighted can fundamentally be attributed to the recent transformation of the sector that entailed product diversification and the corresponding market expansion among other factors.

According to the 1996 Fisheries Annual Report, 60% of the fish landed was marketed fresh, which comprised of such species as Nile perch *Lates niloticus* and Tilapia *Oreochromis niloticus*. Using artisanal methods, over 40% of the catch was processed into smoked, salted, sun dried and deep-fried products depending on the type of species, consumer preference, and accessibility to landing sites. Of the 60% of the fish that was marketed fresh at the landing sites, 40% was sold to processing plants for conversion into value added product intended for the export markets dominated by Nile perch.

It is evident that since the inception of industrial fish processing in mid-1980s, the fishery sector has changed drastically. Prior to that point in time, the fishery was confined to the fishing communities and nearby trading centres with narrow market outlets. However, with the current sectorial transformation, the market channels have increased and have become slightly complicated to sustain. The market channels have taken on a three-tiered channel of distribution; local, regional and international with specific characteristics relating to the type of fish species, fish products and market destination (SEDAWOG, 1999). At the local level, the market for all the three fish species of commercial importance namely; Nile perch, Tilapia and Mukene *Rastrineobola argentea*, has been expanding over the last decade. The expansion has been attributed to changes in consumption habits of local consumers, price of fish in relation to other animal proteins and the need for fishmeal by poultry farmers. The fish products available on the local markets have therefore tended to be diverse, depending mainly on the tastes and preferences of the consumers. Regionally, the market has not only expanded to the three riparian states but also to other neighbouring countries mainly Rwanda, Democratic Republic of Congo and Burundi. This market is mainly dominated by traditionally processed smoked and sun dried tilapia. The international market on the other hand, a relatively recent player with fastidious demands for quality and safe white meat has directly influenced the operations of fish processing plants scattered around the Lake Victoria shores since 1988. Currently, 25% of the total catch from Lake Victoria is processed into frozen and chilled fish products for export mainly to European Union Countries, Middle East, South East Asia and Australia (Annual fisheries report 1996).

Evidently, the role of the market has had a significant influence in transforming the fishery sector, hence the need to maintain and expand it. However, the above developments in the sector are being thwarted by the inability of the sector to actively compete for the international markets. For instance, fish exports from Uganda were banned in 1997 and 1998 because of quality concerns exacerbated by poor sanitation and fish handling among other factors. This action greatly impacted on the economy, as employment, incomes and foreign exchange were lost. Uganda Fish processors and Exporters Association (UFPEA) estimated the loss at US\$ 100 million. Consequently, Government and Development Partners responded by instituting a Quality Assurance Programme along the entire distribution chain. The intervention measures put in place culminated into lifting of the ban.

1.2 Problem Statement

While the fisheries sector has greatly transformed, the market for fish, a key element of the sector has consistently been affected by failure to meet international fish and fish product quality requirements (New vision, 2001). This scenario has been exacerbated by a host of conditions among which are the social cultural practices of fishers, which relate to sanitation, fish handling and artisanal fish processing. This research investigated the sanitation, fish handling and artisanal fish-processing practices in the fishing communities of Lake Victoria and based on the findings, recommendations have been proposed.

1.3 Overall Objective

The overall objective of the study was to assess the influence of social cultural practices among fishing communities on the levels and use of sanitary facilities, fish handling facilities and artisanal fish processing techniques.

1.4 Specific Objectives:

- (a) Establish fishers' perceptions on the extent to which social cultural practices have affected the levels and use of sanitation facilities, handling facilities and artisanal fish processing techniques.
- (b) Identify social cultural factors, which influence the levels and use of sanitary facilities, handling facilities and artisanal fish processing techniques.
- (c) Make recommendations to improve sanitation, fish handling and artisanal fish processing practices in the fishing communities.

From these specific objectives, the following research questions were derived for which the research answers:

- 1) To what extent have the social cultural practices of fishers affected sanitation, fish handling, and artisanal fish processing among fishing communities?

- 2) What social cultural factors have influenced these social cultural practices?
- 3) What measures can be undertaken to improve sanitation, fish handling and artisanal fish processing?

1.5 Scope of the Study

The study was carried out between June 2002 and May 2003. The time span did not in any way affect the results of this study. It targeted the fishing communities of Lake Victoria from the districts of Mayuge, Mukono and Wakiso. The study concern was the social cultural practices of fishers, which impinge on sanitation, fish handling and artisanal fish processing. Sanitation issues investigated were: the possession and use of latrines and waste disposal sites, as these two factors were representative of sanitation spectrum.

Fish handling investigations were restricted to the practices of fishers on the lake, at the landing and during distribution. Handling practices in the markets and processing factories were not considered in this study.

Investigations under artisanal fish processing involved only two processing techniques namely; smoking and sun drying which are the main processing techniques in the fishing communities around Lake Victoria. As such, findings could be easily generalised. Sun drying was restricted to *Mukene* fishery.

1.6 Significance of the Study

Advocacy, mobilisation and designing of strategies to improve sanitation, fish handling and artisanal fish processing in the fishing communities have been constrained on several occasions. Indeed, the three study aspects have been a cause of concern to the Fishers, Fisheries Policy Makers and Implementers due to their direct and indirect influence on quality and safety of fish and fish products. The present study sought to clarify the understanding of the sanitation, fish handling and artisanal fish processing situation in fisher communities and the underlying causative factors.

Initially, the study set out to establish the extent to which social cultural practices had affected sanitation, fish handling and artisanal fish processing. Then identify the social cultural factors, which had influenced those practices and consequently, deduce recommendations. This information would then form the basis for advocacy by concerned authorities to policy makers and mobilisation of fishers.

1.7 Organisation of the Report

The report begins with an introduction, which gives the background to the problem that highlights the importance of the Fishery Industry in view of the recent transformation and the resultant market expansion. In the same chapter, the problem statement and the overall objective of the study are stated. Pertinent research questions derived from

specific objectives are also stipulated. Lastly, the chapter has the scope of the study and the significance of the study.

Chapter two presents a literature survey. Literature focused on the characteristics of fishing communities in relation to sanitation, fish handling and artisanal fishing processing.

The third chapter presents the methodology, study area, criteria for selection of respondents, data collection and analysis. Finally, study limitations have been outlined.

In chapter four results are presented in narration and summary form. Results on fishers' perceptions on social cultural practices of fishers on the three aspects of the study are summarised using pie charts. Results on factors that influenced these practices in fishing communities are summarised using frequency tables. Lastly, a summary of the results has been given.

The Conclusions and recommendations are presented in chapter five.

The last sections of the report comprises of the bibliography and appendices of research instruments.

SECTION TWO

2.0 Literature Review

2.1 Introduction

This literature centres on the attitudes of fishers to sanitation, fish handling and artisanal fish processing. The focus on processing technologies was restricted on smoking and sun drying. It also examines the factors that have influenced the social cultural practice of the three study aspects.

2.2 Sanitation Characteristics in Uganda

In Uganda, sanitation has been at the centre of Government programmes since 1934 when the then Colonial Government, laid down rules and regulations to effect appropriate sanitation practices due to their appalling situation (GoU, 1994). Although such a policy framework has been in place, little success has been achieved. This scenario has led to a conclusion that issues of sanitation have not been given priority by Government as demonstrated by the low level of latrine coverage noted to be less than 50% in rural areas of most districts in Uganda (Nakiboneka 1998).

Sanitation is a relatively broad concept involving among others the construction and use of sanitary facilities as a way of preventing diseases arising out of inappropriate hygiene habits such as poor disposal of excreta (Bukuluki, 1995). According to studies conducted in different communities in Uganda (Bewule, 1999; Borghesi *et al*, 1987 and RUWASA, 1992), the sanitation situation in those respective communities was appalling. Generally, their findings indicated the high magnitude of these practices in most communities of Uganda irrespective of their social cultural practices. According to Bukuluki (1995), possession and use of sanitary facilities in communities were two different things. He argued that even where some members of the fishing communities possessed sanitary facilities, the use of these facilities was not certain. His research gave an outlay of varying factors, which influenced possession and/or use of sanitation facilities. Poverty, illiteracy and taboos were identified as the key factors influencing the possession and/or use sanitation facilities in most communities in Uganda. Nakiboneka (1998) also noted that the nature of the soils had a bearing on the possession of latrine in most fishing communities as it influenced the frequency of replacement.

2.3 Fish handling Characteristics and Influencing Factors in Fishing Communities

According to Connell, (1995) and Huss, (1994) fish handling is one key practice for ensuring improved fish quality and safety. In Uganda, improvement of fish quality and assurance of safety has of late become a key priority for the fisheries sector. The Government and Development partners like the Food and Agriculture Organization (FAO) have extended both technical and monetary assistance to improve fish handling along the distribution and marketing chain (FAO, 2000).

The assistance has focused largely on regulations, training of fish inspectors, introduction and application of good manufacturing practices/good hygienic practices (GMP/GHP) and Hazard Analysis Critical Control Points (HACCP). These initiatives have resulted into the implementation of quality management programs in processing plants. While these initiatives have had a significant impact in improving fish handling for the export market, sanitation in fishing communities has not improved appreciably. This has been manifested in the handling attitudes of fishers at different critical points in the fish handling chain. For example, it is a common practice for fishers mishandling fish during removal from nets or aboard a fishing vessel. Throwing of fish increases the likelihood of damage through bruises on fish fresh, which subsequently enhances passage of spoilage micro-organisms into the interior of fish. In addition, it causes gaping of fish fillets, which is a quality defect especially in the export markets (Ssali & Masette, 2001). Exposure of fish to direct sun's rays especially UV-light while at the fishing grounds or at any stage along the marketing chain, enhances chemical spoilage processes in fish which may be more pronounced in Nile perch because of its high fat content (Kizza, 1989).

The common fishing boats on most water bodies in Uganda are small and un-painted. Such boats are not compartmentalized and this greatly affects the way fish are handled aboard considering that most fishing boats have 3-4 fishing crew and invariably susceptible to seepage with dirty water (Reybolds and Kitakule, 1992). Fish is usually transported from fishing ground to landing sites from the bottom of the boats where in some instances it is covered with plastic sheets or leaves of vegetation. The use of ice keeps fish at chill temperatures, which in turn slows down the rate of microbial proliferation however, fishermen rarely use ice for preserving fish. Upon reaching the landing site, it is a common practice to drag fish through the contaminated inshore muddy water. Dragging of fish not only affects its texture but it also enhances microbial contamination as the inshore waters are highly polluted (Muganwa and Nakavuma 1997). Often times, fish is also gutted and rinsed in the same inshore waters. According to these authors, the faecal or thermo-tolerant coliform counts and incidence of *salomonella spp* were higher in the inshore waters at landing sites than in the offshore waters. (Table 2.1). Gutting and rinsing of fish in the inshore waters or dragging fish in beach sand and mud, increases the risk of fish contamination with spoilage bacteria and/or pathogenic strains (Ssali and Masette, 2000).

Table 2.1: Average microbiological contamination at landing sites (Kasenyi, Katosi, Kasensero and Dimmo landing sites)

Location (Site)	Counts (c.f.u/ml)				
	TPC	Coliform	E.coli	<i>Staph.aureas</i>	<i>Salmonella</i>
Inshore water	4.5x10 ⁶	2x10 ⁵	3.6x10 ⁶	9.65x10 ⁵	2.15x10 ³
Offshore water	2.25x10 ³	4.7x10 ²	Nil	Nil	Nil

Source: Muganwa & Nakavuma (1997)

At most landing sites, social amenities like potable water, shelter, electricity, sanitary facilities and other necessities like ice are lacking (Ssali and Masette, 2001). In the absence of these facilities, fishers at some landings use shoreline water for cleaning fish, racks and other handling facilities. In most cases, ice is not used at all. However, of recent, there has been public as well as private initiatives to put up similar facilities through both individual factory processors and the Lake Victoria Environmental Management Project (LVEMP) Micro project Sub- component at selected landing sites.

The access roads to landing sites are generally in a poor state of repair. This condition impacts on the quality of fish as time and temperature parameters have direct influence on spoilage rates of fish and fish products (Connell, 1995). Irrespective of whether fish is processed or fresh, it is stacked so poorly that fragmentation and spoilage are exacerbated enroute from landing site to the market place. It is also a common practice for fish traders and/or transporters to sit on fish and put other items aboard transport vehicles, which further increases fragmentation and spoilage (Masette, 2000). These practices are largely influenced by the facilities available to the fishers. Fish destined for local markets is transported on bicycles, open pickups, public commuters and some by people on their heads. Locally made baskets and sacks are used for carrying processed tilapia and *Mukene* respectively.

On the other hand, the imposition of international quality and safety standards on the export of Nile perch has caused some improvement in fish handling during distribution to the fish processing factories. Tracks that are specifically designed to handle fish and ice are used although some time ice is not sufficiently used. At this stage of fish handling, it's also common for fishers to tread and even throw fish about especially when loading.

2.4 Artisanal Fish Processing

Processing of fish is a common practice in most fishing communities around most of the water bodies in Uganda. Processing of fish is mostly done as a fall back to preserve fish for both future consumption and ensuring that fish was kept in marketable conditions (Ogunja, Werimo and Okemwa, 1990).

In Uganda, the traditional fish processing methods include smoking, sun drying, salting and deep-frying. The processing of fish is mainly done as a fall back to utilize fish, which cannot be sold in fresh form either because it is spoilt or has failed to go through the normal channel of distribution (Ssali and Masette, 2001). Both researchers further argue that when fish is processed then it will more likely fetch a lower price than if it had been sold in fresh form, approximating price fall at 30%. This is attributed to the consumers' general preference for fresh fish as opposed to cured fish (Reynolds and Kirema 1991). According to Masette, (2000), although all the artisanal fish processing methods do achieve the primary objective of preserving fish for shelf-life extension, they are waste full and produce low quality fish products. The author mainly attributes this to the procedural techniques employed rather than the processing methods per se.

A variety of fish species including Nile perch, tilapia, cat fish (*Bagrus*) and mud fish (*Protopterus*) are smoked at landing sites mainly on Lake Albert, George and Edward. On Lake Victoria, processing of the three main species of commercial importance is also conducted at both the islands and around shores.

2.4.1 Fish Smoking practices

In the fishing communities partial success has been registered in improving fish smoking. This has widely been achieved due to interventions, which have targeted the improvement of fish smoking methodologies. Such success was manifested in the increase in exportation of smoked fish in 1995 estimated at 86,000 tonnes and valued at Ushs. 34.4 million. (Fisheries Annual Report, 1996)

This success however, is being hampered by the persistence of some poor processing practices of fishers. According to (Ssali and Masette, 2001), it is a common practice among fishers to smoke spoilt fish. Smoking of spoilt fish will in the end affect the quality of the final product because a high quality fish product is dependent on the quality of the initial raw material (Storey, 1982).

The use of traditional kilns is also a common practice. A traditional kiln is an excavation in the ground on top of which a welded mesh is put and fish is arranged on top. There are no special techniques involved in the construction of the kiln. This type of kiln according to Nfamara, (1990) and Masette, (2000), produce poor quality fish products because of inability to control temperature and smoke density.

2.4.2 Sun drying practices

In the fishing communities of Lake Victoria, this method of preserving fish is mainly restricted to the small pelagic fishes of mainly *Rastrineobola Argentea* locally known as *Mukene*. The fish is sun dried whole because of its size. Notable traditional practices according to Masette, (2000) are the spreading of fish on bare ground and exposing it to environmental contaminants like run off water and of often times bird droppings. These practices directly affect the quality of the final products especially when it is used for human consumption.

SECTION THREE

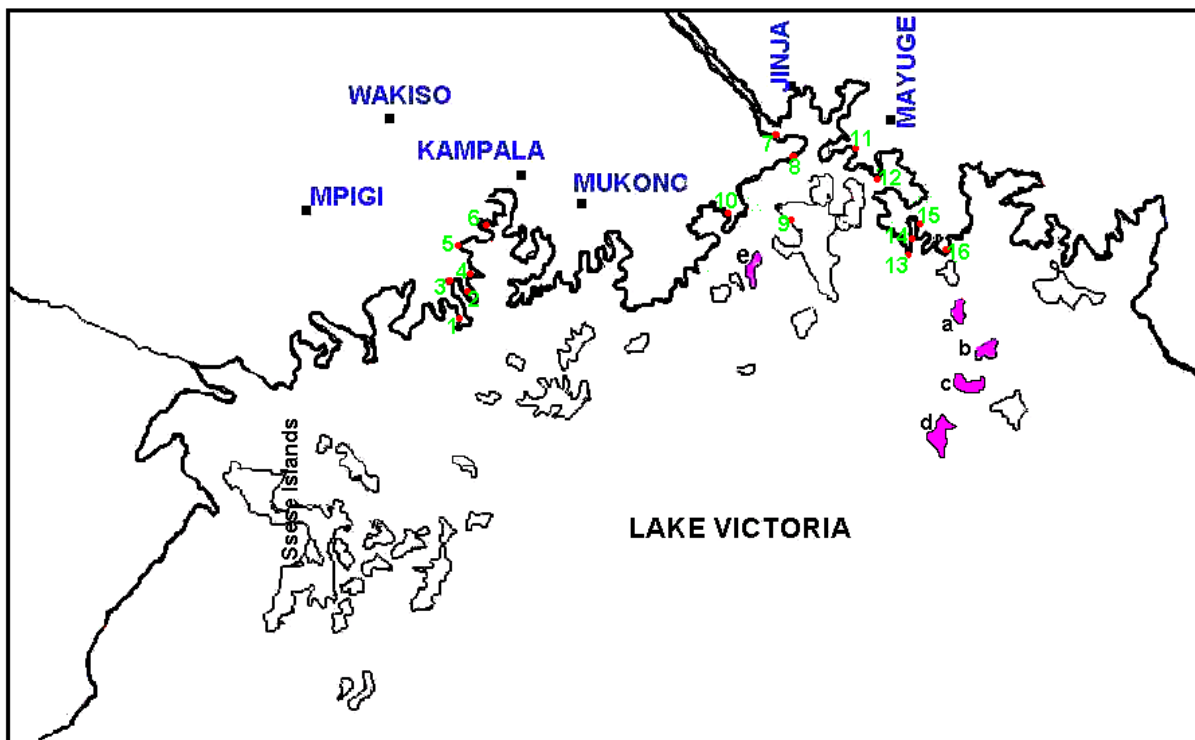
3.0 METHODOLOGY

3.1 Area of the Study

The study was conducted in Mayuge, Wakiso and Mukono (Fig 3.1), from May 2001-June 2002. Mayuge and Wakiso districts once formed part of Mpigi and Iganga districts.

The three districts were purposely selected due to their population size (Table 3.1), and diversity in ethnic composition.

Table 3.1: Population density and growth rate of riparian districts per annum.



KEY

Landings

- 1 Nakabugo
- 2 Mutungo
- 3 Kasenyi
- 4 Kasenyi-

Bugiri

5

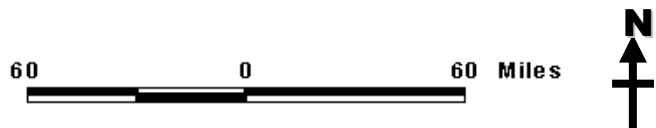
- 6 Busabala
- 7 Kikondo
- 8 Kalega
- 9 Kyanamu
- 10 Nkombwe

- 11 Iguluibi
- 12 Busuyi
- 13 Walumbe
- 14 Nakalanga
- 15 Bukagaba
- 16 Bwondha

Islands

- a Kaza
- b Sirinyabi
- c Bumba
- d Masolya
- e Bukwaya

Fig. 3.1: Map of area of study



District	Population	Population Density	Growth Rate per Annum (%)
Rakai	456,400	99	3.0
Masaka	1,015,400	216	2.7
Kalangala	18,400	38	4.1
Kampala	878,600	4,581	4.0
Mpigi	1,121,000	202	2.7
Mukono	1,063,200	179	2.4
Jinja	397,300	428	1.8
Iganga	887,600	210	3.0
Bugiri	283,800	165	4.0
Busia	209,300	232	2.8

Source: MFPED, 1998

The population size of Mpigi, Mukono and Iganga were slightly higher than other districts. In relation to ethnic composition, on the Uganda side of the lake, the main dominating tribes are Baganda occupying the districts of Kalangala, Rakai, Masaka, Mpigi, Wakiso, Kampala, Mukono and Basoga occupying the districts of Jinja, Mayuge, and Bugiri with Samias dominating in Busia and some parts of Bugiri district. The two parameters were based on when selecting the study area. To further enhance representation, mainland landings and islands constituted the study area.

3.2 Selection of the sample

At the landing sites, respondents involved in fisheries related work were randomly selected. Respondents included: fishermen, fish traders and fish processors. Virtually all members of the fishing communities were in position to answer most of the questions. Some respondents who could not give information relevant to the study objectives were terminated. In total, a sample of 507 respondents was selected with 407 from the mainland landings and 100 from the islands.

3.3 Data Collection

The data was collected using both quantitative and qualitative methods of data collection.

3.3.1 Quantitative Data Sources

A unit questionnaire was the main data-collecting instrument for quantitative data used in the survey. The designing of the instrument was based on seeking perceptions of fishers on the extent to which social cultural practices had affected sanitation, fish handling and artisanal fish processing and the factors that influenced social cultural practices in the fishing communities (Appendix 11).

Prior to the survey, the questionnaire was tested in a pilot survey at Bumeeru and Murwanda landing sites in Bugiri district for which 100 responses were enlisted. The pilot survey served to ascertain whether the instrument was appropriately capturing the research objectives. It also served to appropriate codes. In all, 484 questionnaires were administered.

3.3.2 Qualitative Data Sources

Data sources were: a literature survey, Focus Group Discussions and observations. Secondary data was collected both in the initial stages and in course of the study. Information relevant to the study specifically on aspects of sanitation, fish handling and artisanal fish processing was collected from such sources like the Fisheries department Entebbe (DFR), Fisheries Resources Research Institute (FIRRI) Food Science and Technology Research Institute (FOSIL) and other relevant information sources.

Focus Group discussions were conducted both in the preparatory stages of the study as a way of streamlining and identifying the key issues, and in course of the survey. In course of the survey, questions derived from the three themes were asked groups comprising of fishermen, fish traders and processors (Appendix 1). Groups comprised of 8-12 participants.

A competent facilitator was selected from the team to moderate the discussions. The discussions went on as important information was recorded for analysis. In all the discussions, caution was taken to keep the discussion on or around the original topic and to avoid domineering from some discussants.

Observations were also used in the collection of data. Structured observations using an observation checklist was the method used. The checklist targeted pre-identified social cultural practices and the facilities fishers used. It involved watching, recording and taking on-spot photographs.

3.4 Data Analysis

Data from unit questionnaire interviews were edited both from the field and in the office. This was preceded by data entry, cleaning and tabulation using the statistical package for Social scientists (SPSS).

Data were then categorised by running frequency tables and pie charts for set questions. Tables and pie charts were used for purposes of providing information at a glance.

Content analysis was used to analyse qualitative data. The analysis was based on social characteristics of fishers with emphasis on the content of perceptions and knowledge of fishers about the practices and the factors respectively.

3.5 Limitations of the Study and Data

The study was sensitive of the social and cultural fibre of fishing communities. This affected the data collected. The social and cultural being of fishers directly or indirectly

influences the three study aspects. Therefore, this might have limited the fishers to explicitly express their “actual self” because of perceived fears.

However, this limitation was addressed by having preparatory statements for set questions, specifically, in the Unit questionnaire. Statements prepared the respondent for questions he/she was about to answer.

SECTION FOUR

4.0 Results and Discussions

4.1 Socio-demographic Characteristics

Most of the respondents, 40% were from Mayuge, 31% were from Wakiso and 29% from Mukono district. The mean age of the respondents was 29 years; an indication that fishing was mainly dominated by the youth. The Baganda constituted the biggest tribe with 37%, followed by the Basoga 21% and lastly, the Adholas and Samias who constituted 5% each. Other tribes in the sample included: Bagwere, Banyole and Bagisu.

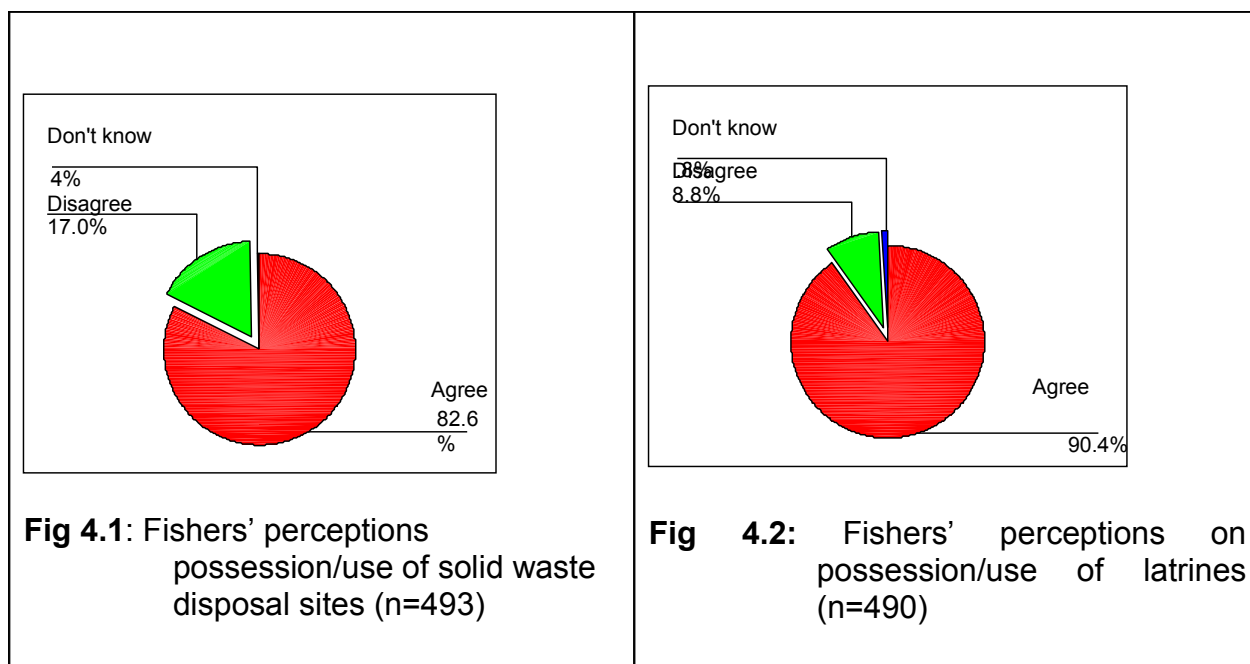
About 95% of the respondents were males and only 5% were females. The sex composition was mostly influenced by the activities of the fishers. 51% of the respondents were fishing labourers, 21% fishing unit owners, 16% fish traders and only 8% were involved in artisanal fish processing and particularly smoking and sun drying. The first three types of activities were mainly male dominated while fish curing was the preserve of the womenfolk. Most of the fishers 75% were married and 25% were single. At least 59% had attained primary education, (24%) had attained secondary level education and only 1% had acquired tertiary education while 16% had not attained any formal education. The majority of respondents had stayed in the fishing communities either as fishermen, fish traders, or fish processors for at least 7 years.

4.2 Sanitation

4.2.1 Fishers' Perceptions on the Social Cultural Practices of Sanitation

The practices examined were about possession and use of solid waste disposal sites and latrines. With regard to possession and use of solid waste disposal sites, the majority (82.6%) of the respondents agreed that some fishers did not possess or use solid waste disposal sites and some 17% disagreed (Fig 4.1). On whether some fishers possessed or used latrines, 90.4% agreed that some fishers did not possess or use latrines, 8.8% disagreed (Fig 4.2). It was evident that most fishers did not possess and/or use waste disposal sites and latrines (Fig 4.1 and 4.2). Fishers' perceptions reflected an appalling sanitary situation in the fishing communities. Comparatively, the status of sanitation at study sites was quite similar to other fishing communities around Uganda water bodies (Nakiboneka, 1998).

Failure to use wastes disposal sites and latrines at fishing communities has fish quality implications as seepage from the two sources can contaminate the aquatic environment with spoilage bacteria. Microbial proliferation increases the risk of contamination, which inevitably leads to fish spoilage (Huss, 1995).



Social Cultural Factors that Influenced Sanitation Practices

There were several factors that influenced possession or use of waste disposal sites. The majority of respondents attributed it to lack of awareness (59%) while 13% attributed the practice to unplanned landing sites which, led to lack of specific areas for constructing waste disposal sites and 11% reckoned that some fishers because of poverty, could not afford constructing waste disposal sites (Table 4.1).

Table 4.1: Factors that influenced possession and use of waste disposal sites (n=405)

Factors	Percentage*
Lack of awareness	59
Unplanned Landing sites	13.2
Poverty	11
Others	16.8

As indicated (Table 4.1), most fishers were not aware that waste disposal sites were a necessity in ensuring a rightful sanitary environment. This was mainly a consequence of fishers' illiteracy. Others were limited by lack of specific designated areas for disposal of waste. Fishers mostly argued that because some landing sites were not gazetted and others were not properly planned. A small percentage 11% attributed inability to construct sanitary facilities to poverty. With regard to non-possession and use of latrines, most fishers (24%) attributed it to the nature of the soils and 22% report the cultural beliefs of some fishers as one constraining factor to the use of latrines. Some 17% reported poverty (Table 4.2).

The factors, which were reported mostly, varied with most fishers attributing non-possession or use of latrines to the type of soils in the communities. This could not be underrated because most soils along lakeshores where communities resided were sandy. Group discussions revealed that sandy soils could not sustain latrines for a long time. Besides, that the water table was high and this greatly impacted on the durability of latrine.

Table 4.2: Factors that influenced possession and use of latrines

Factors	Percentage
Nature of the soil	24
Cultural beliefs	22
Poverty	17
Others	42

Similarly, fishers in their group discussion noted their inability to construct latrines or even replace the ones, which had collapsed as they reported in the discussions. They argued that it was financially expensive and lacked money due to poverty.

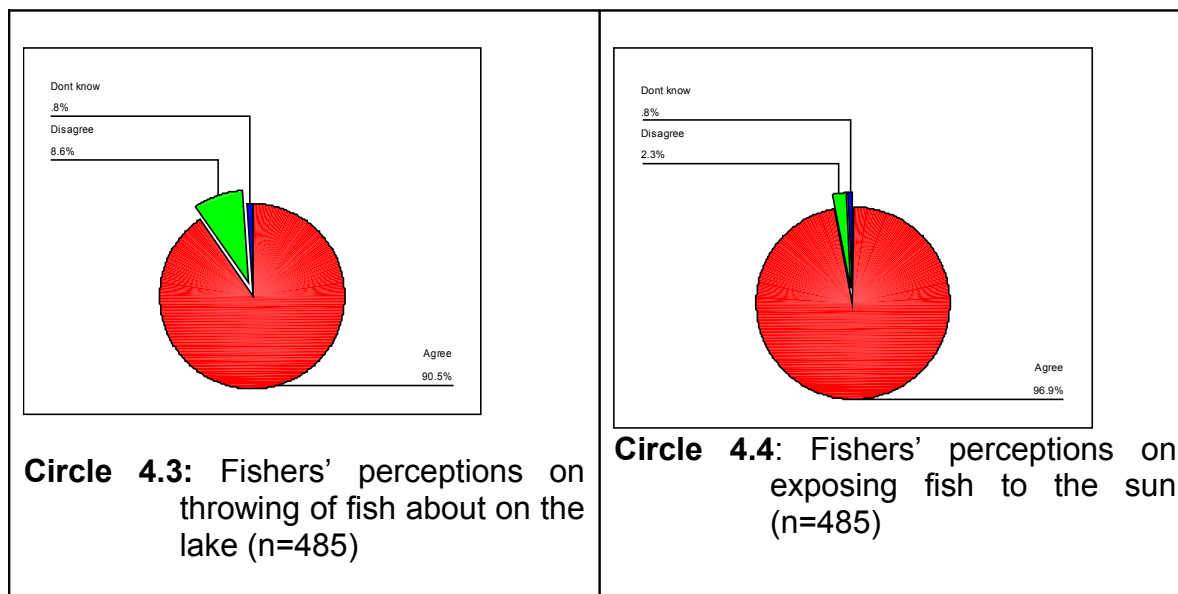
Cultural beliefs of fishers also featured significantly. Fishers reported a number of cultural beliefs related specifically to non-use of latrines. Outstanding beliefs were: **“Use of latrines could affect women fertility”** and that **“When a pregnant woman uses a latrine he gets a miscarriage”**.

Further more, as fishers discussed, it was realised that to some extent cultural beliefs had also affected possession of latrines. Some fishers felt that there was no need to construct latrines they were not going to use.

4.3 Fish Handling

4.3.1 Fishers attitudes to Social Cultural Practices of Fish handling at the Lake

Fishers’ attitudes were established on practices of throwing fish about and exposing fish to the sun. Some 90.5% of the respondents agreed that it was a common practice while only 8.6% reported the contrary (Circle 4.3). Direct exposure of fish to the sun rays while on the lake was a common practice as evidenced by the 96.9% of the respondents while 2.3% denied the practice. Fishers who feigned ignorance of the practice were very insignificant (Circle 4.4).



With respect to these two practices on the lake, the majority of fishers agreed that these were common practices on the lake (Circle 4.3 and 4.3). The two practices lead to fish quality deterioration. Throwing of fish about bruises the fish and softens fish texture. In addition, it causes gaping and blood spots in fillets. Fish exposure to direct sun rays, at beaches or even at market places and more at elevated temperatures increases the rates of spoilage.. More so, it leads to drying of fish surface all of which accelerate spoilage processes in fish.

4.3.2 Social cultural Factors that Influenced Fish handling Practices at the Lake

Most respondents (38%), attributed the practice of throwing fish about on the lake by some fishermen to lack of awareness, some 34% thought it was due to negligence on the part of some fishermen and 13% thought is was because some fishermen wanted to save time (Table 4.3).

Table 4.3: Factors that influenced mishandling of fish,

Factors	Percentage
Lack of awareness	38
Negligence	34
Saves time	13
Others	15

Invariably, most fishermen lacked awareness about the effects of throwing about or mishandling of fish while others were only negligent and did not handle fish as a consumable commodity. This coupled with the need to save time as was reported greatly affected fish and fish product quality.

When asked for the factors that influenced exposure of fish to the sun on the lake, 35% attributed the practice to lack of covering facilities, 33% to negligence and 26% thought it was due to lack of awareness (Table 4.4).

Table 4.4: Factors that influenced exposure of fish to the sun

Factors	Percentage
Lack of covering facilities	35
Negligence	33
Lack of awareness	26
Others	6

4.3.3 Findings of Focus Group Discussions on Fishers Perceptions on Possession or Use of Fish handling Facilities

Group discussions sought to establish whether fishers used ice and fish containers for handling fish. Participants reported that most fishermen did not use ice and fish containers. In instances where fishers used ice, it was provided by factory processors and usually in small quantities. Containers for keeping fish safely a board were also rarely used. Fish boxes were never used instead fishermen used mats or polythene to cover fish. These facilities while they served the purposes of fishermen; they harbour spoilage bacteria since they were difficult to wash and disinfect. Besides, they enhance unfavourable temperatures thereby increasing the risk of fish deterioration. (Ref)

4.3.4 Findings of Focus Group Discussions on the Factors that influenced the possession or use of Fish handling Facilities

Focus group discussions were also employed to gather information on the factors that influenced possession and use of fish handling facilities like ice and fish container. Although two different facilities were discussed, responses for either were nearly the same. Notable factors were:

Poverty

The majority of fishers reported that most fishermen could not afford to purchase ice and fish containers. Fishers argued that the incomes from fish could not meet costs of especially ice and containers.

Nature of boats

They reported that most fishing boats were small in size and could not accommodate ice in addition to other fishing facilities like gears. Coupled with this, fishing boats were

not compartmentalised to meet placement or requirements of fish and equipment or tasks respectively.

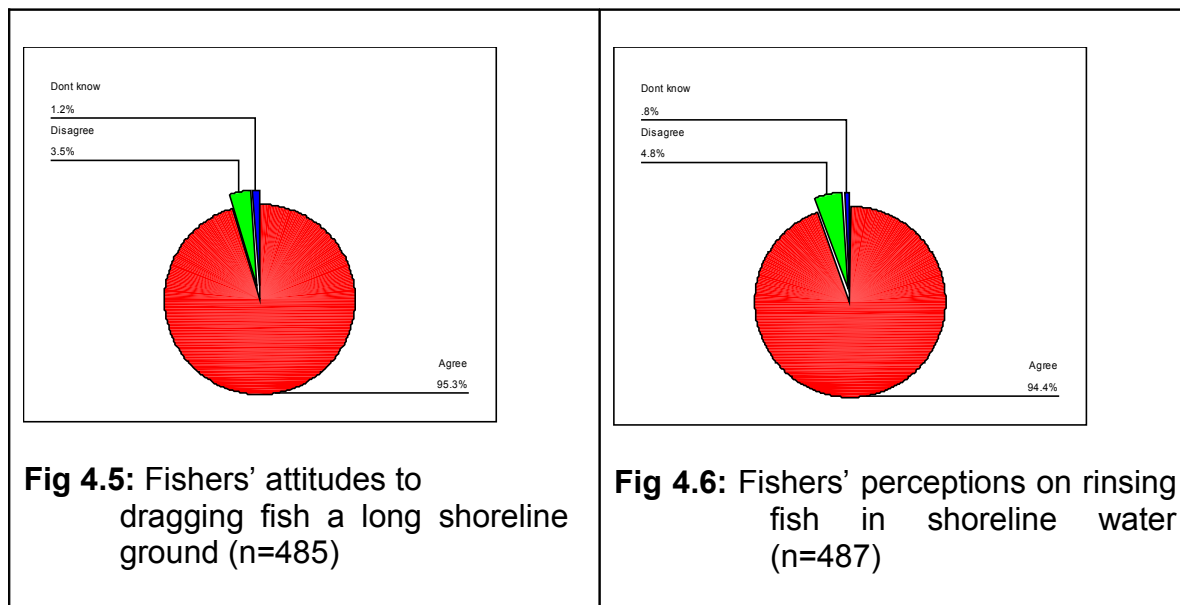
Inaccessibility of ice

They further reported that ice was not readily available to fishers. In the discussions they argued that the situation was more severe on the islands yet according to them most fishing was done on the islands.

4.3.5 Fishers' attitudes to Fish handling Practices at the Landing sites

The majority (95.3%) of the respondents agreed that some members of the fishing communities drag fish, 3.5% disagreed while only 1.2% did not know (Fig 4.5). This was further observed (appendix 111 photo 1). Dragging of fish in shoreline water did not only bruise the fish, but it also exposed fish to environmental contaminants. Inshore waters are known to have high microbial loads.

On whether some members of the fishing community rinse fish in shoreline water, some 94.4% agreed that some fishers in the communities rinse fish in shoreline water, 4.8% disagreed (Fig 4.6). Rinsing of fish in shoreline water exposes fish to contaminants and eventual deterioration in quality.



4.3.6 Social Cultural Factors that Influenced Fish handling Practices at the Landing sites

Most fishers, (35%) attributed the dragging of fish a long shoreline ground to lack of awareness, 29% to lack of fish landing facilities and 23% thought it was as a result of negligence on the part of some members of the fishing community (Table 4.5).

Table 4.5: Factors that influenced dragging of fish a long shoreline ground (n=341)

Factors	Percentage
Lack of awareness	35
Lack of fish landing facilities	29
Negligence	23
Others	13

As it's indicated in the Table (4.5) some fishers were not aware of the dangers associated with dragging of fish. Concerning lack of fish handling facilities, it was observed at certain landing sites lacked facilities for handling fish and at some landings where there were semblance facilities; they were rudimentary and inappropriate in nature. The practice of rinsing fish in shoreline water was attributed to lack of awareness by 45% of respondents while 28% attributed it to lack of clean water at landing sites and 13% reckoned that poor enforcement of rules and regulations (Table 4.6).

Table 4.6: Factors that influenced rinsing of fish in shoreline water (n=341)

Factors	Percentage
Lack of awareness	45
Lack of clean water	28
Poor community leadership	13
Others	14

4.3.7 Findings of Focus Group Discussions on the Factors that Influenced the possession or use of Fish handling Facilities at the Landing sites

Group discussions were conducted for purposes of identifying the social cultural factors that influenced possession or use of fish handling facilities like slabs, raised platforms and racks. Fishers revealed the following factors:

Poor community leadership

Participants reported that some local leaders were not inspirational; in that they could not inspire fishers to undertake collective projects aimed at construction of low cost fish handling facilities like racks. In addition, they lacked commitment and dedication to mobilize fishers to change their practices towards the betterment of their work. Finally, some of the Fisheries Extension Workers posted to the different landing sites have become “native”; in that they viewed such practices in the same way as fishers.

Inaccessibility of fish handling facilities

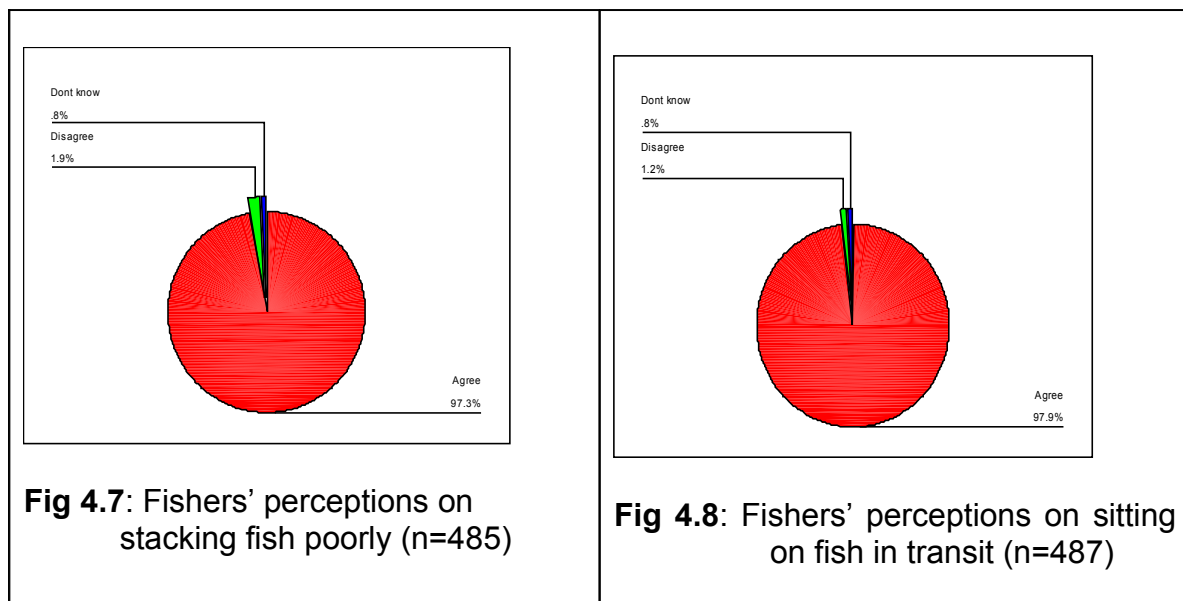
The majority of fishers argued that they were unable to access these facilities. Fishers were not sure of the responsible person or institution supposed to provide these

facilities at landing sites. The majority reported that while it was a responsibility of the Local Government through the “market tenderers”, they had not positively responded to the plight of fishers. They argued that most of them were only interested in collecting taxes but with little interest in developing the landing sites.

Discussants reported that “market tenderers” were duty bound to pay back to the fishers by providing these facilities. This implied that even where fishers could provide facilities for themselves, they had become reluctant expecting the local Government to provide.

4.3.8 Fishers’ Perceptions on Fish handling Practices During the Distribution of fish

About 97.3% of fishers were in agreement with the observation that some members of the fishing communities stacked fish poorly and some sat on fish while in transit and only 1.9% disagreed with the observation (Fig 4.7). Another category of fishers involved in the practice were fish traders and/or transporters. About 97.9% of the discussants agreed this category also sat on fish while in transit while 1.2% disagreed (Fig 4.8).



Poor fish stacking and the habit of sitting on fish while on transit were both unacceptable practices prevalent at some landing sites. Besides sitting on fish was unethical. Fish was often stacked up in sacks or baskets and then sat on. This practice was common among fish traders who used pick-up vehicles. Both practices lead to fish quality deterioration and consequently to poor fish quality and fish products (Ref).

4.3.9 Social Cultural Factors that Influenced Fish handling Practices During the Distribution of Fish

Of the 97.3% of the respondents who acknowledged the practice of poor stacking of fish, 48% attributed it to lack of proper facilities, 22% to poor enforcement of rules and regulation and 21% to inadequate means of transport (Table 4.7).

Table 4.7: Factors that influenced stacking of fish poorly (n=486)

Factors	Percentage
Lack of proper facilities	48
Poor enforcement of rules and regulations	22
Inadequate means of transport	21
Others	9

Fishers, in the absence of appropriate facilities devised ways of carrying fish. They used rudimentary methods and readily available facilities such as putting fish on bicycles and sacks respectively and sometime locally made baskets known as “Bisero” in the local language. The respondents, who attributed this practice to poor enforcement of rules and regulations, argued that although there were rules and regulations governing transportation of fish, some fisheries extension workers were complacent about their enforcement and implementation. Worse still, fishing communities were disadvantaged when it came to means of transportation. Some fishers stacked fish poorly hence lacked space on the available means of transport.

There were factors that contributed to bad handling practices like sitting on fish by some fishers, 36% reckoned that it was due to inadequate means of transport, 35% thought it was due to poor enforcement of rules and regulations while 23% attributed it to lack of proper containers (Table 4.8).

Table 4.8: Factors that influenced sitting on fish, (n=416)

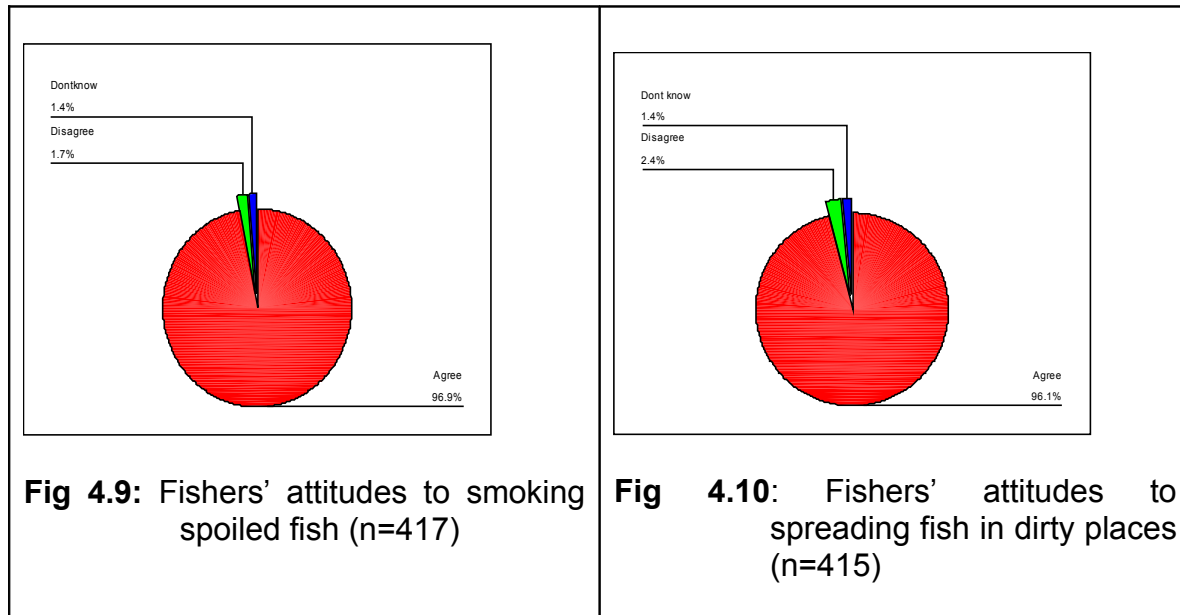
Factors	Percentage
Inadequate means of transport	36
Poor community leadership	35
Lack of appropriate fish containers	23
Others	6

4.4 Artisanal Fish Processing

4.4.1 Fishers’ Perceptions on Fish Smoking Practices

Fishers’ perceptions were sought on smoking of spoiled fish and spreading of fish in dirty environment.

Most, of the respondents (96.9%) agreed that some fish processors smoked spoiled fish, 1.7% disagreed and 1.4% did not know (Fig 4.9). When further asked whether some fish processors spread fish in dirty environment, 96.1% of the respondents agreed, 2.4% disagreed while 1.4% did not know (Fig 4.8). This practice was observed in some fishing communities (appendix 111 photo 3).



4.4.2 Social Cultural Factors that Influenced the Smoking of Spoiled Fish

There were several socio-economic factors that influenced the smoking of spoiled fish. About 64% of the members of the fishing community attributed the practice of smoking spoiled fish to limited incomes, 20% attributed it to scarcity of fresh fish and 13% thought it was due to lack of awareness (Table 4.9).

Table 4.9: Factors that influenced smoking of spoiled fish, (n=359)

Factors	Percentage
Limited incomes	64
Scarcity of fresh fish	20
Lack of awareness	13
Others	3

The limited incomes of fishers have had a great impact almost in all sectors in the fishery industry. The principle underlying factor for smoking spoilt fish was its low price on account of its low quality. With the advent of industrial fish processors, processing of spoilt fish by artisanal fish processors was a means of survival since the price of fresh fish was unaffordable. Fishers reported that some artisanal fish processors purchased fish that had been rejected by factory procurement staff.

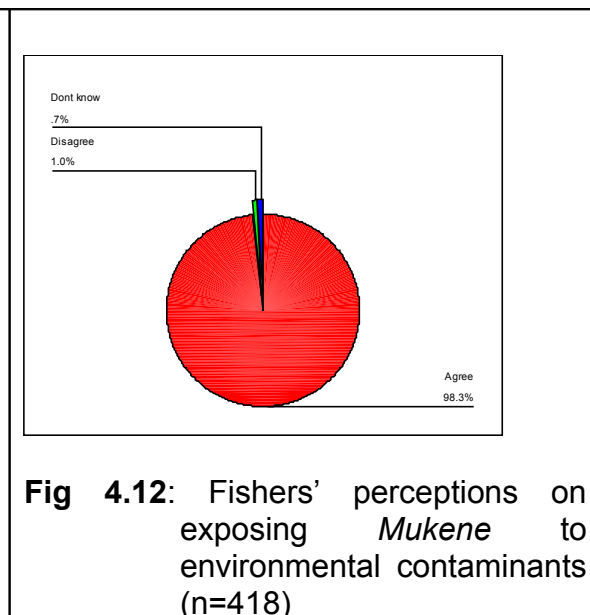
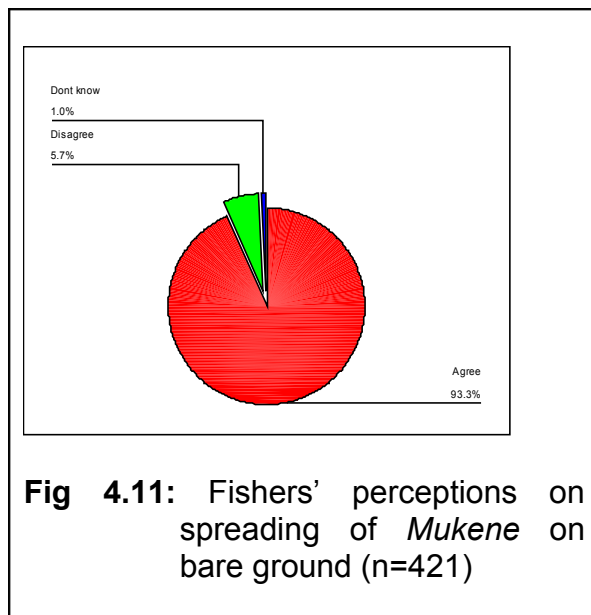
On the other hand, 37% of respondents attributed the practice of spreading fish in dirty places to poor community leadership, 31% attributed the practice to lack of awareness, 29% to negligence on the part of some processors and 20% to poor enforcement of rules and regulation (Table 4.10).

Table 4.10: Factors that influenced spreading of fish in dirty environments, (n=351)

Factors	Percentage
Poor community leadership	37
Lack of awareness	31
Negligence	29
Poor enforcement of rules and regulations	20
Others	3

4.4.3 Fishers' Perceptions on Sun drying Practices

Fishers' attitudes to spreading of *Mukene* on bare ground, and exposing it to environmental contaminants were quite varied. Of the 421 respondents, 93.3% agreed that the practice of spreading *Mukene* on bare ground was common, 5.7% disagreed (Fig 4.11). The practice was further observed at some fishing communities (appendix 111 photo 4). In the same way, 93% of these respondents agreed, that some fishers expose *Mukene* to environmental contaminants, 1.0% disagreed (Fig 4.12). *Mukene* dried on bare ground or exposed to potential contaminants was invariably of poor quality fit for animal feed production and was not recommended for human consumption (ref).



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In the process of sun drying, *Mukene* usually gets contaminated with a myriad of extraneous matter like stones and animal wastes which might compromise the safety of the products and may lead to health related outcomes (Ref).

4.4.4 Social Cultural Factors that Influenced Sun drying Practices

The factors influencing the spreading of *Mukene* on bare ground included, lack of spreading facilities (62%), about 17% to the belief that *Mukene* dried faster when spread on bare ground than on other surfaces and only 13% indicated lack of alternative drying surface (Table 4.11).

Table 4.11: Factors that influenced spreading of *Mukene* on bare ground, (n=418)

Factors	Percentage
Lack of spreading facilities	62
Dries fast	17
Lack of alternative means of sun drying	13
Others	8

Exposure of *Mukene* to environmental contaminants like bird droppings and runoff water was attributed to various factors for example 57% of the respondents reported that most processors of *Mukene* lacked an alternative method of preservation as such exposing fish to environmental contaminants whilst drying was unavoidable. Others consisting of 14.5% of the respondents attributed it to lack of storage facilities for the fish. They argued that *Mukene* had a foul smell making it impossible for fishers to keep it in the same house with them. Some 12.9% reported that it was due to the flexibility of the market for the fish. That could easily be sold as an animal feed if it got spoiled due to runoff water or when rejected by the first market (Human consumption) (4.12).

Table 4.12: Factors that influenced exposure of *Mukene* to environmental contaminants, (n=379)

Factors	Percentage
Lack of alternative to sun drying	64
Lack of storage facilities	14.5
Flexibility of the market	12.9
Others	8.6

SECTION FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The importance of the Fisheries sector in the economy is undisputable and therefore, there is need to up hold any socio-economic initiative tailored toward transforming the sector for the better. This research established the following:

- (a) Social cultural practices of fishers, have greatly affected the levels and use of sanitation facilities, fish handling facilities and artisanal fish processing techniques in the fishing communities of Lake Victoria.
- (b) Social cultural factors notably: lack of awareness, Lack of facilities, poverty poor community leadership and lack of alternatives to fish processing techniques such as sun drying have to a greater extent influenced these practices.

5.2 RECOMMENDATIONS

This research recommends a preventive approach to the persistence of these practices in the fishing communities. In consideration of both direct and indirect effects of these practices on fish quality and safety, the approach should involve grass root centred strategies, with focus on advocacy and mobilisation. The strategies should include the following:

- a) Sensitisation of fishers on the effects of social cultural practices and their actions. on fish quality to make them more responsible in their work
- b) Landing sites should be planned and gazetted to cater for all sanitary requirements like waste disposal sites and latrines
- c) Community leaders should be empowered with knowledge and leadership skills through workshops and seminars.
- d) Fisheries Extension Workers who have become “native”, should be remind of their responsibility
- e) Responsible authorities like the Local Government and industrial fish processors in collaboration with fishers should provide facilities that may be too expensive for fishers for example: echosan toilets, slabs, ice and fish drying racks.
- f) The road networks to fishing communities should be improved

- g) Provision of alternative means to sun drying of fish. The alternative should cater for the aspirations of fishers.
- h) Research should be conducted to examine the material and economic losses of fish to fishers.

Bibliography:

- Anon, 1996. Annual Report, Fisheries Department, Entebbe.
- Armando, B. 1987. Baseline Survey Report, Arua District.
- Bewule, G. B. 1991. *Constraints affecting Sanitation in Mulago 11 Village*, Masters of Medicine Thesis, Makerere University Kampala.
- Bukuluki, P. 1995. *Factors influencing people's responses to the construction of hygienic latrines in RUWASA project area*. A research project submitted to the department of social work and Social Administration Makerere University Kampala.
- Connell, J.J. 1995. Control of Fish Quality, Fishing News Books Ltd., England.
- Government of Uganda, 1994. *A situational analysis of women, adolescents and children in Uganda: Equity and Vulnerability*.
- FAO, 2000. Food and Agricultural Organisation in Uganda.
- FMP 1998 Fisheries Master Plan
- Huss, H. H, 1995. Assurance of seafood quality. FAO Fisheries Technical Paper 348, Rome.
- Kizza F. M. X 1989
- Masette, M. 2000. *Basic principles of post harvest losses in commercially viable species in Uganda*. Paper presented at the Stakeholders Workshop on Kyoga and Rivers, Fisheries Resources Research Institute, Jinja, 18-20 October 2001.
- Muganwa, M. and Nakavuma, J. 1997. Assessment of microbial load along and processing chain. Unpublished Annual Report, FOSRI, Kampala
- Nakiboneka.P. 1998. Sanitation and water for all. Towards better sanitation in Uganda. 24th WEDC Conference, Islamabad, Pakistan. <http://www.lboro.ac.uk/departments/cv/wedc/papers>.
- The New vision, 2001. Fish Industry Review Supplement: Fisheries will do better under Autonomous Status. The New Vision, 19th June, Pp 19 and 20. New Vision.
- Nfamara, J, D. 1990. Improved methods for smoking fish in the Kigoma region of Lake Tanganyika, Tanzania. UNDP/FAO, regional project for Inland Fisheries Planning (IFIP), RAF/87/099-wp/06/90 (En): 23p

- Ogunja.J.C, Werimo.K.O and Okemwa. E.N. 1992. A case study on high-value Nile perch products. In Teutsher (ed) 1992. *Proceeding of symposium on post-harvest fish technology*. FAO/CIFA Technical paper No. 19, Rome.
- Reynolds. J.E and Kilrema Mukasa.C.T, 1991. Fishing Notes and Records. Fisheries Statistics and Information Systems, FAO/UNDP Project UGA/87/007.
- RUWASA (Rural Water and Sanitation Project). 1992. House hold sanitation report, in Ikumbya and Nawaikoke subcounties. Kampala.
- Ssali, W. and Masette, M. 2001. Post-harvest fisheries. In Mukiibi, J.K. (ed) 2001. *Agriculture in Uganda, Livestock and fisheries*, Vol. iv. Kampala Fountain Publishers.
- SEDWOG (Socio-economics Data Working Group). 1999. Marketing survey. *LVFRP Technical Document* No. 2. LVFRP/TECH/99/02. Jinja, Socio-economics Data Working Group of the Lake Victoria Fisheries Research Project.
- Storey, R.M. 1982. Smoking. In: Fish handling and Processing. Ed.: A. Aitken. Publ. HMSO Books.

APPENDICES

APPENDIX 1

Guild lines for Focus Group Discussions with fishers (Fishermen, Fish traders and Fish processors)

Sanitation:

How are fishers' sanitation practices in this community? (*Possession and use of latrines and waste disposal sites*)

What factors influence possession or use of waste disposal sites and latrines in this community?

Fish handling:

How are the fisher' fish handling practices in this community? (*At the lake, landing site and during the distribution of fish*)

What factors influence:

Throwing fish about?

Exposing fish to the sun on the lake?

Dragging fish a long shoreline ground?

Rinsing of fish in shoreline water?

Stacking fish poorly?

Sitting on fish in transit?

Use of ice for preserving fish?

Use of raised platforms?

Artisanal fish processing:

How are the fishers' artisanal fish processing practices in this community? (*Smoking and sun drying*)

What factors influence:

Fish Smoking:

Smoking spoiled fish?

Spreading fish in dirty environments?

Sun drying

Spreading *Mukene* on bare ground?

Exposing *Mukene* to environmental contaminants?

APPENDIX 11

Unit questionnaire

Name of Interviewer: _____

Date: _____

1. Landing: _____

2. District: _____

3. Zone: _____

A. Personal Data:

Name of respondent: _____

4. Age: _____ Years

5. Sex: [1] Male [2] Female

6. Tribe:

- [1] Samia [2] Musoga [3] Muganda
[4] Iteso [5] Alur [6] Mukenye
[7] Other (Specify) _____

7. Marital status:

- [1] Married [2] Single [3] Divorced [4] Widowed
[5] Others (Specify) _____

8. What is your level of education? (*Tick one*)

- [1] No schooling [2] Primary [3] Secondary [4] Tertiary
[5] University [6] Others (Specify) _____

9. What fishery activity are you engaged in? (*Tick one*)

- [1] Fish smoking [2] Sun drying [3] Fishing labourer
[4] Fish trader [6] Fish transporter [7] Fishing unit owner
[8] Others (Specify) _____

10. How long have you been at this landing? _____ Years.

B. Sanitation Characteristics

We would like to know about the sanitation characteristics of some members of the fishing communities. Please consider the following questions.

Do some members of the fishing communities not use solid waste disposal sites?

[1] Agree [2] Disagree [3] Don't know

11. Why do some members of the fishing communities not use waste disposal sites?

[1] Lack of awareness [2] Can't afford [3] Lack of space
[4] Landlord has not provided [5] Don't know
[6] Others (Specify) _____

12. Do some members of the fishing communities not use latrines?

[1] Agree [2] Disagree [3] Don't know

13. Why do some members of the fishing communities not use latrines?

[1] Poverty [2] Physical nature of the soils [3] Habit
[4] Cultural beliefs [5] Lack of space [6] Don't know
[7] Others (Specify) _____

C. Fish handling characteristics

We would like to know about the fish handling characteristics of fishers at the lake, landing sites and during distribution of fish. Please consider the following questions.

Fish handling at the lake:

14. Do some fishers throw fish about?

[1] Agree [2] Disagree [3] Don't know

15. Why do some fishers throw fish about?

[1] Lack of awareness [2] Negligence [3] Save time
[4] Don't know [5] Others (Specify) _____

16. Do some fishers expose fish to the sun on the lake?

[1] Agree [2] Disagree [3] Don't know

17. Why do some fishers expose fish to the sun on the lake?

- [1] Lack of awareness [2] Negligence [3] Lack of covering facilities
[4] No rules/regulations [5] Don't know [6] Others (Specify)_____

Handling at the landing sites:

18. Do some people drag fish along shoreline ground?

- [1] Agree [2] Disagree [3] Don't know

19. Why do some members of the fishing communities drag fish a long shoreline ground?

- [1] Lack of awareness [2] Negligence
[3] Lack of fish landing facilities [4] Poor community leadership
[5] Don't know [6] Others (Specify)_____

20. Do some members of the fishing communities rinse fish in shoreline water?

- [1] Agree [2] Disagree [3] Don't know

21. Why do some members of the fishing communities rinse fish in shoreline water?

- [1] Lack of awareness [2] Lack of clean water [5] Negligence
[3] Poor community leadership [6] Don't know
[7] Others (Specify)_____

Handling During Distribution:

22. Do some fish traders/transporters stack fish poorly while transporting it?

- [1] Agree [2] Disagree [3] Don't know

23. Why do fish traders/transporters stack fish poorly while transporting it?

- [1] Inadequate means of transport [2] Lack of proper handling facilities
[3] Poor community leadership [4] Lack of transport
[5] Don't know [6] Others (Specify)_____

24. Do some traders/transporters sit on fish in transit?

- [1] Agree [2] Disagree [3] Don't know

25. Why do some traders/transporters sit on in transit fish?

- | | |
|---|-------------------------------|
| [1] Lack of appropriate fish containers | [2] Poor Community leadership |
| [3] Lack of transport | [4] Negligence |
| [5] Don't know | [6] Others (Specify)_____ |

D. Artisanal Fish Processing Characteristics

We would like to know about the fish smoking and sun drying characteristics of fishers in your communities. Please consider the following questions.

Fish smoking

26. Do some fish smokers smoke spoiled fish?

- [1] Agree [2] Disagree [3] Don't know

27. Why do some fish smokers smoke spoiled fish?

- | | | |
|---------------------------------|----------------------------|-----------------------|
| [1] Limited incomes | [2] Scarcity of fresh fish | [4] Lack of awareness |
| [3] Desire to increase earnings | | [5] Don't know |
| [6] Others (Specify) _____ | | |

28. Do some fish smokers spread fish in dirty environments?

- [1] Agree [2] Disagree [3] Don't know

29. Why do some fish smokers spread fish in dirty environments?

- | | |
|-----------------------|----------------------------------|
| [1] Lack of awareness | [2] Poor community leadership |
| [3] Negligence | [4] Lack of spreading facilities |
| [5] Don't know | [6] Others (specify)_____ |

Sun-drying

30. Do some people spread fish on bare ground?

- [1] Agree [2] Disagree [3] Don't know

31. Why do some people spread fish on bare ground when sun drying?

- | | |
|----------------------------------|-------------------------------|
| [1] Lack of spreading facilities | [2] Poor community leadership |
| [3] Dries fast | [4] No alternative means |
| [5] Negligence | [6] Don't know |
| [7] Other (Specify)_____ | |

32. Do some members of the fishing community expose fish to environmental contaminants (rain and bird droppings) during sun drying?

[1] Agree [2] Disagree [3] Don't know

33. Why do some members of the fishing communities expose fish to environmental contaminants (rain and droppings) during sun drying?

- | | |
|---|-------------------------------|
| [1] Lack of alternative means of drying | [2] Negligence |
| [3] Market flexibility | [4] Poor community leadership |
| [5] Lack of stores | [6] Don't know |
| [7] Others (Specify) _____ | |