

## Evaluation of Intervention Measures to Mitigate the Socio-Economic Impact of Water Vessel Accidents in Mbita Sub County, Kenya

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### ABSTRACT

*For a long time, in many regions across the world, water vessel accidents have been on the rise hence has disrupted the socio-economic activities of many people. Indeed, a lot of properties and lives have been lost during these unfortunate occurrences. Therefore, this study assessed the interventions for mitigation of social-economic impacts of water vessel accidents in Mbita Sub-County. The study employed a disaster impact model by Lindell and Wisner to analyze the impact of ship and boat accidents on the community's livelihood. Similarly, the research used survey research design in this study. The study used stratified sampling technique to select respondents for the study. The sample size of this study was 384 respondents drawn from all the communities around Lake Victoria with Mbita sub-County. Data collection tools included questionnaires, Interview guide and document analysis. Data was coded and then entered in the SPSS software and analyzed. The data collected was analyzed using descriptive statistics and quantitative results were presented in graphs, tables, frequencies and percentages. The findings of the study revealed that there is presence of navigational aids, search and rescue teams, and daily weather updates information, inspection of water vessels standards and crews and educational training. However, the study indicated that there is absence of emergency rescue portals for those in distress trapped in Lake Victoria waters. The government responds to distress calls by clearing water hyacinthand through using motor boats, choppers and divers. However, slow response during water vessel accidents was cited in addition to the government not offering any help to cushion the affected families from suffering negative socio-economic effects resulting from the disasters. the study recommends that concerned government departments promotes local community-initiated mitigation measures so as to build community resilience.*

**Keywords:** Fisher Folks, Navigational Aids, Water Vessel Accidents

### I. INTRODUCTION

Generally, across the globe some oceans, lakes, seas and rivers have become too dangerous to many users for a long time (Onsongo, 2017). For instance, the Drake Passage which connect Pacific and Atlantic Oceans; the other dangerous places are the Bermuda triangle which is situated in the Atlantic Ocean, Michigan Triangle in Lake Michigan, Dragon's Triangle in the Pacific Ocean, Sargasso Sea in the middle of the North Atlantic Ocean. In addition, Onsongo (2017), in Lake Natron in Tanganyika there is a channel where boats and ships have been involved in the mysterious accidents. Similarly, there are numerous boats and ships accidents that have taken place in Lake Victoria. Those accidents have taken place across the three countries that share Lake Victoria that is Kenya, Uganda and Tanzania. Moreover, these accidents have caused devastating effects on the household's income of the communities around.

Mangione (2014) states that the United States of America, more so in California and Mississippi, adopted educational campaigns on life jackets in 2007 to reduce the drowning fatalities, which stood at 71% of all reported fatalities between 1999 to 2011 in its waters. Some of life saving intervention measures for instances mass media promotions, radio advertising, marina events, signing of pledge cards, celebrity appearances, and a campaign tour boat staffed with 'ambassadors' that cruised the Delta educating the public, disseminating information, and giving away free inflatable life jackets.

In 2006 International Maritime Organization (IMO) approved and implemented the adoption of e-navigation in world waters. In line with e-navigation, Ramirez *et al.* (2013) developed a web and mobile-based emergency quick portal application in Albay that has helped reduce the impact of disasters by providing interaction between the affected citizens and emergency units. This application which was later named PINDOT (Provincial Information Network on Disaster Occurrences and Threats), had been tested and proven in Albay province in the Philippines.

At the Northern Sea Route (NSR) in the Arctic Ocean, Arctic Voyage Environmental Information System (VEIS) for sea ice, ocean, wave, and weather parameters (Yang *et al.*, 2018). Through the projects 'Development of Safe Voyage Planning System for Vessels Operating in Northern Sea Route' and 'Development of Ship-handling and Passenger Evacuation Support System,' VEIS was developed to reduce water vessel accidents updating its users five times a day. Satellite-based Sea ice monitoring is also linked to produce dynamic information on sea ice, ocean, wave, and weather in near real-time using polar-orbit satellite remote sensing and numerical model-based prediction data.

In 2007, the East African Community achieved a significant lake safety milestone through the creation of the Lake Victoria Transport Act. The transport act served to address the maritime safety standards within four main perspectives: seaworthiness of ships, collision prevention, crewing standards, and the establishment of navigational aids. If fully implemented, the Act would curb water vessel accidents in Lake Victoria. Additionally, each county surrounding Lake Victoria in Kenya has prepared a disaster management policy that seeks to reduce dangers of the Lake.

Angela Oketch, the editor of 'The East African magazine,' reported on 9<sup>th</sup> May 2018 that Lake Victoria Basin Commission (LVBC) secured Ksh3.6 billion (\$35.8 million) from donors to improve the safety of Lake Victoria, which would mitigate recurrent water vessel accidents. LVBC had dubbed the project "Multinational Lake Victoria Maritime Communications and Transport" was implemented by Kenya, Uganda, and Tanzania over four years at the cost of about \$36.58 million.

### 1.1 Statement of the Problem

According to Nakyoniyi (2011), the East African Community had created 30 navigational assistances in the form of visual marks in Lake Victoria. Additionally, the sailing directions within the Lake were revised in 1972. Lake Victoria Basin Commission has also implemented the 1956 navigational charts and nautical surveys created between 1900 and 1906. To some point, these measures have ensured the reduction of trans-border water vessel accidents of boats, ferries, and ships. Powell (2016) records that Kenya Meteorological Department in 2003 set up two buoys carrying floating automatic weather stations, which were anchored at the lake bed off Homa Hills at Winam Gulf and in the open Lake close to Rusinga Island. Buoy's primary purpose was to monitor Lake Victoria, Kenya sector currents and water temperature to warn fishers against sailing in harsh weather to reduce water vessel accidents.

The study asserts that Kenyan fishers around the Ugandan border occasionally request the daily mobile weather alerts issued by the Uganda National Meteorological Agency (UNMA) and make fishing expedition decisions based on the results received on their cell phones. Odhiambo (2013) analyses the coping and adaptive mechanism of the fishing community in Lake Victoria- Mbita Division due to overwhelming disasters experienced in the Lake.

These fishers already face a high risk of drowning. Up to 1,500 fishers drown on Lake Victoria every year, an estimated 1,000 of them during bad weather. The study identified 141 fisher drowning deaths across 43 landing sites in Mbita. Our study found that most of the fishers who drowned were men aged under 40. Bad weather conditions, including rough water, strong wind and heavy rainfall, were described as the cause in 42% of recent fisher drowning deaths. While boats were generally in good repair, navigation equipment and life jackets were rarely made available by the boat owners despite Kenyan laws requiring life jackets. This increased the drowning rate: 69% of the fishers who drowned in storms were not wearing life jackets (Rasolofoson and Fiorella, 2023). These high rates of statistics and effects prompted the need to conduct this current study.

The economic contribution of this sub-sector has continually remained poor and below expected benchmarks due to marine hazards. This equally has economic and financial costs and implications which consequently hinder the maximization of the contribution of the maritime transport sub-sector to the national output (GDP) of Kenya (Nwokedi *et al.*, 2014). Nwokoro and Nwokedi, (2015) affirms the non-implementation of strategies in managing prevalent hazards which has concurrently posed threat to the maritime sector generally.

### 1.2 Research Objective

To evaluate intervention measures being applied by residents and government agents to mitigate the socio-economic effects of water vessel accidents in Mbita Sub-County, Kenya.

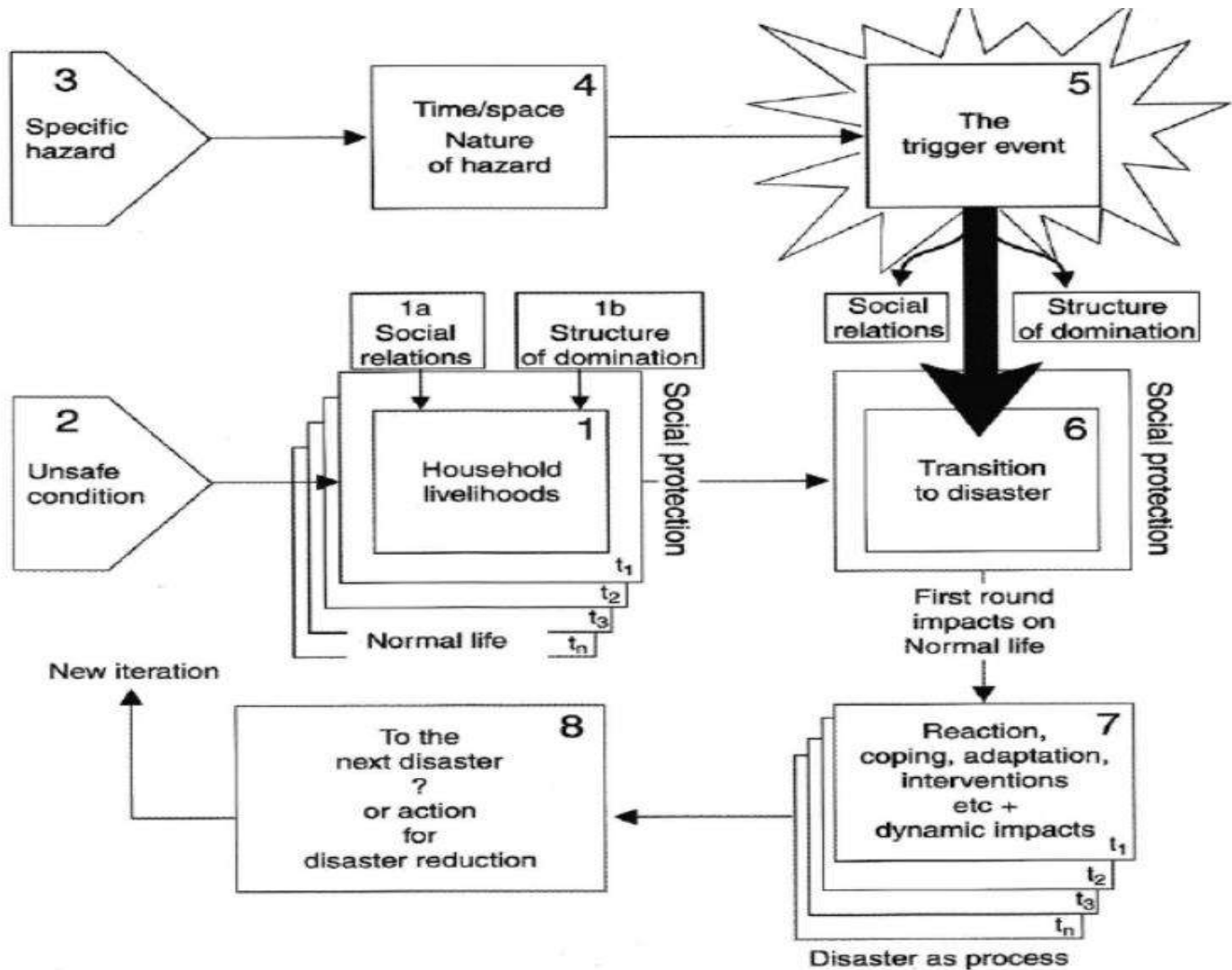
## II. LITERATURE REVIEW

### 2.1 Theoretical Review

The study was guided by access model. As stated in Wisner *et al.*'s (2004: 89), the access model is of the idea that disasters resulting from vulnerabilities significantly affect household livelihoods. We were having water vessel accidents as our study's specific hazard; the time in which maritime emergencies take to develop varies, with most being rapid on-set. On short notice, water vessel accidents occur when triggered by bad weather, leaking boats, attack by animals, or personal sail-men confrontation; the emergency is transformed into a disaster.

Water vessel accident triggers are met with unsafe conditions, which causes vulnerability such as the absence of SAR responders, life jackets, and lack of emergency call center. After the disaster event has taken place, a transition from pre-disaster to post-disaster conditions takes place.

Disaster transition is the most challenging phase for the water vessel accidents-affected, often coupled with direct negative impacts on the household livelihoods. The affected families, later on, employ coping mechanisms and post-disaster interventions for resilience purposes. Depending on the copying mechanism or intervention received, water vessel accidents have dynamic impacts on the affected which has a relationship with household livelihoods.

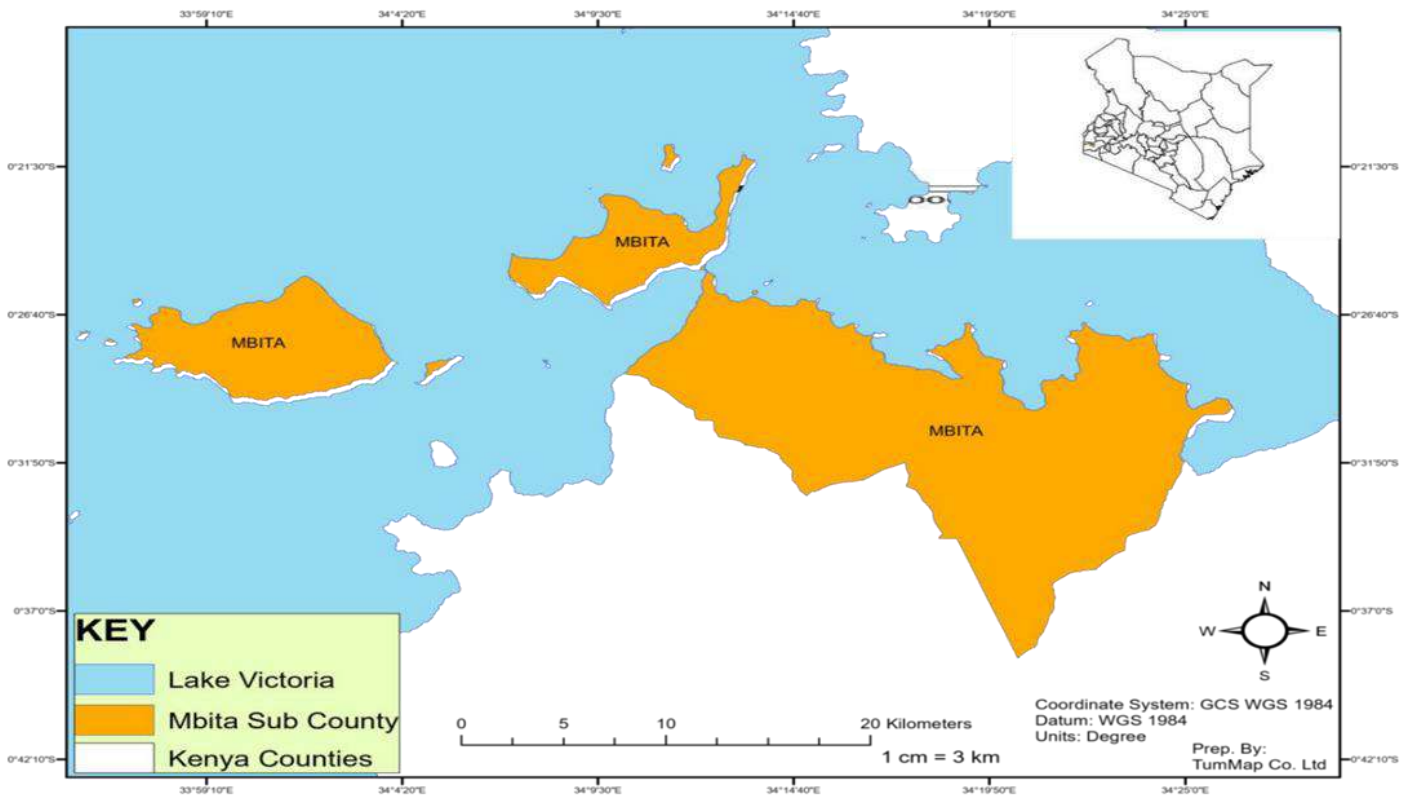


**Figure 1**  
*Access Model*

### III. METHODOLOGY

#### 3.1 Area of Study

This study was undertaken in Mbita Sub- County of the Kenyan side of Lake Victoria, among the households who have lost valuable property or close members who contributed helpfully to the household's economy or whose members have ever experienced life-threatening emergencies in the lake. Mbita Sub- County was chosen because it is one of the key regions around Lake Victoria where households largely depend on the fishing activity and many commutes across the lake frequently. From the 2009 population and census indicate that Mbita Sub-County has a total population of 111,409 from the 23,904 existing households and a density of 264.72 people per square kilometers. The location of the study area is shown in Figure 2.



**Figure 2**  
*Showing Map of Mbita Sub- County the Study Area*

### 3.2 Research Design

In this particular study, the researcher employed a survey research design that had both qualitative and quantitative methods. Phenomenology was applied in this study because it shows the thing and then focuses on individuals' experiences and comprehending the structure of those lived encounter (Goodman, 2011). In addition, the study employed phenomenological design since it encompasses description, in-depth, and the common characteristics of the phenomena that have occurred through the in-depth interviews data collection method.

### 3.3 Sampling Size and Sample Strategies

This study employed a non-probability sampling technique to collect data which included purposive, convenience and snowball sampling. KMA & LVBC staff members, frequent lake commuters, tourists, human rights activists, officers from Homa bay county government department of disaster management and special programs, disaster management committee members, opinion leaders and fisher folks were sampled purposively and randomly. Household members that have lost a member, property having significant implications on livelihoods together with those whose members have experienced emergency scenarios in the lake was sampled using the snowball sampling technique.

The sample size for this study was determined using the following formula:

Where:

- n = the desired sample size (if the target population is greater than 10,000)
- z = the standard normal deviation at the required confidence level
- p = the proportion in the target population estimated to have characteristics being measured ( $q = 1 - p$ )
- d = the level of statistical significance set

Therefore:

$$n = (1.96)^2(.50)(.50) / (.05)^2 = 384 \text{ respondents}$$



### 3.4 Sample Size Distribution

**Table 1**

*Proportionate Sampling of Household Heads Per Ward*

Ward	No of Households	Proportionate sample
Gembe	4013	52
Rusinga Island	10,456	135
Mfangano	3,321	43
Kasungu	7597	98
Lambwe	4379	56
<b>Total</b>	<b>29,766</b>	<b>384</b>

## IV. FINDINGS & DISCUSSIONS

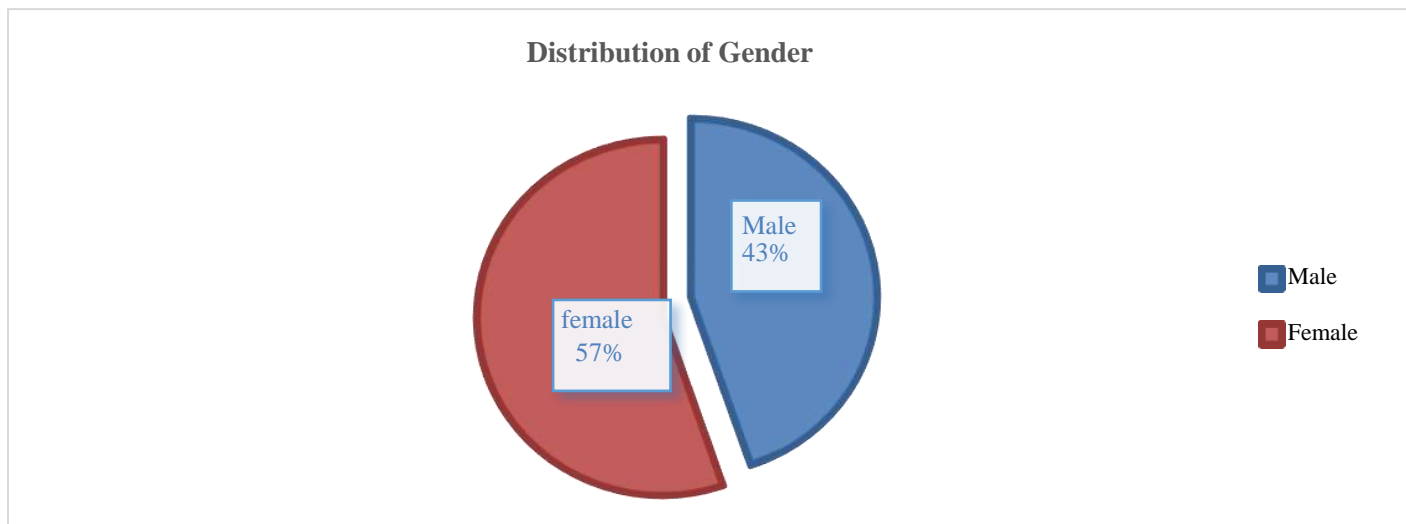
### 4.1 Demographic Characteristics of Respondents

This section presents information on demographic characteristics of various categories of respondents that are significant for this study. The demographic characteristics that were examined were; Gender of the respondents, Age, Marital status, level of education, how long they have living along Lake Victoria and Source of livelihood.

### 4.2 Distribution of the Respondents by Gender

This section presents the information concerning the gender of the respondents who participated in this study. Figure 3 below shows the findings on the gender of the respondents. The study revealed that majority 57% (219) of the respondents were female while 43% (165) were male.

The disparity in the percentages of gender distribution was because there are many jobs done in the post-harvesting stage of fisheries by women therefore the higher number. Additionally, most of the victims of the water vessel accidents are men thereby reducing their numbers in the beaches.



**Figure 3**

*Distribution of Respondents by Gender N=384*

### 4.3 Distribution of the Respondents by Age

Respondents were asked to state their age brackets and the following is the presentation of the ages. The findings were presented in Table 1.

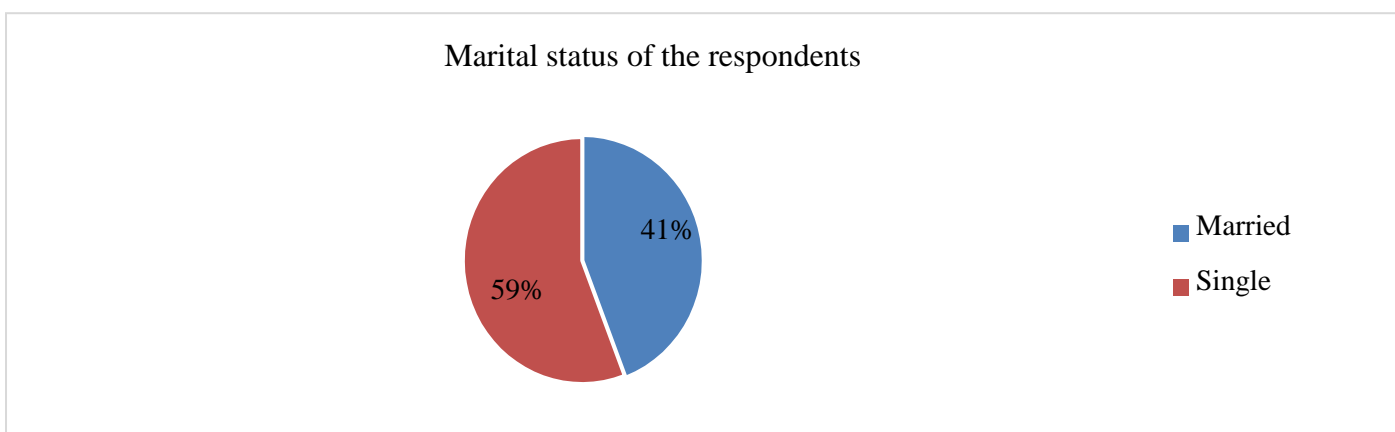
**Table 1**  
*Distributions of the Respondents by Age (N=384)*

Age Distributions	Frequency	Percent
18-25 years	70	18.2
26-33 Years	79	20.6
34-41 Years	95	24.7
42-49 Years	84	21.8
50 Years and Above	56	14.6
<b>Total</b>	<b>384</b>	<b>100.0</b>

The result in Table 1 above shows that majority 24.7% (95) of the respondents were in the age bracket 34-41 years followed by age bracket 42-49 at 21.8% (84). Those in the age bracket 26-33 were 20.6% (79) while those in the age bracket 18-25 years were 18.2% (70) and those in the age bracket 50 years above were 14.6% (56). This is due to complication in fisheries which requires people who have a lot of strength to the catching and transportation, processing and sale. That could be the reason why the majority of the respondents are people below 45 years of age.

**4.4 Distributions of the Respondents by Marital Status**

The respondents were asked to indicate their marital status. Their responses as indicated in Figure 4.

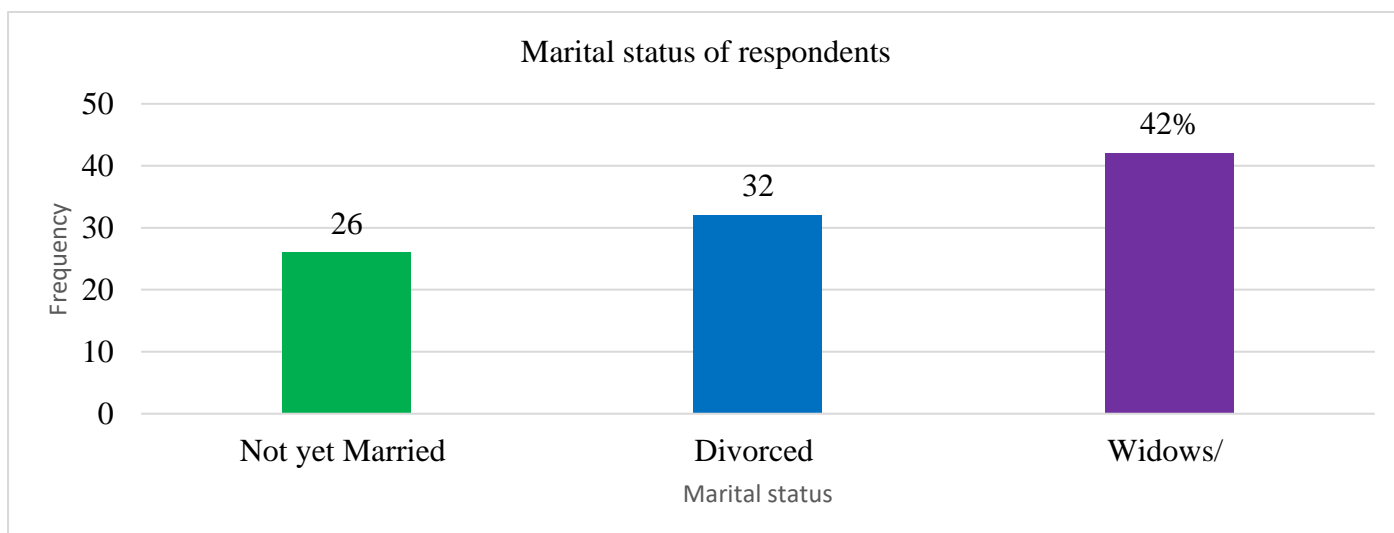


**Figure 4**  
*Distributions of the Respondents by the Marital Status N=384*

On the marital status of the respondents, the study revealed that the majority 59% (227) were single 41% (157) were married. The single respondents may be as a result of not yet married, divorced, widows or widowers. The other point relating to majority being single is the nature of fishing sector where people keep on migrating from beach A to beach B depending on where the catch is booming. The makes it difficult for the fishers to keep married, some tend to remain single for long times.

**4.5 Distributions of the Respondents by Marital Status for those who Responded Single.**

The study further asked the respondents who stated that they were being single to explain why they are single. The responses are as presented in Figure 5.



**Figure 5**

*Distributions of the Respondents by Marital Status for those who Responded Single N=227*

Of those who responded that their marital status as single, majority 42% (96) were widows/ widowers followed by those who divorced at 32% (73) and, those who were not yet married were 26% (58). Widows/ widowers were many as men are the main victims of boats and ships accidents because they are the ones who are crew members and again on the fact of the HIV/ AIDs prevalence in the area. Divorcees are also many due to the nature of life along the Lake where migration is the norm of the day and some have decided to remain single.

#### 4.6 Distribution of the Respondents by the Highest Level of Education Attained.

The study asked the respondents to state their highest level of education attained. Table 2 presents the findings.

**Table 2**

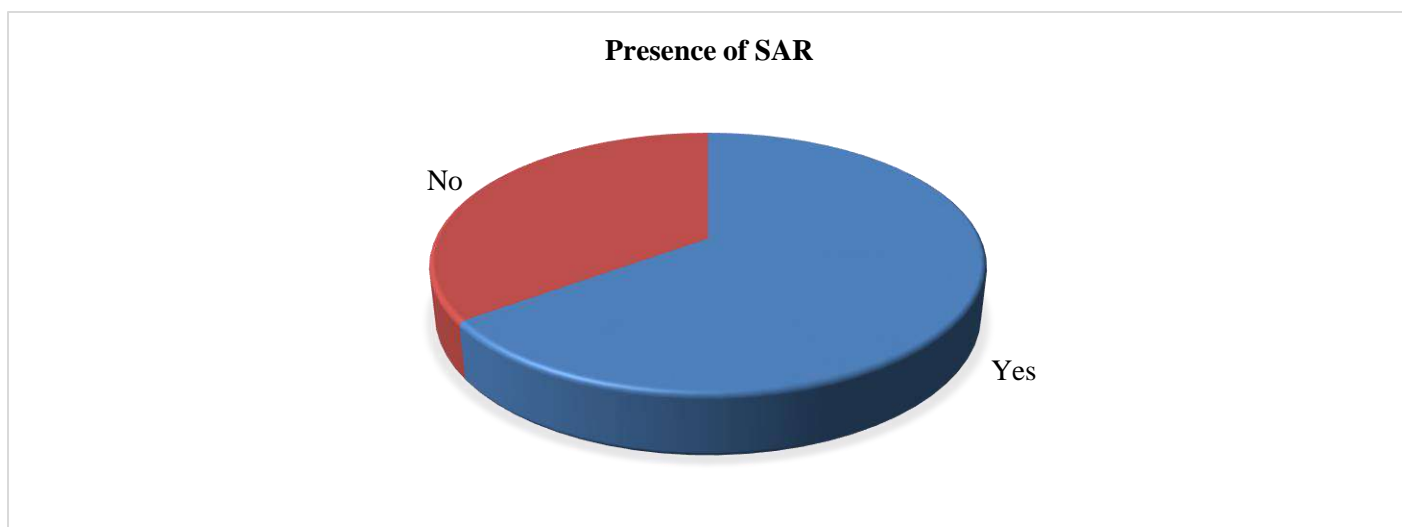
*Distribution of the Respondents by the Highest Level of Education Attained (N=384)*

Highest level of education	Frequency	Percentage
Below Class Seven	134	35
Completed Class Eight	119	31
Completed Secondary Education	78	20
College/ University	53	14
<b>Total</b>	<b>384</b>	<b>100.0</b>

Findings in the Table 2 revealed that majority 35% (134) of respondents did not complete class Eight, they went up to class seven, 31% (119) of respondents completed class Eight. Another 20% (78) completed Secondary education and 14% (53) of respondents went up to College or University.

#### 4.7 Availability of Stand by SAR team that Responds to distress Emergency Calls in Lake Victoria

The study asked respondents if there is a stand by SAR team that responds to distress emergency calls in Lake Victoria. The findings are presented in the Figure 6 below.



**Figure 6**  
*Availability of Stand by SAR Team that Responds to Distress Emergency Calls in Lake Victoria*

The study revealed that majority 65% (250) indicated that there is a stand by SAR team in Lake Victoria that responds to distress emergency call by the fishers and other lake user while 35% (134) are not aware of the existence of the SAR team in Lake Victoria. From the discussion with LVBC the researched realized that the team exists in Lake Victoria. One of the respondents stated that.

*“We have many stands by teams in Lake Victoria that responds within a short time to help fishers and other lake users in case of an emergency. They are very efficient and effective in handling the calls and signals to help but other fishers are also very alert whenever they sense a boat is not stable, they will run there and help unless it is at night when we they either don’t or respond very late”* (Interview #18 on 19/08/2020).

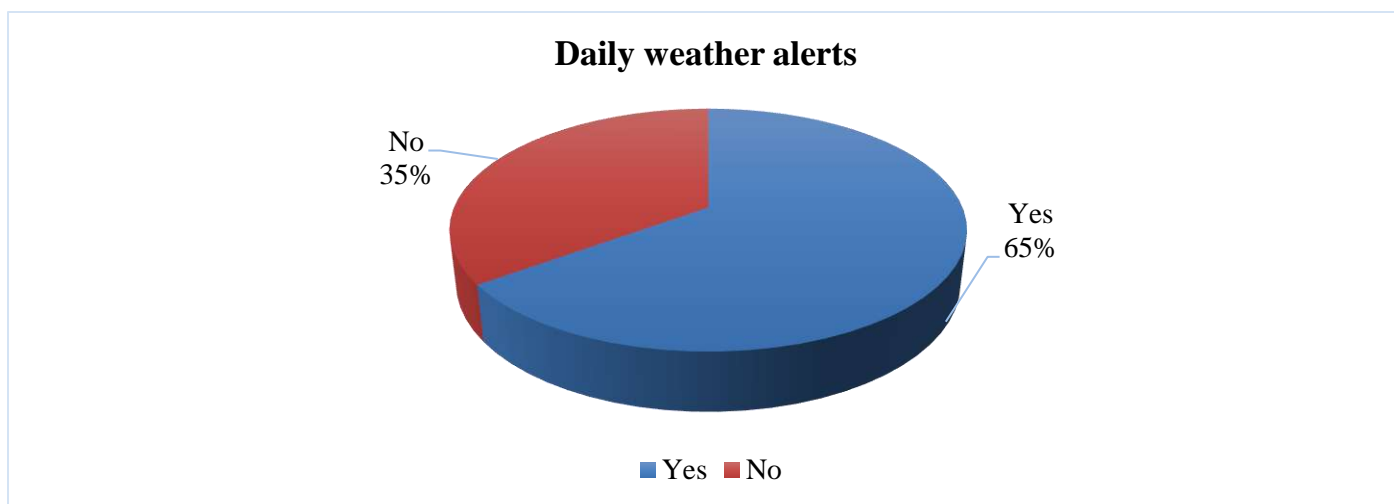


**Plate 1**  
*Ongoing Search and Rescue Activity by BMU and Volunteers in response to a water vessel accident in Lake Victoria*

**4.7.1 Provision of Day-To-Day Weather Alerts to Fisher Folks and Other Lake Users in Lake Victoria**

Respondents were asked if they are provided with day-to-day weather alerts. The findings are presented in the Figure 7.





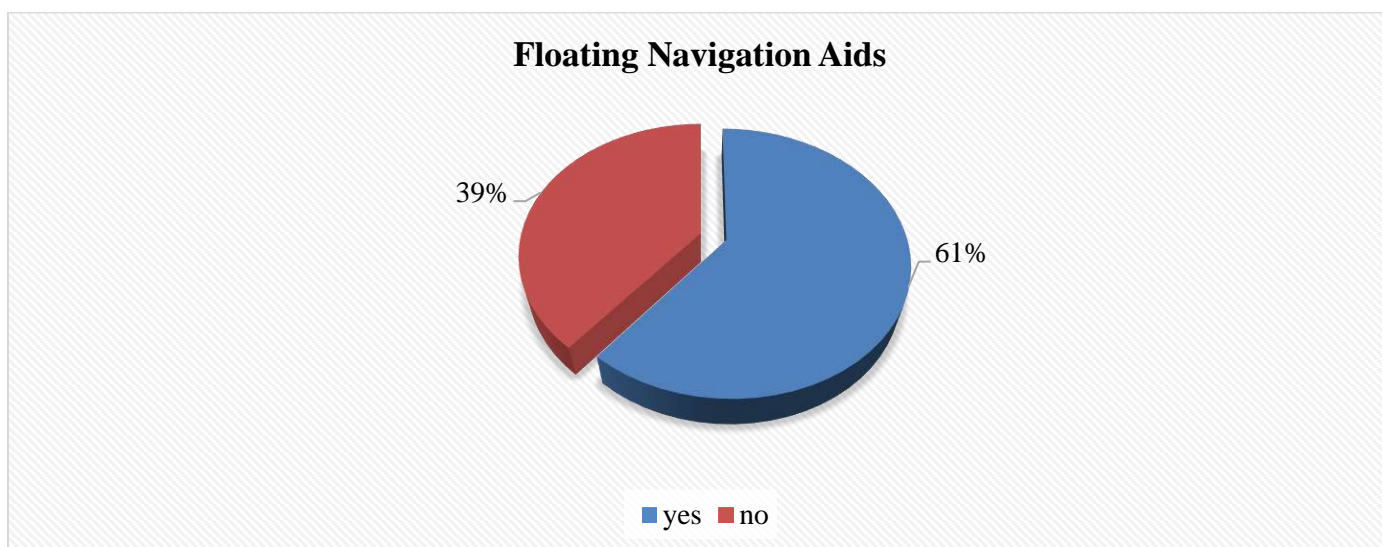
**Figure 7**  
*Provision of day-to-day weather alerts to fisher folks and other lake users in Lake Victoria (N=384)*

The Majority 65% (250) responded that there are daily weather alerts provided to fishers and other lake users while 35% (134) have not heard any weather alerts. There are weather alerts provided daily. There are weather alerts that do come for the fishers and other lake users. However, sometimes those weather alerts provided by LVBC are not that accurate so, some fishermen and Lake users ignore them and try to use traditional methods to predict the weather of the day (cf. interview #04 on 17/ 08/2020).

The findings concur with literature reviewed that LVBC dubbed “Multinational Lake Victoria Maritime Communications and Transport” is intended to provide regular weather reports and alerts to people on the lake (via text message and radio broadcasts), expand cellphone coverage and build a network of 22 rescue centers along Lake Victoria shore. So, there is weather alerts given to the Lake users across the three countries that share it. It has reduced fatalities and disasters to some extent.

**4.7.2 Presence of Well-Maintained and existing floating Navigational Aids in Lake Victoria to Guide Sailors**

The study asked respondents if they have well maintained and existing navigational aids in L. Victoria to guide sailors. The findings are presented in the Figure 8.



**Figure 8**  
*Floating Navigation Aids*

The majority 61% (234) agreed that there is a well maintained floating navigational aids in Lake Victoria to guide sailors while 39% (150) said there are no floating navigational aids in Lake Victoria. The contrast may be alluded to the fact that not everybody understands that there are some navigational aids because they are not frequent travelers in Lake Victoria or they are not keen to see those floating aids. The positive response is confirmed from the Interview with the LVBC member who said that.



*“We have, but not very many floating navigational aids in Lake Victoria, but the ones that are there are erected strategically to show sailors where to follow and alsowhere there are many rocks that can interfere with the boats, canoes and ships. Theycan’t be erected everywhere on the lake but specific points”* (Interview #09 on 25/ 08/2020).

The findings are in line with the literature reviewed that in 2007, East Africa Community created Lake Victoria Transport Act, which addresses the maritime safety standards such as seaworthiness of ships, collision prevention, crewing standards together with the establishment of navigational aids. The Act would curb water vessel accidents in Lake Victoria. The act also requires every county surrounding Lake Victoria in Kenya has prepared a disaster management policy which seeks to improve the safety of the Lake. The findings are further supported by Nakyonyi (2011) that East African Community in the past hadcreated 30 navigational aids in the form of visual marks in Lake Victoria which were later revised in 1972.

Lake Victoria Basin Commission has implemented the 1956 navigational charts and nautical surveys created between 1900 and 1906 which have reduced trans-border water vessel water vessel accidents of boats, ferries and ships. For example, two buoys carrying floating automatic weather stations which wereanchored at the Lake bed off Homa Hills at Winam Gulf and in the open lake close to Rusinga Island erected by Kenya Meteorological Department in 2003 (Powell, 2016). These floating navigational aids are very important to lives of the Lake users as it has and will reduce most of the disasters.

**4.7.3 Response to Distress Calls from Fisher Folks and other lake Users Trapped in Water HyacinthIn Lake Victoria**

The study asked the respondents to mention how Kenya Maritime Authority and other emergency bodies responds to the distress calls from fishers and other lake users trapped in water hyacinth in Lake Victoria.The findings are presented in the Table 3.

**Table 3**

*Responses to Distress Calls from Fisher Folks and other Lake Users Trapped in Water Hyacinth in Lake Victoria (N=384)*

<b>How do you respond to stress calls from lakeusers.</b>	<b>Freq.</b>	<b>Percent</b>
Motor boats	181	47
Use choppers	105	27
Use divers	70	19
Clear hyacinth	28	7
<b>Total</b>	<b>384</b>	<b>100.0</b>

From the Table 3 majority 47% (181) mentioned that Lake Victoria Basin Commission and other emergency bodies use motor boats to respond, 27% (105) said they use choppers to respond in case thereare people drowning in water, 19% (70) said the response is done using divers and 7% (28) said they clearwater hyacinth to create way for those trapped. In the focused group discussion, all members agreed that.

*“The first people to respond are those who have motor boats, paddled boats or canoes will always come later. When people are trapped in the water hyacinth andthe boat cannot move then they will use police choppers to rescue. In all water vessel accidents, we have seen here the community responds before any other emergency bodies”* (FGDs in Mfangano #06 on 11/08/2020).

In an interview with a community leader, he had this to say.

*“We use motors to disaster scene even if it is at the mid of the night to rescue peopleor those in the Lake at that time will ensure they rescue them before it’s too late. Itis our responsibility to rescue any kind of disaster in the lake. The Red Cross, KMAand Police are also there to help in the rescue mission until everyone is removed out of water dead or alive”* (Interview at Mbita town #011 on 15/ 08/ 2020).

**4.7.4 Main Traditional Measures that the Community Members put in Place to MitigateWater Vessel Accidents in Lake Victoria**

Researcher asked respondents to mention some of the traditional measures that community members putin place to mitigate water vessel accidents in Lake Victoria. Table 4 provides the findings.

**Table 4**

*Traditional Measures Used by the Community to Mitigate Water Vessel Accidents in Lake Victoria (N=384)*

Measures to mitigate water vessel accidents in Lake Victoria.	Freq.	Percent
Boat Naming	234	61.0
Use of celestial navigational techniques (using stars, moon and sun)	72	19.0
Observation of Natural signs e.g. cloud formation, bird behaviors	78	20.0
Beating of drums to chase away evil spirits ( <i>nyawawa</i> )	81	21.1
Charm (blessing of vessels)	75	19.5
Assigning of experienced coxswains ( <i>madhars</i> )	71	18.5
Designated traditional routes	92	24.0

The majority of 61% (234) responded boat naming, 20% (78) said observation of natural signs while 19% (72) said use of celestial navigational techniques. Further, 19.5% (75) agreed use of charm, 18.5% (71) said assigning of experienced coxswains while 24% (92) said designated routes. The first measure that is taken to mitigate water vessel accidents is training or educating the lake users on what to do before you get in any boat or canoe. They are supposed to know how to sail the boat, put on life saving jackets, and under the guidance of an expert have followed that route at night or day time. Number two is knowing the capacity of the vessel, and finally to improve and repair the leaking or maintain the condition of the boat. From the focused group discussion, the following was agreed on.

*“In our beach, we don’t allow visitors to lead the crew for fishing expeditions, they must first work under experts for a period of not less than two years then they were allowed to work in that area. Crews must be trained on weather observation and how to be alert all the time”* (FGD #01 on 28/07/2020).

Susilo, Edi, et al. (2021) studied traditional fisherman household coping strategies in overcoming poverty by actively extending working hours and passively reducing spending during fishing seasons. The findings of Salmi (2005) remarks that coping strategies for small-scale fishing are shown by proactivity to get productive wages, be farmers, and wage workers.

In an interview with one beach leader who stated that.

*“Everyone who lives along the Lake is trained and taught dos and don’ts while in the lake. For example, when we were young, we were taught by our seniors how to swim, how to block leaking boats, how to catch fish using different methods. Finally, how balance on the boat to avoid capsizing of the boat”* (Interview #02 in Rusinga on 22/07/2020).

The findings of this study were confirmed by Mangione (2014) who stated that education campaigns adopted on the use of life jackets in 2007 in the United States of America more so in the state of California and Mississippi to reduce the drowning fatalities which stood at 71% of all reported fatalities between 1999 to 2011 in its waters. Education is very important as it creates awareness of the mitigation and also improves the understanding on the usage of the equipment recommended therefore it is applied as the traditional method to reduce Lake fatalities.

The level of knowledge of Cilicing fishermen regarding life safety is quite good because they often receive safety training and life safety equipment at sea. The level of knowledge of fishermen is influenced by experience and can increase a person's knowledge about something that is informational. With culture, someone with a good level of knowledge can meet their needs with the attitudes and beliefs they have. Some fishermen in Cilicing do not understand life safety at sea and existing procedures and only rely on minimal knowledge regarding safety.

There are several fishermen who rely on traditional knowledge about fishing safety based on experience passed down from generation to generation from their ancestors and combining knowledge obtained through government outreach. Fishermen usually only look for signs from nature before going to the sea and do not bring the safety equipment they should carry it. According to the fisherman, if an accident occurs that causes the boat to capsize or sink, the fisherman can hold on to their boat and rely on jerry cans as an alternative buoy. This is based on the experience of fishermen when they have an accident and don't bring a life jacket, so the jerry can is an alternative so they don't drown.

Moreover, the jerry can has a cover so it doesn't sink and can help fishermen to stay afloat. Apart from jerry cans, cork can also be another choice for fishermen to avoid drowning because of the nature of cork which can also float in the sea. Knowledge of weather conditions before going to sea is also very important for fishermen. Because weather is a natural condition that is difficult to predict. Therefore, looking at natural signs and celestial bodies is something that is highly recommended for fishermen before going to sea to ensure the safety of their lives.

Fishermen in the Cilicing fishing village stated that they need to know the weather conditions before going to sea by looking at the sky, clouds and sea waves that occur on the beach. If the sky is cloudy, thick black clouds, especially accompanied by lightning, and the sea waves on the coast are very high, then it is very likely that the weather will be

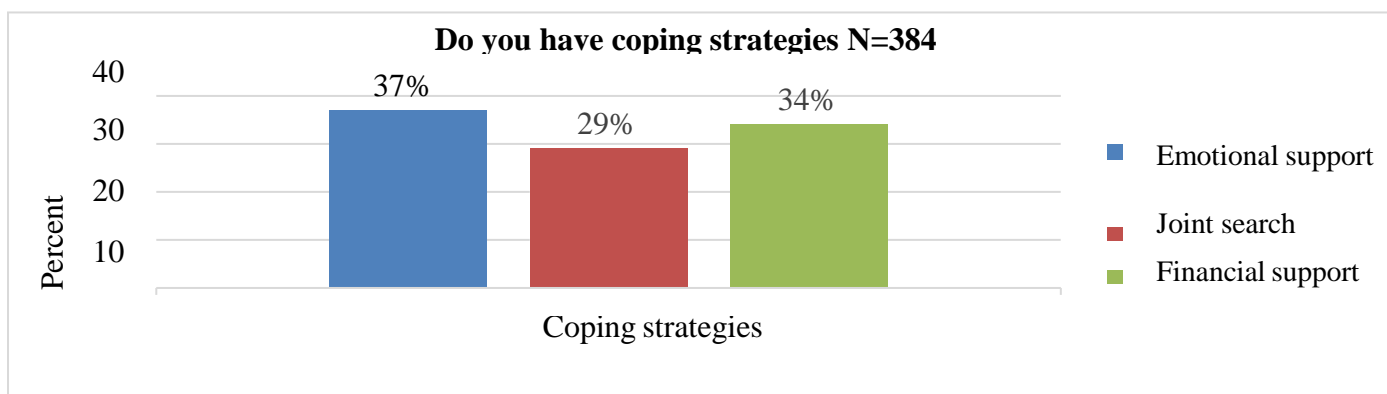
heavy rain accompanied by strong winds and big waves, and in these bad weather conditions fishermen will decide not to go to the sea.

In 2006, International Maritime Organization (IMO) approved the implementation the adoption of e- navigation in world waters. In line with e-navigation, Ramirez *et al* (2013) developed a web and mobile-based emergency quick portal application in Albay that has helped reduce the impact of disasters by providing interaction between the affected citizens and emergency units. This has also reduced water vessel accidents but it is not mentioned in the findings, may be due lack of technological development in Lake Victoria. But the other two findings such as overloading and improving the conditions of the boat are captured with the education and training.

Everyone who fishes has to work on improving their ship husbandry skills because doing so will increase overall safety. For the purpose of documenting the findings of the pre-sailing system and machinery checks, among other equipment checks, it is imperative that a log be kept. Diving safety behavior needs to be encouraged and socialized. As a support system, the development of a diving community that is concerned with safety practices must become crucial (Kusnanto *et al.*, 2020).

#### 4.7.5 Main Copying Strategies that the Community Members Employ during and after Occurrence of Water Vessel Accidents

The study asked the respondents to mention some of the copying strategies that community members employ during and after occurrence of water vessel accidents. The findings are presented in the Figure 9.



**Figure 9**

*Coping Strategies that the Community Members Employ during and after Occurrence of Water Vessel Accidents*

Figure 9 shows that majority of 37% (142) respondents that emotional support given when a disaster takes place and even after the disaster, 34% (131) responded that the community give financial support to the affected families and 29% (111) responded that there are joint rescue operations during and after the disaster. From the group discussion all members agreed that.

*“When a disaster takes place, everyone in the village and the beach joins the rescue team and search until they find the lost person. The family members are also comforted to come to terms with what has taken place and there are also contributions that everyone must make in order to support the families and also any other program”* (FGDs #03 on 17/09/2020).

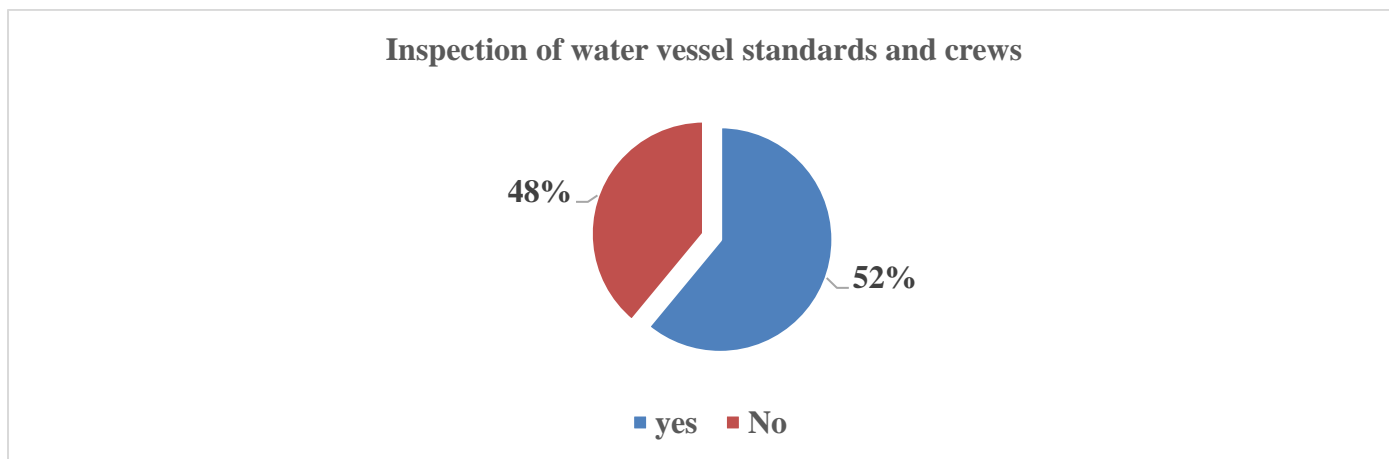
In an interview with one fish monger, she stated that;

*“We support those who are involved in water vessel accidents by offering counselling, psychological support and even through prayers. In case of fatalities, we contribute for the funeral expenses and any other bill. Everyone is expected to contribute for that. Some beaches have welfare offices where people contribute money every week. Others have self-help groups that help people when any calamity strikes”* (Interview #9 on 20/9/2020).

The findings do not concur with the findings of Odhiambo (2013) on the Coping and adaptive strategies of fishing community in Lake Victoria- Mbita Sub- County due to overwhelming disasters experienced in the lake. Some of the copying and adaptive measures they do are farming, small scale business, and boat repairing, fish mongering, operating boda-boda and grazing animals for other people. This is because most of the respondent looked at immediate response but his study looked at the overlying on the fishing to reduce poverty.

#### 4.7.6 Inspection of Water Vessel Standards and Crews in Lake Victoria

The study sought information from respondents if the government does inspection of water vessel standards and qualified crew members. The findings are presented on Figure 10.



**Figure 10**  
*Inspection of Water Vessel Standards and Crews (N=384).*

The study revealed that a majority 52% (200) of respondents admitted the government through Kenya Maritime Authority and Lake Victoria Basin Commission after a duration of time inspects the water vessel standards in the docks and popular fishing beaches. Only 48% (184) of respondents reported that neither of them nor their water vessels have never been inspected.

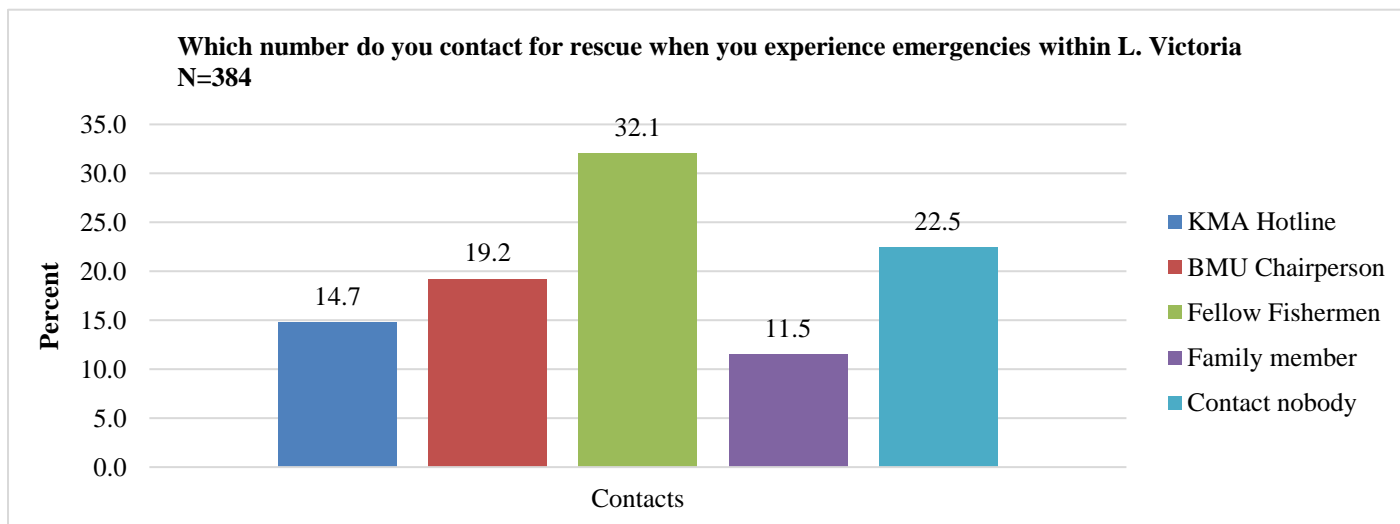
One of the Beach Management Unit chairpersons reported:

*“Most water vessels plying Mbita to Luanda Kotieno route have been inspected and their crew members been found qualified. Kenya Maritime Authority officials usually make impromptu visits at Mbita point and does the inspection of the state of the water vessels and qualification of their crew members “(Interview #10 on 21/9/2020).*

This is in line with Onsongo (2017), who stated that thorough inspections are usually done to domestic water vessels to guarantee their safety. In the process of inspection, unqualified crew are pruned out.

#### 4.7.7 Numbers Contacted for Rescue during Emergencies within Lake Victoria

The study sought information on which number they contact for rescue when they experience emergencies within Lake Victoria waters. Phone number contacted for rescue in Lake Victoria can determine the level of success of emergency response. The findings are presented in the Figure 11.



**Figure 11**  
*Number Contact For Rescue When Respondents Experience Emergencies within L. Victoria*





Out of 384 people who responded in this study, 32.1% (123) people reported that they contact fellow fishermen during emergencies in Lake Victoria. This was followed by 19.2% (74) who reported they contact Beach Management Units chairpersons and 14.7% (56) who reported they contact the Kenya Maritime Authority Hotline number. A further 11.5% (44) of respondents indicated they contacted families during distress calls in the lake. However, 22.5% (86) of the respondents reported they contact nobody during emergencies within Lake Victoria.

*“Last year when we were sailing to the larger Chamaunga Island, you see over thereto cut some firewood for sale in Mbita town, water started leaking into our boat which finally made us capsized. From my experience, the water vessel accidents brought us a lot of psychological fear and confusion that we could not remember to contact any number for rescue. With our phones in the pockets, we tightly held in the capsized boat whose parts remained afloat till other passer by fishermen came to our rescue” (Interview #15 on 24/9/2020).*

#### 4.7.8 Correlation between Occurrence Water Vessel of Accidents and Copying Strategies

The study sought to investigate the correlation between the effects of water vessel accidents and copying strategies put in place. Table 5 shows the summary of the findings (N=384).

**Table 5**

*Correlation between Effects Accidents Occurrence and Copying Strategies*

		The effects of occurrence of water vessel of accidents in Lake Victoria	Copying strategies
The effects of occurrence of water vessel of accidents in Lake Victoria	Pearson Correlation	1	.093
	Sig. (2-tailed)		.000
	N	384	384
Copying strategies	Pearson Correlation	.093	1
	Sig. (2-tailed)	.000	
	N	384	384

\*\* Correlation is significant at the 0.01 level (2- tailed).

The table above shows that there is a correlation of .093 between effects of accidents occurrence and the copying strategies. The finding also shows that the correlation is not a strong one. It indicates that effects reduce with the application of copying strategies put in place to fight side effects of the accidents. With the 2-tailed significant at 0.01, there is a highly significant correlation between the effects of occurrences of water vessel accidents and copying strategies.

### V. CONCLUSIONS & RECOMMENDATIONS

#### 5.1 Conclusion

The study discovered that the community has got acceptable traditional copying strategies employed during and after water vessel accidents to prevent them from suffering from the adverse effects. The government in partnership with the Beach Management Units heads also participates in conducting search and rescue for those who have experienced water vessel accidents. The government responds to distress calls by clearing water hyacinth and through using motor boats, choppers and divers. However, slow response during water vessel accidents was cited in addition to the government not offering any help to cushion the affected families from suffering negative socio-economic effects resulting from the disasters.

#### 5.2 Recommendation

The study also found that the community has devised copying strategies that is employed by members during and after the occurrence of water vessel accidents which are conducting joint search, emotional support and financial support. The study revealed that the government has implemented a number of intervention measures to mitigate water vessel accidents in Lake Victoria. Thus, the study recommends that concerned government departments promote local community-initiated mitigation measures so as to build community resilience.

## REFERENCES

- Fiorella, K. J., & Rasolofoson L. (2023). Environmental change and resource access in aquatic food systems: a Photovoice case study of Cambodian fisheries. *Ecology and Society*, 28(4).
- Goodman, N. D., Ullman, T. D., & Tenenbaum, J. B. (2011). Learning a theory of causality. *Psychological review*, 118(1), 110.
- Kusnanto, K., Wabula, L. R., Purwanto, B., Arifin, H., & Kurniawati, Y. (2020). Safety behaviour and healthy diving: A qualitative study in the traditional diverse fishermen. *International maritime health*, 71(1), 56-61.
- Mangione, T., & Chow, W. (2014). Changing life jacket wearing behavior: An evaluation of two approaches. *Journal of Public Health Policy*, 35(2), 204-218. Retrieved from <http://www.jstor.org/stable/43288018>
- Nakyonyi, A. (2011). *Maritime safety on Lake Victoria: Analysis of the legal and regulatory framework* (Master's thesis).
- Ngwu, E. C., & Nwokedi, M. E. (2014). Political Economy of Crude Oil Marketing and Nigeria's Maritime Industry. *University of Nigeria Journal of Political Economy*, 9(2).
- Nwokoro, I. A., & Nwokedi, T. C. (2015). An evaluation of the economic and financial capacity of indigenous underwriting firms for marine risk and investment cover in Nigeria. *International Journal of Research in Commerce, IT and Management*, 5(3), 62-66.
- Odhiambo, T. (2013). *Effects of Weather and Climate Variability on Fishing Activities and Fishers' Adaptive Capacity in Mbita Division- Homa Bay County, Kenya* (Thesis, Kenyatta University).
- Oketch, A. (2018, May 9). \$36.6m raised for Lake Victoria safety project. *The East African*. <https://www.theeastafrican.co.ke/scienceandhealth/-36-raised-for-Lake-Victoria-safety-project/3073694-4553020-ujq4xm/index.html>
- Onsongo, S. K (2017). *Analysis of the domestic passenger ferry safety in Kenya*. World Maritime University Dissertations. 552.
- Powell, R. (2016). *Proposal for a Daily Weather Forecast for Kenyan Fishermen on Lake Victoria*. WISER Western Project.
- Ramirez, E. ., & Amagsila, G. A., Cabuhat, M. E., Tigbayan, J. E., Uy, E., (2013, December). A framework for mobile application of flood alert monitoring system for vehicle users using Arduino device. In *2013 IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)* (pp. 1-6). IEEE.
- Salmi, P. (2005). Rural pluriactivity as a coping strategy in small-scale fisheries. *Sociologia Ruralis*, 45(1-2), 22-36.
- Susilo, E., Purwanti, P., Fattah, M., Qurrata, V. A., & Narmaditya, B. S. (2021). *Adaptive coping strategies towards seasonal change impacts: Indonesian small-scale fisherman household*. *Heliyon*, 7(4), e06919.
- Yang, C., Kim, K., Lim, H., Kim, C., Kim, M., & Hong, D. (2018). Voyage Environmental Information System (VEIS) for Safe Navigation Support in the Coastal Waters of the Arctic Ocean. *Journal of Coastal Research*, 561-565. Retrieved from <https://www.jstor.org/stable/26488280>