

National University of Rwanda
Université Nationale du Rwanda



SCHOOL OF PUBLIC HEALTH
ECOLE DE SANTE PUBLIQUE

University Avenue
Tel:+250 585 166
Fax:+250 500 014
B.P 5229, Kigali
Rwanda
Email: nfosph@nursph.org
Web site: www.nursph.org

KNOWLEDGE OF *PRIMARY HEALTH CARE PROVIDERS* IN THE PREVENTION OF
DROWNING.

CASE OF COMMUNITY HEALTH WORKERS AND STAFF OF HEALTH CENTERS
BORDERING LAKE KIVU IN THE DISTRICT OF KARONGI

Dissertation presented in
Order to obtain the
Degree of Masters
Degree in Epidemiology

By: MFIZI NGABOYISHEMA JEAN, MD

Supervised by: NZAYIRAMBAHO MANASSE, MSc, PhD

Kigali. JULY 2013

SUMMARY

The Rwanda utilities regulatory agency (RURA) has put in place regulations about safe trips on lake using canoes, ships, boats to protect passengers and crew members against drowning. Users of these means of transportation need to show their interest in knowing and applying these rules.

Among users and passengers are opinion leaders including community health workers (CHW) and health centers workers (HCW). These persons play a key as role models in the society. As far as health matters are concerned. CHW and HCW are key people to know and apply safety measures in order to show a good example and sensitize the neighboring population.

This study aimed at assessing the knowledge of CHW and HCW in sectors bordering Lake Kivu in Karongi District about safety measures against drowning in order to improve them.

The study specific objectives were the following:

1. to determine the proportion of health workers at the health center and community with knowledge of the standards in respect of the safety of lake transport,
2. to determine the proportion of boats recently used by these workers who meet the optimal conditions for the transport of persons on the lake,
3. To estimate the proportion of trips that posed risks of drowning.

Both quantitative and qualitative approaches were used through a questionnaire and a focus group discussion among 575 primary healthcare workers.

Results show that less than 10 % of respondents have knowledge about safety laws and regulations of the transport on the lake.

Some of trips on the lake were dangerous with death among passengers (almost 10% of cases) Passengers used the boat without knowing whether or not it was licensed for transport on the lake (more than 50 % of cases),

Boats were sometimes overcrowded (more than 60% of cases) and in almost all cases, the weight of was not systematically taken.

In 2/3 of cases, boat crew did not have systematically a mobile phone for an emergency call for assistance, while in 64% of cases boats were not always covered and in 56% of cases, lifejackets were not systematically put.

There was a significant difference between Community health workers and health center workers in the following situations:

Being at risk of drowning, death among trips companions, having a cell phone for emergency calls for assistance, coverage of the boat and knowing whether or not the boat was licensed to carry passengers.

There is an urgent need to carry out training sessions and sensitization campaigns focusing on the importance of abiding by safety regulations and laws.

Primary health care providers need to be empowered in order to be able to train their communities' members in this area.

Prevention of drowning need to be put as a priority in the public health package of information, education and communication (IEC) sessions for CHWs.

A study to assess the magnitude of morbidity and mortality related to drowning in Lake Kivu is also needed.

Dedication

To my wife and children, I dedicate this dissertation,

To my parents, thank you for encouraging me to dare go every time further

To my sisters and my brother, thank you for your prayers and your love

To my friends and colleagues, thank you for your support

To my Heavenly Father, thank you for the gift of life and the capacity to think, move and appreciate your love.

To my country authorities, thank you for providing equal chance for all of us for education.

Acknowledgements:

My thanks go to my wonderful family, my lecturers, and coworkers.

All of them participated to enable me to reach this point of presenting the results of my research. The support of all of them continue to inspire and sustain me

The Direction of DR MANASSE NZAYIRAMBAHO enlarged my perspective on research. The NUR/SPH provided me with a favorable environment for carrying out this research.

Last but not least my colleagues health staff and community health workers at Mugonero, Mpenbe, Karora, Mubuga, Kibuye and Rubengera Heath centers who participated in this research;

To all, my profound gratitude.

Author's declaration

I declare that the work in this dissertation is original except where indicated by special reference and has not been submitted for any other degree or presented to any other university for examination.

Signed.....

Dated.....

List of abbreviations and acronyms.

CHW: Community health worker

EICV: Enquête intégrale sur les conditions de vie et des ménages (Integrated household living Conditions survey).

FGD: Focus group discussion

HC: Health Center

HCW: health Center Worker

IEC: information, education, Communication

MDG: Millennium Development Goal

NURSPH: National University of Rwanda School of Public Health

RURA: Rwanda utilities regulation agency

WHO: World Health Organization

Table of contents.

SUMMARY	I
DEDICATION	III
ACKNOWLEDGEMENTS	ERROR! BOOKMARK NOT DEFINED.
AUTHOR'S DECLARATION	V
LIST OF ABBREVIATIONS AND ACRONYMS	VI
TABLE OF CONTENTS.....	VII
LIST OF TABLES.	IX
LIST OF FIGURES.....	X
I. INTRODUCTION	1
1.1. DEFINITION OF CONCEPTS	1
1.2. STATEMENT OF THE PROBLEM.....	2
1.2.1. <i>Justification of the problem</i>	3
1.3. INTEREST OF THE STUDY.....	4
1.4. DESCRIPTION OF THE STUDY AREA.....	4
1.4.1. <i>Survey site</i>	6
1.5. LITERATURE REVIEW	6
1.5.1 <i>Drowning magnitude worldwide</i>	6
1.5.2 <i>Drowning magnitude in the great lakes reagon</i>	7
1.5.3. <i>Drowning in Africa in General</i>	8
1.5.3 <i>Drowning in Rwanda compared to other countries of the great lakes reagon</i>	10
1.6. RESEARCH HYPOTHESIS	11
1.7. OBJECTIVE OF THE STUDY.....	11
1.7.1. <i>Overall objective</i>	11
1.7.2. <i>Specific objectives</i>	11
1.7.3. <i>Research question</i>	11
CHAPTER II.COMPLETE METHODOLOGY OF RESEARCH	12
2.1. STUDY DESIGN	12
2.2. METHODOLOGY	12
2.2.2. <i>Study Variables</i>	13
2.3. DATA COLLECTION	13
2.4. DATA ANALYSIS.....	13
2.5. STUDY POPULATION AND SAMPLE SIZE	14
2.6. ETHICALCONSIDERATIONS	14
III. RESULTS	16
3.1. QUANTITATIVE RESULTS.....	16
3.1.1. <i>Socio- demographic characteristics of respondents</i>	16
3.2. ACTUAL RESULTS.....	17
3.2.1 <i>Knowledge of standards of the safety of transport on Lake Kivu</i>	Error! Bookmark not defined.
3.2.2 <i>Conditions of Boats recently used compared to optimal conditions of transport on Lake Kivu.</i>	18
3.2.3. <i>Trips representing a major risk made by health workers on Lake Kivu.</i>	20
3.2.4 <i>Comparison between the level of knowledge of standards and the profession of the worker.</i>	Error!
Bookmark not defined.	
3.3. QUALITATIVE APPROACH.....	22

IV. DISCUSSIONS.....	23
V. CONCLUSION AND RECOMMENDATIONS	26
5.1. CONCLUSION.....	26
5.2. RECOMMENDATIONS	26
REFERENCES.....	27
APPENDICES.....	30

LIST OF TABLES.

Table 1: Socio demographic characteristics of respondents.....	16-17
Table 2: Tendency and dispersion measures of age of participants.....	17
Table 3: Knowledge of standards of the safety of transport on Lake Kivu.....	18
Table 4: Conditions of Boats recently used compared to optimal conditions of transport on Lake Kivu.....	19-20
Table 5: Trips representing a major risk made by health workers on Lake Kivu.....	20
Table 6: Comparison between community health workers and health centers staff.....	21-22

List of figures.

Fig.1Karongi District Roads.....6

I. INTRODUCTION

1.1. Definition of concepts

Boat

Any small vessel propelled by oars, sail, or power under 65' (20 meters) in length. ^[1]

Canoe

A light, long and narrow boat, usually double ended and usually propelled by one single bladed paddle per person. ^[1]

Community health worker:

Community health workers are members of a community who are chosen by community members or organizations to provide basic health and medical care to their community. Other names for this type of health care provider include village health worker, community health promoter, and lay health advisor ^[3]

Drowning

Death from asphyxia caused by a liquid entering the lungs and preventing the absorption of oxygen leading to cerebral hypoxia and cardiac arrest ^[3]

Health center

A health Center is a public, private or faith based health facility that plays a vital role in the provision of ambulatory primary contact health services.

In Rwanda, it is estimated that: « +/- 85% of treatment needs can be addressed at the primary level health facilities, 15% of requirements need to be referred to a district hospital. Less than 10% of hospitalization needs require treatment at national hospitals. ^[4]

An important part of health center package of services is behavior change communication and health education » ^[4]

Lake Kivu

Lake Kivu is one of the great lakes of East Africa, situated between Congo Kinshasa to the west and Rwanda to the east.

Lying at 4,790 feet (1,460m) above the sea level, it occupies 1,040 square miles (2,700 square km). ^[5]

Ship

Any large seagoing vessel over 65' (20 meters) capable of extended offshore travel. ^[1]

Vessel

Any watercraft or other artificial contrivance larger than a rowboat or canoe used, or capable of being used, as a means of transportation on water. ^[1]

1.2. Statement of the problem

Drowning is a situation in which many people perish or develop many sequelae or disabilities.

Some places bordering lakes and big rivers are good places to use boats, ships or canoes.

In this case, respect of strict measures prevents drowning.

The western Province is a special one because 5 among its 7 districts border Lake Kivu

Karongi District is one of the seven districts of the Western Province of the Republic of Rwanda.

Roads are generally good in Rwanda but the Western Province is a special case because the paved road that will cross the province from north to south is still under construction; the second particularity is that this province is bordered on the west by Lake Kivu.

Five Districts (Rubavu, Rutsiro, Karongi, Nyamasheke and Rusizi) are bordered in the West by Lake Kivu. Only Nyabihu and Ngororero Districts do not have direct access to Lake Kivu.

The lake transport route seems shorter and more affordable for the population than roads or air but this system of transportation is not without danger when safety measures are not respected.

Legislation governing the lake transport was enacted in 2009 to prevent accidents in the operation of this pathway.

Karongi District with many peninsulas is hardly reached by good roads. The lake seems to be an easier way to use for transportation of people.

The lake is used as a transportation route for traders carrying goods, fishermen in their daily lives, passengers and for leisure.

Because drowning sometimes occur, this study aims to assess compliance with these standards in order to prevent future drowning and serve as a basis for further studies in this area.

This study was limited to Karongi District, especially areas bordering Lake Kivu

According to the World Health Organization: « around 388,000 people died by drowning in 2004 and is therefore a major public health problem worldwide ». ^[6]

Injuries account for nearly 10% of all deaths globally. ^[6]

Drowning is the third leading cause of death from unintentional injury- 7% of all injury-related deaths. ^[6]

It has been estimated also that: « ninety six percent of unintentional drowning deaths occur in low-income or middle-income, » ^[6]

« it is in the WHO African Region that rates of drowning deaths are highest where there are more than eight times higher than in Australia or the United States of America; » ^[6]

Being more frequently in contact with water is another risk factor: « People who are engaged in commercial fishing or whose livelihood is fishing- which, in low-income countries, using small boats -are more vulnerable to drowning. Children living near bodies of water not closed, such as ditches, ponds, canals or ponds or pools are particularly at risk. » ^[6]

All conditions listed risk above are found in the western part of the District of Karongi.

1.2.1. Justification of the problem

Rwanda is doing very well in the achievements of MDGs in the domain of health.

Many of these MDGs deal with communicable diseases.

One problem which needs to be monitored in the future is related to non-communicable diseases which include injuries.

One of the major issues not thoroughly studied is the case of drowning.

Rwanda being part of the great lakes region is bordered in its western part by Lake Kivu.

This is not the only lake, but it is part of the following lakes:

1. **Lake Kivu**, between Rwanda and the Democratic Republic of Congo to the west, is by far the largest
2. **Lake Muhazi** , about twenty kilometers east of Kigali: a long narrow lake running roughly east-west and extending north and south into a number of tributary valleys
3. **Lake Ihema**, in the Akagera National Park in the far east of the country, on the Tanzania border
4. **Lake Rweru** in the south-east - most of this lake lies in Burundi
5. **Lake Burera** in the north of the country high in the mountains (1862 meters above sea level
6. **Lake Ruhondo** just to the south of Lake Burera, separated from it by a spine of hills
7. **Lake Mugesera**, about thirty kilometers south-east of Kigali and about 15km north of Lake Rweru; this narrow lake consists of five east-west bays joined at the western side
8. **Lake Cyohoha South**, exactly south of Kigali and on the Burundi border

There are a number of smaller, very shallow lakes between Mugesera and Rweru; the region is very flat and swampy. ^[7]

These lakes present a great opportunity for transportation of the population bordering this lake where sometimes roads are either very long or in bad quality. The population use boats or canoes. These means of transportation need to follow strict rules to avoid accident which can result in drowning with terrible consequences on passengers.

The idea of conducting this research came from the desire to inquire on knowledge of safety measures by primary health care educators of the community.

These are community's health workers and staff of health centers

1.3. Interest of the study

Drowning is a problem for which the means of management are very limited in developing countries, ours included.

Indeed, we only have **one** boat ambulance to cover the western province as far as Lake Kivu is concerned to bring rapid assistance.

In case of drowning, people die or develop irreversible sequelaes at the neurological level.

Faced with this situation, only preventive measures are effective and less expensive in our context.

The sensitization at the community level in Rwanda is done by community health workers (CHWs).

Since CHWs are present in all villages in the country and have access to the entire population, they can raise awareness about safety measures and reduce mortality and accidents related to drowning.

The Health Center staffs that are responsible for supervising CHWs must also be able to provide these preventive measures.

Similarly, CHWs must educate the population about drowning preventive measures.

However, so far we have not been able to find any study that has been conducted in Karongi District with regard to drowning

It is therefore important to assess the knowledge of CHWs and those of health centers vis-à-vis drowning in order to be able to develop strategies of reducing the number of drowning efficiently.

1.4. Description of the study area.

The estimated total population of Karongi District as provided by the integrated household living condition survey (Enquête intégrale sur les conditions de vie et des ménages: EICV) in 2010-2011 « is 355, 000, representing 14% of the total population the Western Province and 3% of the total population of Rwanda.

Females comprise 54% of the population of Karongi District.

Only about 38% of the population in Karongi is identified as non-poor ; 22% is poor and 40% extreme –poor.

The majority of the population is young with 80% aged less than 40 years old.

About 54% of the population is aged 19 years or younger.

The secondary school net attendance rate is 14%.

The poverty indicators for Karongi District are far higher than the average for the Western Province.

Within the Western Province, Karongi is the second poorest district after Nyamasheke District. Karongi District is the third poorest District in Rwanda after Nyamagabe and Nyamasheke Districts.

Thirty one percent of households in Karongi own a mobile phone; this ranks the District worst among all Districts of Western Province and fourth worst at national level.

It is also below the national average as well as the rural area average.

Karongi is below the national average percentage for households owning a radio and ranked second last among all Districts in the Country »^[8]

Karongi District is one of the seven District Which Comprise the Western Province and is the seat of the Provincial Headquarters.

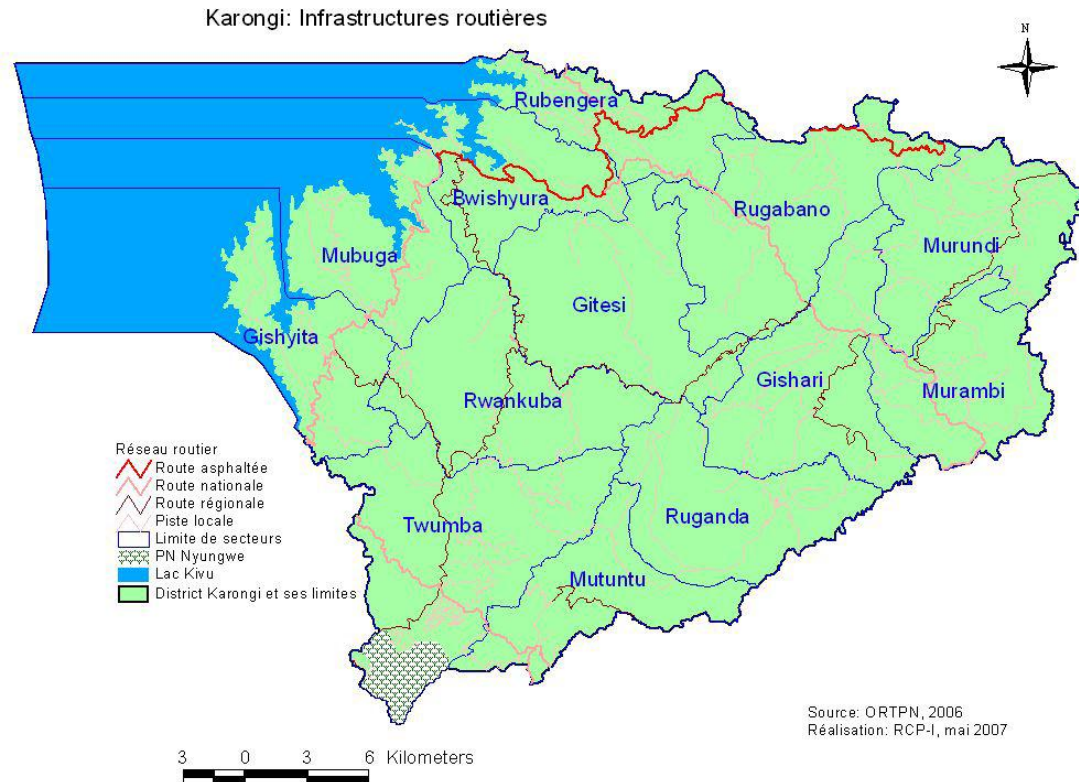
It is situated at the center of the province; to its North are Rutsiro and Ngororero Districts, to the south its borders Nyamasheke and Nyamagabe Districts, to the EAST are Districts of Muhanga and Ruhango and to the West it borders the DRC.

The District has a surface area of 13 administrative sectors, 88 cells, and 539 villages (Imidugudu).

Karongi District shares Lake Kivu with several districts. It has great potentials for export but lacks facilities. These include modern boats to operate on the lake, poor roads networks and modern markets^[9]

1.4.1. Survey site

FIGURE 1: KARONGI DISTRICT ROADS



The site chosen is the catchment area of 6 health centers located in the 4 Karongi administrative sectors bordering Lake Kivu (Bwishyura, Gishyita, Mubuga and Rubengera). These sectors are deep entering in the lake and the population use often the lake for moving from one place for another
I have chosen this site because I work in the same region (MUGONERO HOSPITAL).

1.5. Literature review

1.5.1 Drowning magnitude worldwide

According to the WHO report released in 1999: « Information on drowning are not collected uniformly in all countries but according to the global burden of disease, it is estimated that the overall rate of drowning is 8.4/100,000.

Drowning Statistics include accidental drowning and those deliberate acts such as suicide and homicide. Men and children are disproportionately represented in drowning statistics. In Children aged 5 to 14 years, drowning is the fourth leading cause of death, while in children less than five years, it is the eleventh. In Boys aged 5 to 14 years, drowning is the leading cause of death. The higher risk among boys and men is attributed to greater exposure to risk drowning in recreational and professional.

In Adults aged 15 to 44 years, drowning is the tenth leading cause of death. In the U.S., alcohol is involved in about 25-50% of deaths among adolescents and adults in association with water recreation. This is a major contributing factor in up to 50% of drowning among male adolescents. » ^[10]

Given that information about drowning is not routinely or uniformly collected, « it is essential to give a high priority to research and initiatives in public health in order to determine burden related to drowning in the world and what are the risk factors.

It is imperative to set clear goals, such as the quantification of the magnitude of the problem and identification of vulnerable populations, risk and hazardous situations, and strengthen emergency response services, while putting emphasis on prevention and awareness in at risk populations » ^[6]

The drowning phenomenon can be higher in developed countries where there are many fishers and it is known that « an estimated 1 billion people depend on fish as their primary source of protein » ^[11]

This magnitude of the problem is in contrast with the fact that health providers “belief that drowning prevention counseling is less important than other injury prevention topics.”^[12]

1.5.2 Drowning magnitude in the great lakes region

Many scattered reports from media have shown that drowning is a major but yet not well documented issue in the East African region, Africa and even worldwide.

We will just point out these, as examples:

First, a study has shown that drowning is a major Cause of mortality among the fishermen in lake Victoria, Kenya : « Mortality attributed to work related diseases or accidents and injuries are poorly reported in Kenya. Most of the reported cases are in the formal sectors, while the informal sectors such as fishing, where most Kenyans are employed, are largely ignored. The objective of the study was to determine the cause of mortality and identify factors that influence mortality among Kenyan fishermen in Lake Victoria. The findings reveal that the major causes of death were: HIV - related infections (33.8), drowning (14.3%), pulmonary tuberculosis (12.4%), and malaria (10.4%) » ^[13]

This astonishing revelation is not unique. A second report from Haron has shown overloading of boats in Lake Victoria and lack of safety measures involving sometimes inexperienced school children. This is what he wrote on 27th November 2012:

« I once visited Homa-bay beach on Lake Victoria and I saw a heart-rending practice. When school children visit the beach, they pay 20 shillings for a boat ride in the lake.

None of them are given safety jackets to reduce the risk of drowning. Furthermore all students from one school are packed in one boat.

The risk of losing many school children is high in case of an accident as most of them don't know how to swim and don't have life jackets ». ^[14]

The above mentioned risk can sadly become real as written on March 3rd 2012 by the daily newspaper In2EastAfrica :

« Around 60 people were aboard a boat that capsized on Lake Victoria, according to the sole survivor found so far, a regional police spokesman said on Saturday. »
According to the report: « The boat was overloaded and poor maintained, operators fail to record the number of passengers on board »
The same report states that in May 1996, a ferry sank in Lake Victoria on its way to Mwanza killing around 800. ^[15]

1.5.3. Drowning in Africa in General

Overloading boats is not unique to boats used in Lake Victoria but also on Lake Tanganyika. Another report from Lusaka Times written on 26th September 2012 shows this: « 3 die, 12 missing after a ferry overloaded almost 5 times capacity capsizes on Lake Tanganyika ». ^[16]

The same report continues like this: « 28 people have so far survived the ferry accident from the ferry which was carrying about 50 people against a capacity of 12_». ^[16]

This Phenomenon is not limited to lakes of the Great lakes region but is also seen in the waters on the Indian Ocean.

The following report from Aljazeera released on 10th September 2011 shows the drowning of a vessel killed at least 200 persons in September 2011 in the Indian Ocean between Zanzibar and Pemba in Tanzania:

« 200 dead and many still were missing as vessel capsized off coast of East Africa » ^[17]

These news were later confirmed by the police: « Nearly 200 people have died after a ferry travelling from Zanzibar to Pemba island off the East African country of Tanzania capsized overnight, police said. » ^[17]

« Zanzibar police spokesman Mohamed Mhina told the Reuters news agency that 192 bodies had been recovered and 606 passengers rescued from the Indian Ocean so far. » ^[17]

"There is a possibility that more bodies still remain at sea. Rescue workers are still searching for survivors and retrieving bodies," he said. ^[17]

The rescues also echoed the police :

« The ferry flipped and capsized. There could be more bodies trapped inside the hull of the ship with the cargo," rescue worker Ali Ramadhan told Reuters at the port. »^[17]

"We suspect the ship was overcrowded with more than 800 passengers onboard. It is normal for these ferries to overload passengers and cargo." ^[17]

« Zanzibar Police Commissioner Mussa Alli Mussa said early on Saturday that more than 500 people were on the ship's passenger list. »^[17]

"The ship's manifest shows that the vessel travelling from Unguja [Zanzibar] to Pemba islands had more than 500 passengers on board." ^[17]

« Mussa said rescue workers with the aid of some fishing boats in the area were helping to rescue more passengers and recover bodies. » ^[17]

« Zanzibar and Pemba are the two main islands of the Zanzibar archipelago, a popular destination for tourists visiting their pristine Indian Ocean beaches. » ^[17]

« We fear the greatest calamity in the history of Zanzibar. This is a disaster," a government official in Zanzibar, who declined to be named, told Reuters. » ^[17]

« Many of those present expressed anger that the ship had been allowed to leave port so overloaded and called on government officials to resign. » ^[17]

From the above passages, it is clear that many safety measures were not respected and even rescue means were very limited.

We will lastly quote the following report showing a similar case in the red sea where a boat sank killing 197 people. In this case reported by the daily newspaper In2EastAfrica :The ship caught fire in the red sea , the fact that the ship was carrying illegal immigrants suggest that either the ship was overloaded or it did not beneficiate from routine security procedures before embarking passengers.

Here are the highlights from this sad story:

« A ship packed with refugees bound for Saudi Arabia has caught fire and capsized off the northeastern coast of Sudan, killing 197 people, the Sudanese Media Centre, a state-linked news agency, has said.

The ship had launched from the Red Sea State, one of Sudan's 26 states, and sailed for four hours in Sudanese territorial waters before the blaze broke out, according to the news agency.

"All we know is this boat has caught fire and capsized off the shores of the Red Sea area in Sudan, particularly at a place called Atiaba about 200km from the port of Sudan," Vall said

Sudan has experienced several other incidents of illegal migrants drowning off the coast on their way to nearby countries in past years.

Thousands of African migrants, especially Eritreans and Ethiopians, risk the dangerous route to escape, often trying to go to Saudi Arabia. »^[18]

1.5.3 Drowning in Rwanda compared to other countries of the great lakes region

In Rwanda, no specific study has been done so far.

The only report found on Rwanda, is from World health ranking Website:

The first report states: “in 2010 drowning was the 22nd cause of death in Rwanda with 707 deaths, equivalent to 0.87% of all deaths which occurred in 2010”^[19].

These are more than deaths caused by cervical cancer (23rd cause of death in Rwanda with 678 deaths, equivalent to 0.68% of all deaths which occurred in 2010).^[19].

Compared to other injuries related cases, drowning come at the second position after road traffic accidents “(15th cause of death in Rwanda with 1.638 deaths, equivalent to 2.01 % of all deaths which occurred in 2010).”^[19].

Death by drowning is far more frequent than death by fires “(27th cause of death in Rwanda with 553 deaths, equivalent to 0.68 % of all deaths which occurred in 2010) or falls (43rd cause of death in Rwanda with 203 deaths, equivalent to 0.25 % of all deaths which occurred in 2010).^[19]

From the same source, the report says that, quoting the WHO 2011 report, “Rwanda is ranked 16th country in the world with the highest number of drowning deaths (8.9 deaths per 100.000 people).”^[20].

Other countries in the great lakes region are in the similar condition: “Tanzania is ranked 6th country in the world with the highest number of drowning deaths (10.6 deaths per 100,000 people). Burundi is ranked 7th country in the world with the highest number of drowning deaths (10.6 deaths per 100,000 people). Uganda is ranked 15th country in the world with the highest number of drowning deaths (9.2 deaths per 100,000 people).” [20].

1.6. RESEARCH HYPOTHESIS

The RURA’s standards for human transportation in Lake Kivu are not strictly followed in Karongi District.

The Knowledge of CHWs and health center staff with regard to the prevention of drowning on the lake Kivu is not satisfactory

1.7. OBJECTIVE OF THE STUDY

1.7.1. Overall objective

To evaluate the risk of drowning in Lake Kivu transportation and related prevention measures in Karongi District.

1.7.2. Specific objectives

I. to determine the proportion of health workers at the health center and community with good knowledge of the standards in respect of the safety of lake transport.

II. To determine the proportion of boats and other transport means which meet the optimal conditions for the transport of persons on the lake.

III. To estimate the proportion of trips in Lake Kivu that posed risks of drowning

1.7.3. Research question

1. What is the level of knowledge of providers of primary health care living in the District of Karongi regarding the prevention of drowning in the neighboring Lake Kivu?
2. What is the proportion of trips on Lake Kivu that presents the risk of drowning?
3. What is the proportion of boats and other transport means that respect the norms and standards for human transportation in Lake Kivu?

CHAPTER II.COMPLETEMETHODOLOGYOF RESEARCH

2.1. Study design

The present study is a descriptive cross-sectional study using both quantitative and qualitative approaches.

2.2. Methodology.

2 different approaches were used: the quantitative and the qualitative methods

A. quantitative approach:

To achieve the specific objectives: the following elements were assessed using quantitative methods through a questionnaire:

To assess the respect of norms and standards by transport means as well as to assess the level of knowledge of these norms,

These norms have been set by RURA on 11th November 2013, they define clearly how a commercial boat should be, the boat loading and safety requirements are also clearly defined.

The questionnaire was referring to the knowledge of these safety regulations.

In order to prevent efficiently drowning, the minimum acceptable level of knowledge of these regulations among primary health care providers should not be below 70%.

The acceptable level of meeting these standards when boating is 90%

The acceptable level of risky trips with eventually deaths among passengers is 0 %.

B. Qualitative approach:

The qualitative approach was used to assess the perception of community health workers and health centers staff about safe boating.

The following components have been considered: appreciation of community health workers and health centers staff towards boating safety measures and motivating or demotivating factors to adopt safety practices before embarking in boats, canoes or ships.

2.2.2. Study Variables.

a. Dependent variable:

The dependent variable for this study is the application of boating safety measures.

b. Independent Variables:

The independent variables are many and varied (numerical or categorical). These include : socio demographic and economic characteristics including age, level of education, weight taken before boating, boats covered, use of life jackets and presence of extinguisher in the boats used.

2.3. Data collection.

The subjects were distributed questionnaires which they filled themselves (self-administration)

Heads of health centers (Titulaires) were informed prior to data collection so that the time staff filled the questionnaire did not disturb routine activities.

The self-administration of the questionnaire applied also to CHWs who were contacted during their monthly routine meetings at health center level.

After the quantitative data collection, there was also a qualitative data collection through focus group discussions (FGDs).

Three focus group discussions were conducted. These 3 groups were composed by respectively by 5 persons, 5 persons and 12 persons. The gender ratio was 3 females and 2 males for the first two groups and 8 females and 4 males for the last group. The minimum and maximum ages were respectively of 25 and 40 years for the 2 first groups and the last group had a minimum of 22 years and a maximum of 50 years.

2.4. Data analysis.

Entry was done using the EPI INFO software; data analysis has been done using the SPSS software. The results have been presented in the form of tables and made in Excel, while the report has been written using Microsoft WORD.

The analysis will follow the plan shown in the table below.

Data analysis plan

Objectives of the study	Statistical indices
I. To determine the proportion of community health workers and Health Center workers with knowledge of the standards of the safety of transport on Lake Kivu.	➤ proportion
II. To determine the proportion of boats recently used by health workers at the primary level which meets optimal conditions for transport on Lake Kivu.	➤ proportion
III. To estimate the proportion of trips representing a major risk compared to the total number of trips made by health workers on Lake Kivu.	➤ proportion
IV. to establish a correlation between the level of knowledge of standards and the profession of the worker	➤ Chi-square with level of significance of 5%

2.5. Study population and sample size

Our study population is composed of health providers at community level in charge of education, information and communication to the population about key messages in the area of prevention and treatment of major threats to their safety. These include CHWs and Health center's staff.

Initially we intended to reach exhaustively all CHWs and health centers staff within the catchments areas of Karongi Health Centers bordering Lake Kivu (Mpembe, Mugonero, Mubuga, Karora, Kibuye and Rubengera), totalizing 766 persons.

However, we were able to reach 575 respondents representing 75% of the total population. All these subjects who were reached accepted to participate to the study (participation rate of 100%).

2.6. Ethical Considerations :

All persons who participated in this research participated freely. They have been requested to participate on a free will basis.

A consent form was signed by participants to the research.

Respondents were given right and possibility to decide to participate or not in the research.

The study protocol was approved by the NURSPH and the Karongi District Authorities have been informed about the research and gave also their approval.

In order to ensure the confidentiality, no names of respondents were collected.

There were no risks associated to the research.

Refusing to participate in the research could not affect the affiliation of primary health care to their organization.

III. RESULTS

3.1. Quantitative results

3.1.1. Socio- demographic characteristics of respondents

The majority of respondents were aged between 17 and 39 (54.2%), female (62.1), Community health workers (72%), attained primary level education (54%), married or cohabiting (76.2%), and dwelling in Sectors crossed by a paved road (50.4%). The table below gives more details.

Table 1: socio demographic characteristics of respondents

Age (in years)	Frequency	percentage
Bellow 20	2	0.37%
20-24	35	6.47%
25-29	72	13.31%
30-34	107	19.78%
35-39	114	21.07%
40-44	75	13.86%
45-49	48	8.87%
50-54	55	10.17%
55-59	21	3.88%
60-64	9	1.66%
65 and above	3	0.55%
Total	541	100.00%
Mean	38	
Median	37	
Mode	30	
St Deviation	10.020	
Minimum	17	
Maximum	80	
Gender	Frequency	percentage
Females	354	62.1%
Males	216	37.9%
Total	570	100%
Profession		

Community health workers	390	72%
Health center staff	153	28%
Total	543	100%
Level of education		
Primary	302	54%
Secondary or professional	238	42%
College or university	21	4%
Total	561	100%
Marital status		
Married/cohabiting	419	76.2%
Single	80	14.5%
Separated/divorced	6	1.1%
Widow/widower	45	8.2%
Total	550	100%
Residence		
Sector of residence crossed by a paved road	282	50.4%
Sector of residence not crossed by a paved road	278	49.6%
Total	560	100%

3.1.2. Knowledge of standards of the safety of transport on Lake Kivu

The great majority of respondents have never been trained about boating safety regulations (**97.97%**), had not a copy of boating safety regulations (**98.88%**) and they had not knowledge about boating safety regulations (93.09% %). There is no significant difference ($p = 0.579$) between community health workers and Health center staff Vis a Vis the knowledge of standards of the safety of transport on Lake Kivu. The table 3 and 6 give more details.

Table 3. Knowledge of standards of the safety of transport on Lake Kivu

Variable	frequency	percent
Trained about on boating safety regulations		
yes	11	2.03%
No	530	97.97%
total	541	100.00%
Have a copy of boating safety regulations		
yes	6	1.12%
No	528	98.88%
total	534	100.00%
Have knowledge about boating safety regulations		
yes	38	6.91%
No	512	93.09%
total	550	100.00%

3.1.3. Conditions of Boats recently used compared to optimal conditions of transport on Lake Kivu.

The results show that the means of transportations used in in the last 24 months on Lake Kivu did not have fire extinguisher in 91.33% of cases, not enough seats for all passengers in 66.28% of cases, no cell phone for emergency calls in 66.09% of cases, the boat was not covered in 64.16% of cases , the boat was not necessarily *licensed for the transport of passengers* in 54.47% , not enough lifejackets for all passengers in 55.75% of cases, no Weighing scale to take passengers weight in 98.85% of cases, and passengers' weight was no taken prior to embark in the boat in 99.43% of cases.

There is no Significant Difference between community health workers and Health center staff concerning the presence of fire extinguishers in the boat ($p = 0.829$), and enough seats for passengers ($p = 0.364$). However, there is significant difference between community health workers and Health center staff concerning the presence of cellphone for emergency call ($p = 0.002$), the coverage of the boat ($p = 0.040$), as well as the boat licensed to carry passengers ($p = 0.026$). The table 4 and 6 give more details.

Table 4: Conditions of Boats recently used compared to optimal conditions of transport on Lake Kivu

Variable	frequency	percentage
extinguisher present on the boat		
yes	30	8.67%
No	316	91.33%
total	346	100.00%
enough seats for all passengers		
yes	117	33.72%
No	230	66.28%
total	347	100.00%
Presence of a cell phone for emergency calls		
yes	117	33.91%
No	228	66.09%
total	345	100.00%
boat covered		
yes	124	35.84%
No	222	64.16%
total	346	100.00%
boat licensed for the transport of passengers		
yes	158	45.53%
No	189	54.47%
total	347	100.00%
enough lifejackets for all passengers		
yes	154	44.25%
No	194	55.75%
total	348	100.00%
weighing scale present to take passengers weight		

yes	4	1.15%
No	344	98.85%
total	348	100.00%
passengers weight effectively taken prior to embark in the boat		
yes	2	0.57%
No	350	99.43%
total	352	100.00%

3.1.4. . Trips representing a major risk of drowning

Respondents affirm that in the last 24 months, they have been at risk of drowning in 14.29% of cases, while the in 8.79% of cases some passengers effectively died from drowning.

There is significant difference between community health workers and Health center staff concerning being at risk of drowning ($p = 0.023$), as well as the occurrence of the death among boating companions (0.002). The table 5 and 6 give more details.

Table 5: Trips representing a major risk of drowning made by health workers in the last 24 months

Variable	Frequency	Percentage
being at risk of drowning		
yes	53	14.29%
No	318	85.71%
total	371	100.00%
death by drowning among passengers		
yes	32	8.79%
No	332	91.21%
total	364	100.00%

Table 6. Comparison between community health workers and health centers staff vis a vis the, knowledge of standards of the safety of transport on Lake Kivu, conditions of boats recently used and trips representing a major risk of drowning.

<i>Variable</i>						
Knowledge of laws regulating boats transport on the lake				Chi square	P Value	Conclusion
	yes	no	totals			
CHW	29	343	372	0.44	0.579	No Significant Difference
HC staff	9	138	147			
Being at risk of drowning during the last 24 months				Chi square	P Value	Conclusion
	yes	no	totals			
CHW	29	230	259	<u>5.661</u>	<u>0.023</u>	<u>Significant Difference</u>
HC staff	20	75	95			
Deaths among boating companions				Chi square	P Value	Conclusion
	yes	no	totals			
CHW	15	240	255	<u>11.255</u>	<u>0.002</u>	<u>Significant Difference</u>
HC staff	16	75	91			
Presence of extinguishers in the boat				Chi square	P Value	Conclusion
	yes	no	totals			
CHW	22	216	238	0.221	0.829	No Significant Difference
HC staff	7	85	92			
enough seats for passengers				Chi square	P Value	Conclusion
	yes	no	totals			
CHW	85	155	240	0.973	0.364	No Significant Difference
HC staff	27	64	91			
Presence of cellphone for emergency call				Chi square	P Value	Conclusion
	yes	no	totals			
CHW	94	144	238	10.118	0.002	<u>Significant Difference</u>
HC staff	19	72	91			

Coverage of the boat				Chi square	P Value	Conclusion
	yes	no	totals			
CHW	93	146	239	4.278	0.040	<u>Significant Difference</u>
HC staff	24	66	90			
Boat licensed to carry passengers				Chi square	P Value	Conclusion
	yes	no	totals			
CHW	119	121	240	5.189	0.026	<u>Significant Difference</u>
HC staff	32	58	90			
Enough life jackets for all passengers				Chi square	P Value	Conclusion
	yes	no	totals			
CHW	112	128	240	2.545	0.138	No Significant Difference
HC staff	34	58	92			
Totals						

3.3. Qualitative approach.

Opinion and perception of respondents about safe boating

Focused Group discussions (FGDs) were conducted to find out the opinion, perception and attitude of primary health workers about safe boating

Profile of FGD participants

22 participants participated in focused group discussions as part of this study. Respondents' age was comprised between 22 and 50 years

All of them were highly interested to give their opinions about boating issues on Lake Kivu

At large, their opinion and perception about safe boating were based on socio economic factors.

1. *Social economic factors*

Respondents said that even if there a danger in boating without fulfilling all required security measures, there is no choice. Someone gave this example.

“From KARORA to KIBUYE you have to pay 7000 rwf by motorbike or 1000 rwf by boat. You will just be happy that you can find a boat even if it does not seem safe”

2. Abuse of alcohol and violence

Some respondents also pointed out that sometimes boat captains are under the influence of alcohol. They just mind about having many passengers

3. Motivating factors to abide by safety regulations.

All respondents highlighted the importance of safety measures They said that, there is a great danger when wind blows on the lake, especially when it is overloaded

4. Demotivating factors to abide by safety regulations.

Respondents highlighted that it is hide to abide by these regulations without clear marks given to boats fulfilling these measures.

They suggested that the marine police should be increased in numbers and control means

IV. DISCUSSIONS.

4.1. socio demographic characteristics of respondents

Results from our study show that health care providers at primary level are in general older compared to the average age of the population.

Those aged in below 25 represent only 6.84% while in the general population about 54% are aged 19 years or younger.

The second very important finding is that primary health care providers who attended secondary or professional schools represent 42% compared to the average net attendance rate which is 14%.

These 2 parameters (age and education) make them good opinions leaders in their community. Therefore, their role in educating the community about safety measures is crucial.

4.2. Knowledge of standards of the safety of transport on Lake Kivu

In this study, we found that only less than 10% of community health workers and health center staff are aware about regulations about safe boating.

Knowing safety boating laws can lead to the decline of drowning cases.

According to a report released by the Canadian Red Cross, drowning have been decreasing since 1992 due to community education: “The steady decline in drowning is a positive trend that we believe is directly related to water safety instruction, education about proper boating techniques

and increased vigilance by consumers to take precautions," said **John Mulvihill, Deputy Secretary General - Operations, Canadian Red Cross.**

Drowning statistics have been on the decline since Canadian Red Cross began its water safety program more than 50 years ago. ^[21]

Our results show that the current knowledge of primary health care providers Vis a Vis standards of the safety of transport on Lake Kivu is not satisfactory at all. Therefore, the education of primary healthcare providers about safe boating is certainly necessary, and could probably reduce the risk of drowning in Lake Kivu.

4.3 Conditions of boats recently used compared to optimal conditions of transport on Lake Kivu

Our results show that optimal conditions of transport were also substandard at an alarming level.

In effect, the noncompliance with optimal conditions varies from 54.4% for boat license for transportation of passengers to 99.43% for taking passengers weight. Furthermore, in more than 55% of cases life jackets were not systematically put by all passengers. This situation is extremely dangerous.

The annual meeting of the UK's Casualty Review Panel has revealed that: "there were 95 maritime deaths in the last five years which might have been prevented if those involved had been wearing a lifejacket or buoyancy aid."

"The panel looked at fatal maritime incidents for 2011 and, where there was sufficient information, assessed whether it was probable, possible or unlikely that the person involved could have been saved had they been wearing a lifejacket or buoyancy aid.

In 2011, the UK's Casualty Review Panel judged that, of the incidents that they considered, it would have been appropriate for 18 people to have worn some form of buoyancy. Of these, 13 would probably or could possibly have been saved if they had a lifejacket or buoyancy aid.

The UK's Casualty Review Panel considered 120 fatalities and in 95 of these cases a life could probably, or might possibly have been saved if the person involved had been wearing a lifejacket or buoyancy aid."^[22]

Another important advice about safety states that: "having the right equipment on board can save your life. If something goes wrong on the water, you'll be much better prepared to deal with it if you have the right equipment on board, if it's in good working order, and if everyone can find it and use it. Remember, the best protection you can give yourself on the water is to wear your **lifejacket!**"^[23]

The fact that boats used by primary health care providers did not meet to optimal conditions of transport on Lake Kivu can be the source of many drowning and eventually deaths among passengers.

It is therefore necessary, not only to educate all persons involved in boating on these minimum standards, but also to put in place mechanisms for the control and punishment of those who do not comply with them.

4.4 **Risk of drowning and Deaths during boating**

In this study, for almost 10% of respondents, there were some deaths from drowning among passengers for some of the trips they had on Lake Kivu in the last 24 months.

This shows that these trips were not totally safe. There are many examples of drowning in Lake Kivu in recent years. For example,

Up to 32 passengers miraculously survived a boat accident on Lake Kivu, in December 2011, which was blamed on overcapacity and bad weather. The ill-fated engine boat was headed for Mpembe Island, carrying passengers from a weekly market in Mubuga Sector. ^[24]

In comparison with the neighboring countries, we find that:

Drowning was demonstrated in 1997 community study to be the leading cause of injury deaths in central Uganda contributing 27% of injury deaths. Activities implicated as causes of drowning include boat transportation and commercial fishing. From Jan- July 2010, a total of 98 persons were reported in the 4 newspapers. All newspapers carried some information on drowning events involving at least 20 people at ago. Of the 98 cases, a total of 61(62.2%) drowning deaths were confirmed while a total of 21(21.4%) were near drowning cases. There was inconclusive information regarding the survival and or rescue of the remaining 16(16.3%) persons. From a total of 2834 trauma registry cases in the same period of 2010, only 3(0.1%) cases were recorded. All these were near drowning cases.

There was inconclusive information regarding the survival and or rescue of the remaining 16(16.3%) persons.

This problem is not limited to central Uganda as there are large lakes on the Ugandan border and Lake Victoria is also part of the geography of Eastern Uganda. There is no systematic process to record and track drowning related incidents and deaths in Uganda. Hospital based trauma registries greatly underestimate the burden of drowning. The lack of information could be attributed to a lack of synthesized research and information regarding the burden of drowning. ^[25]

Our findings have also shown that the weight was not systematically taken, according to more than 90% of respondents.

It also shows that the number of seats were fewer than the number of passengers.

The 2 combined parameters lead to overloading boats.

According to the Australian safety advices: « having an understanding of boat capacity is vital to safe and effective vessel operation. Overloaded boats have a greater risk of being swamped or capsizing. Swamping refers to a boat being filled with water and a capsized vessel is one that is turned on its side or has been flipped over. Boat loading has a major influence on vessel handling and performance. Overloaded boats turn poorly and burn excessive fuel. » ^[26]

This discussion has shown how dangerous were trips on Lake Kivu.

This is an urgent need to train primary healthcare providers about the danger of overlooking safety boating measures.

A regular inventory of all drowning and fatalities related to them would show more about the magnitude of the phenomenon in comparison with measures taken.

Limitations of the Study:

This study was related to the 24 last months.

There is a recall bias inherent to this kind of study.

We wish we could also use RURA guidelines to observe directly how boats comply with them but financial means needed to conduct such kind of study were not available at the period when this study has been conducted. We hope that an additional study assessing directly the behavior of sailors in comparison with the RURA Guidelines is welcome.

V. CONCLUSION AND RECOMMENDATIONS

5.1. CONCLUSION

The study reported low rates of knowledge about safety boating measures among primary health care providers. This resulted in embarking in boats not fulfilling safety standard measures. In some cases, the risk of drowning was real with eventually some deaths among passengers.

Systematic community based Surveys are needed to quantify the burden of drowning and act as a baseline research for drowning interventional research in RWANDA.

A study to assess the magnitude of morbidity and mortality related to drowning in Lake Kivu and others RWANDA lakes is highly needed.

A study to assess the magnitude of morbidity and mortality related to drowning in Lake Kivu and other Rwanda lakes is highly needed

5.2. Recommendations

An education program needs to be put in place targeting primary health care providers and the general population regarding drowning prevention when boating or swimming. This program needs to be implemented by the **Ministry of Health** and the **Ministry in charge of transportation**

The Ministry in charge of transportation needs also to train boats owners on safe boating.

To Karongi District:

1. Primary health care providers need to be empowered in order to be able to train their communities' members in this area. There is an urgent need to carry out training sessions and sensitization campaigns stressing the importance of abiding by safety regulations and laws
2. Prevention of drowning need to be put as a priority in the public health package of IEC sessions for CHWs in Karongi District and other Districts with the same profile

To the Rwanda National Police :

Sensitization campaigns similar to those carried out to prevent road traffic accidents are also needed in order to prevent efficiently drowning.

Control mechanisms in the domain of safe boating need to be improved in terms of number of police staff controlling the traffic on lake Kivu and in terms of equipment of detection of boats not fulfilling safe boating measures.

REFERENCES

Environmental Health and Safety Florida Atlantic University,

1. Diving And Boating Safety Manual, Web: www.fau.edu/ehs Revised: April, Revised: April, 2010
2. International labor organization, International standard classification of occupations, 2008 revision, GENEVA, ILO
3. (<http://medical-dictionary.com/drwowning>) Accessed on 9th June 2013
4. <http://moh.gov.rw/english/wp-content/uploads/2012/05/SERVICE-PACKAGE-FOR-HEALTH-FACILITIES-AT-DIFFERENT-LEVELS-OF-SERVICE-DELIVERY-last-version-pdf>(page 2,9), accessed on 9th June 2013
5. <http://.britannica.com/EBchecked/topic/319745/Lake-Kivu>
6. <http://www.who.int/mediacentre/factsheets/fs347/fr/index.html>
Accessed on 5/7/2011
7. http://en.wikipedia.org/wiki/List_of_lakes_in_Rwanda
Accessed on 8th July 2013
8. Republic of Rwanda, National Institute of statistics, EICV3 DISTRICT PROFILE, WEST –KARONGI. WEBSITE : www.statistics.gov.rw, pages 11, 14,15,24,24
9. Kagina, Daniel ,Republic of Rwanda Capacity Building needs assessment(CBNA) Karongi District,Final report , March 2008

10. http://www.who.int/water_sanitation_health/diseases/drowning/fr/index.html
Accessed on 5/7/2011
11. Arthur Getis, Judith Getis, Jerom D. Fellman, Introduction to Geography (12th Edition), 2009, Library of Congress cataloging in Publication data. P.265
12. http://pediatrics.aappublications.org/content/104/Supplement_6/1217.full
CONSULTED ON 9TH June 2013
13. <http://ir-library.ku.ac.ke/ir/handle/123456789/2336?show=full>
Accessed On 9th June 2013
14. http://7.6.78ae.static.theplanet.com/~clookco/bonny/index.php?option=com_easydiscuss&view=post&id=39&Itemid=69
Haron on Tuesday, November 27 2012, 05:05 PM
Accessed on 9th June 2013
15. <http://in2eastafrika.net/boat-capsizes-on-lake-victoria-60-feared-dead/>
Accessed on 9th June 2013
16. <http://www.lusakatimes.com/2012/09/26/3-die-12-missing-ferry-overloaded-5-times-capacity-capsize-lake-tanganyika/> Accessed on 9th June 2013
17. <http://www.aljazeera.com/news/africa/2011/09/201191072355624359.html>
Accessed on 9th June 2013
18. <http://in2eastafrika.net/red-sea-boat-sinking-leaves-197-people-dead/> Accessed On 8th July 2013
19. <http://www.worldlifeexpectancy.com/country-health-profile/rwanda> Accessed On 8th July 2013
20. <http://www.redcross.ca/article.asp?id=739&tid=001/> Accessed On 9th June 2013)
21. <http://www.fishnewseu.com/latest-news/uk/8176-lack-of-lifejackets-leads-to-95-deaths.html>
ACCESSED ON 9TH June 2013
Lack of lifejackets leads to 95 deaths
Created on Thursday, 10 May 2012 09:29

22. <http://www.tc.gc.ca/eng/marinesafety/tp-tp511-equipment-1140.htm>

Accessed on 9th June 2013

23. (<Http://Www.Newtimes.Co.Rw/News/Index.Php?I=14844&A=48257> ACCESSED On 9th June 2013)

24. *Boniface Mutatina, Mable T Nakitto, Bonnie Wandera, Ronald R Lett Presenter: Boniface Mutatina , Drowning in the Great Lakes of Uganda: A neglected problem / (Injury Control Center-Uganda)* <http://www.ipifa.net/downloads/presentations/Boniface%20Mutatina%20-%20Drowning.pdf>) Accessed On 9th June 2013

25. <http://www.msq.qld.gov.au/Safety/Capacity-labels.aspx> Accessed On 9th June 2013

APPENDICES

APPENDICE 3 : Collection data Sheet Questionnaire

Partie 1 : INDIVIDUAL INTERVIEW:

001	Identification number of the questionnaire	/-----//-----/-----/-----/-----/
002	village	
003	Cell	
004	Health center	
005	Sector	
006	Date of interview	
007	Coder results:: Complete Respondent not available refusal partially completed other	1 2 3 4 5
008	Interviewer : code : /..... /...../	Noms
Supervisor-----		signature : -----date :

SECTION 1 : sociodemographic characteristics:

0101	What is your age?	Age in years : /-----/-----/ unknown : 99
0102	Sex	Male : 1 Female : 2
0103	Have you ever been to school ?	Yes : 1 No : 2
0104	What is your level of education? (choose the highest you have ever attended)	Primary: 1 Secondary: 2 university: 3 Other (specify): 4 Masters or PHD : 5
0105	What is your occupation ?	Community health worker: 1 staff at the health center: 2
0106	For how long have you been in that occupation ?
0107	What is your marital status?	Married: 1

		Single: 2 Divorced: 3 Widow (er): 4
0108	How many minutes do you need to get to the lake from your home?minutes
0109	How long does it take from your home up to the road where you can find a public transportation car?	Less than 15 minutes: 1 Between 16 and 30 minutes: 2 Between 31 minutes and 1 hour: 3 More than an hour: 4
0110	Is your area crossed by a paved road?	Yes: 1 No: 2

Section 2 : laws governing the transportation of persons and property on the lake.

0201	Do you know the laws governing the transportation of people and goods across the lake. ?	Yes: 1 No: 2
0202	Have you ever been trained about laws governing the transportation of people and goods across the lake. ?	Yes: 1 No: 2
0203	Do you have a copy of these laws ?	Yes: 1 No: 2
0204	Can you show them ?	Yes: 1 No: 2

Section 3 : trips by lake

0301	Did you travel through the lake during the last 24 months ?	Yes: 1 No: 2
0302	How many times did you travel through the lake during the last 24 months?
0303	Have you been at risk of drowning during the last 24 months?	Yes: 1 No: 2
0304	Was there any case of death among your companions on trip?	Yes: 1 No: 2
0305	Did all boats / canoes used during the last 24 months have a fire extinguisher?	Yes: 1 No: 2
0306	Did all boats / canoes used during the last 24 months have enough seats for all passengers?	Yes: 1 No: 2
0307	Did each driver of the boat / canoe used during the last 24 months have a cell phone?	Yes: 1 No: 2
0308	Was each of the boat/canoe used during the last 24 months covered?	Yes: 1 No: 2
0309	Did you know if each boat used during the last 24 months was licensed to carry people?	Yes: 1 No: 2
0310	Did you know if each boat used during the last 24 months was allowed	Yes: 1

	to carry luggage?	No: 2
0311	Were you wearing a vest that protects you against drowning at each trip during the last 24 months?	Yes: 1 No: 2
0312	Was there a weighing scale in each boat / canoe used during the last 24 months?	Yes: 1 No: 2
0315	were you every time weighed before being transported by each boat / canoe used during the last 24 months?	Yes: 1 No: 2

ANNEX 4 : QUESTIONNAIRE IN KINYARWANDA

**UBUSHAKASHATSI KU BWIKOREZI BUKORERWA KU KIYAGA CYA KIVU
UBU BUSHAKASHATSI BUGAMBIRIYE KWIRINDA IMPANUKA ZO KUROHAMA.**

**IBISUBIZO BYA UMUJYANAMA W'UBUZIMA CG UMUKOZI
W'IKIGONDERABUZIMA**

IGICE 1 : IBIBAZO BURI MUNTU YISUBIRIZA UBWE:

001	NUMERO D'IDENTIFICATION DU QUESTIONNAIRE	/-----//-----/-----/-----/----- ----/
002	UMUDUGUDU	
003	AKAGARI	
004	IKIGO NDERABUZIMA	
005	UMURENGE	
006	ITARIKI	/-----//-----/-----/
007	CODE DES RESULTATS : COMPLET REONDANT NON DISPONIBLE REFUS PARTIELLEMENT COMPLETE AUTRE	1 2 3 4 5
008	INTERVIEWER : CODE : /...../...../	NOMS
SUPERVISEUR-----		SIGNATURE : ----- DATE : /---//--/---/

IGIKA 1 : IBIRANGA USUBIZA :

0101	IMYAKA Y'UBUKURU ?	IMYAKA : /-----/-----/ SINYIZI : 99
0102	IGITSINA	GABO : 1 GORE : 2

0103	WAGEZE MU ISHURI ?	YEGO : 1 OYA : 1
0104	ESE AYA MASHURI (UHITEMO HAMWE GUSA AYO HEJURU WAGARUKIYEMO)	ABANZA : 1 AYISUMBUYE/IMYUGA : 2 KAMINUZA / ISHURI RIKURU : 3 MAIRTISE CG DOGITORA : 4
0105	UMURIMO :	UMUJYANAMAWAUBUZIMA : 1 UMUKOZIW'IKIGONDERABUZIMA : 2
0106	HASHIZE IGIHE KINGANA GITE UKORA UWOMURIMO ?
0107	IRANGAMIMERERE ?	UFITE UMUGORE / UMUGABO: 1 INGARAGU : 2 MWARATANDUKANYE/CG KWAHUKANA : 3 WARAPFAKAYE : 4
0108	ESE KUVA AHO UTUYE KUGERA KUKIYAGA CYA KIVU BIGUTWARA IMINOTA INGAHE ?	IMINOTA.....
0109	ESE KUVA AHO UTUYE KUGERA AHO WATEGERA IMODOKA BIGUTWARA IMINOTA INGAHE?	IMINOTA.....
0110	ESE UMURENGE UTUYEMO UCAMO UMUHANDA WA KABURIMBO/?	YEGO : 1 OYA : 1

IGIKA 2 : AMATEGEKO AGENGA UBWIKOREZI .

<u>020</u> <u>1</u>	ESEWABAUZIAMATEGEKOAGENGAUBWIKOREZIBWAABNTU N'IBINTUKUKIYAGACYA KIVU ?	YEG O : 1 OYA : 1
<u>020</u> <u>2</u>	ESEWABAWARUGEZEUHUGURWAKUAMATEGEKOAGENGAUBWIKOR EZIBWAABNTU N'IBINTUKUKIYAGACYA KIVU ?	YEG O : 1 OYA : 1
<u>020</u> <u>3</u>	ESEWABAUFITEAYOMATEGEKO	YEGO : 1 OYA : 1
<u>020</u> <u>4</u>	WAYATWEREKA ?	YEGO : 1 OYA : 1

IGIKA 3 : INGENDO ZO MU BWATO

<u>03</u> <u>01</u>	ESE WABA WARIGEZE UGENDERA MU BWATO MU MEZI 24 ASHIZE ? NIBA ATARIBYO ,WAHITAUIYAKUGIKACYA 4)	YEGO : 1 OYA : 2
------------------------	---	------------------------

03 02	NIBAARIYEGO, WABAWARAGIYE MU BWATOKANGAHE MU MEZI 24 ASHIZE ?
03 03	ESE WABA WARAROKOTSE UBWATO BUGIYE KUOHAMA MU MEZI 24 ASHIZE ?	YEGO : 1 OYA : 2
03 04	ESE HABA HARI ABAHATAKARIJE UBUZIMA?	YEGO : 1 OYA : 2
03 05	ESE UBWATO WAGIYE UGENDERAMO BWOSE BWABAGA BUFITE KIZIMYA MOTO ?	YEGO : 1 OYA : 2
03 06	ESE UBWATO WAGIYE UGENDERAMO BWOSE BWABAGA BUFITE INTEBE ZIHAGIJE KUBAGENZI BOSE ?	YEGO : 1 OYA : 2
03 07	ESE UBWATO WAGIYE UGENDERAMO BWOSE BWABAGA BUFITE TELEFONI IGENDANWA IKORESHA N'ABASARE (ABABUYOBOYE ?)	YEGO : 1 OYA : 2
03 08	ESE UBWATO BWABAGA BUTWIKIRIYE ?	YEGO : 1 OYA : 2
03 09	ESE WABAGA UZI NIBA UBWATO BWARI BUGENEWE GUTWARA ABANTU ?	YEGO : 1 OYA : 2
03 10	ESE WABAGA UZI NIBA UBWATO BWARI BUGENEWE GUTWARA IBINTU ??	YEGO : 1 OYA : 2
03 11	ESE ABAGENZI BOSE BABAGA BAFITE JAKETI ITUMA BATAROHAMA ?	YEGO : 1 OYA : 2
03 12	ESE UBWATO WAGIYE UGENDERAMO BWOSE BWABAGA BUFITE UMUNZANI WO GUPIMA IBIROBY'ABANTU N'IBINTU ?	YEGO : 1 OYA : 1
03 15	ESE BAGUFATAGA IBIRO MBERE YO KUJYA MU BWATO?	YEGO : 1 OYA : 2