DECLARATION

I solemnly declare that this research project report is my original work and has not been presented for a degree or any diploma award in any other university.

Signature…… Date ……..……

AMBOKA A. T. MESHACK

REG NO**: L50/61864/2013**

The undersigned certify that they have guided, supervised and therefore recommend the project report "Factors affecting disaster preparedness at Moi International Airport, Mombasa County, Kenya."

Signature …….. Date ……..

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UNIVERSITY OF NAIROBI

DEDICATION

This research work is dedicated to my father Saverio and mother Risper who have given me the drive and discipline to tackle any task that however large it is, it can be accomplished if it is done one step at a time. They remain my source of inspiration for they taught me the love of reading and respect for education.

ACKNOWLEDGEMENT

I wish to express my sincere gratitude to all those responsible for my success at writing this project report. For all that has been, I thank my spirit that is always guiding me to the success of all my endeavors.

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LOVE AND PEACE BE WITH YOU ALL.

TABLE OF CONTENTS

CONTENTS

DECLARATION ii

DEDICATION iii

ACKNOWLEDGEMENT iv

LIST OF FIGURES ix

LIST OF TABLES x

LIST OF ABBREVIATIONS AND ACRONYMS xi

ABSTRACT xii

CHAPTER ONE 1

INTRODUCTION 1

1.1 Background of the study 1

1.2 Statement of the problem 2

1.3 Purpose of the study 3

1.4 Objectives of the study 3

1.5 Research questions 3

1.6 Research hypothesis 4

1.7 Significance of the study 4

1.8 Basic assumptions of the research 5

1.9 Limitations of the study 5

1.10 Delimitations of the study 6

1.11 Definitions of significant terms 6

1.12 Organization of the study 8

CHAPTER TWO 9

LITERATURE REVIEW 9

2.1 Introduction....9
2.2 Air disaster preparedness and recovery....9
2.3 Airport safety management....10
2.4 Phases of a disaster....13
2.5 Elements and Dimensions of Disaster Preparedness....15
2.5.1 Hazard Knowledge....16
2.5.2 Formal and Informal Response Agreements....17
2.5.3 Supportive Resources....17
2.5.4 Life safety and property protection....18
2.5.5 Emergency coping and restoration of key functions....20
2.5.6 Initiation of recovery activities....20
2.6 Communication and Information Management....22
2.7 Availability of Facilities and equipment....23
2.7.1 Emergency Operations Centers (facilities)....24
2.7.2 Equipment Acquisition and Maintenance....24
2.8 Management, Direction, and Coordination (MDC)....25
2.9 Public education, staff training and rehearsals....26
2.10 Conceptual framework....27
CHAPTER THREE....29
RESEARCH METHODOLOGY....29
3.1 Introduction....29
3.2 Research design....29
3.3 Target population....29
3.4 Sample size and sampling technique....30
3.4.1 Sample size....30
3.4.2 Sampling procedures....30

3.5 Data collection instruments....31
3.5.1 Pilot testing of the instruments....31
3.5.2 Validity of the instrument....31
3.5.3 Reliability of the instrument....31
3.6 Data Collection procedures....32
3.7 Data analysis and presentations....32
3.8 Ethical considerations....33
3.9 Operation definition of the variables....33
CHAPTER FOUR....35
DATA ANALYSIS, PRESENTATION AND INTERPRETATION....35
4.1 Introduction....35
4.2 General characteristics of the respondents....35
4.3 Objective based information and findings....38
4.3.1 Communication and information management on disaster preparedness at MIA....38
4.3.2 Availability of facilities and equipment at MIA.....40
4.3.3 Management, direction and coordination at MIA....43
4.3.3.1 Does your organization have any employees who are specifically tasked with playing a leadership role in the event of a crisis?....43
4.3.4 Public education, staff training and rehearsals at MIA....44
CHAPTER FIVE....47
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS....47
5.1 INTRODUCTION....47
5.2 SUMMARY OF FINDINGS....47
5.2.1 Demographic information....47
5.2.2 Objective based Information....48
5.2.2.1 Communication, information management and disaster management at MIA....48

5.2.2.2 Availability of facilities and Equipment and disaster management at MIA 48
5.2.2.3 Management, direction and Coordination and disaster management at MIA 49
5.2.2.4 Public education, Staff training and rehearsals on disaster management 50
5.3 Conclusions 50
5.4 RECOMMENDATIONS 52
5.4.1 Training, security & safety and policy for disaster preparedness and mitigation 52
5.4.2 Suggestion for further study 53
REFERENCES 54
APPENDIX I: LETTER OF TRANSMITTAL 58
APPENDIX II: QUESTIONNAIRE 59
MANAGEMENT, DIRECTION AND COORDINATION AT MIA 62
APPENDIX IV: INTERVIEW GUIDE FOR KEY INFORMANTS 64

LIST OF FIGURES

Page

Figure 1: The '5M' Model (Ayres, 2009)….....12

Figure 2: Disaster management cycle (*Adopted from; Garatwa & Bollin, 2002*).....14

Figure 3: Conceptual framework….....28

LIST OF TABLES

Table 3.1: operational definition of the variables…….34

Table 4.1: Respondents per department……...35

Table 4.2: Respondents by age…….36

Table 4.3: Respondents by gender……...36

Table 4.4: Respondents by level of Education…….37

Table 4.5: Respondent and nature of Employment……..38

Table 4.6: Existence of emergency communication plan…….39

Table 4.7: Emergency communication plan…….39

Table 4.8: telephone exchange office awareness…….40

Table 4.9: Rating on disaster preparedness……..….41

Table 4.10: Level of equipment for disaster management……...…42

Table 4.11: Level of disaster preparedness……..42

Table 4.12: Existence of disaster response Centre……...…43

Table 4.13: employees with special roles during disaster……44

Table 4.14: Experience with a disaster at the airport……..….45

Table 4.15: Staff training on disaster management……..45

Table 4.16: Type of training conducted……...…46

Table 4.17: Existence of community outreach program on disaster management……...46

LIST OF ABBREVIATIONS AND ACRONYMS

AEP	Airport Emergency Plan
AIP	Aeronautical Information Publication
CAR	Capability Assessment for Readiness
DHS	Department of Homeland Security
EMAP	Emergency Management Accreditation Program
EOCs	Emergency Operation Centre
FEMA	Federal Emergency Management Agency
ICAO	International Civil Aviation Organization
JKIA	Jomo Kenyatta International Airport
KAA	Kenya Airport Authority
KCAA	Kenya Civil Aviation Authority
DaLA	Damage and Loss Assessment
MDC	Management, Direction, and Coordination
MDG	Millennium Development Goals
MIA	Moi International Airport
NEMA	National Emergency Management Association
NFPA	National Fire Protection Agency
NIMS	National Incident Management System
NRC	National Research Council
USACE	United States Centre for Emergency

ABSTRACT

The main aim of the research was to find out factors affecting disaster preparedness at Moi international airport, Mombasa County, Kenya. The specific objectives of the study were: To determine how communication and information management influence disaster preparedness at Moi international airport; To establish how availability of facilities and equipment influence disaster preparedness at Moi international airport; To determine how management, direction and coordination (MDC) influence the level of disaster preparedness at Moi international airport; and To assess how public education, staff training and rehearsals influence disaster preparedness at Moi international airport.The study adopted a correlational and regression design combining both quantitative and qualitative approaches so as to provide solutions to the research questions and to test and come up with the outcomes of the hypothesis. The sampling method was used since the researcher was interested in interviewing the staff with the required information. Questionnaires, Focus Group Discussions and Key Informants were interviewed to provide information needed for the study. The target population was the 277 Moi International Airport staff that is involved in disaster management from Air traffic control department; fire and rescue department; safety department; security department; the airline operators and the airport management. According to Yamane formulae (1967) the calculated sample size was 73 people, but due to the homogeneity of the target population, resource and time constraints, the researcher selected a sample size of 65 which is 89% of the calculated sample size.It is expected that findings from this research will be used to put measures in place to improve disaster preparedness in Kenyan airports and other key places of operation.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The air transport industry continues to play an increasingly important role as a facilitator of overall economic activity and a critical element in certain economic sectors. Notwithstanding the importance of passengers carried, air transport has become a necessity to ensure the efficient and cost effective movement of goods and services. Even though flying is one of the safest forms of transportation, headline-grabbing disasters still occur at frequent intervals and Africa has been labeled as one of the most aviation disaster prone regions in the world (Kwiatkowski, 2001).

Airports are very busy and dynamic to handle especially when any disaster strikes. Performing disaster assessment or inventory of resources is the first step in determining your jurisdiction's preparedness to effectively handle debris and other disaster related substances generated after a disaster. The purpose of this assessment is to identify the kind of disaster preparedness strategy needed especially for an airport and diversion programs to consider. It will also show the areas that need to be developed in order to prepare an effective disaster debris response in an airport. (Smith 2004)

Airport disasters global perspective (Global General, 2010): In May 12, 2010, Afriqiyah Airways plane en route to Tripoli, Libya, from Johannesburg, South Africa, crashes into the desert less than a mile from the runway, killing 103 people; In April 10, 2010: The plane of Polish President Lech Kaczynski crashes outside the western Russian city of Smolensk, killing all 96 aboard; In June 30, 2009, Yemenia Airbus 310 en route to the Comoros Islands crashes into the Indian Ocean with 153 people on board; While in June 1, 2009, Air France Airbus A330 runs into thunderstorms and crashes into Atlantic Ocean en route from Rio de Janeiro to Paris, killing 228 people on board; and in February 19, 2003, Iranian Revolutionary Guard military plane crashes into a mountain, 275 dead.

Countries worldwide are regularly touched by a variety of manmade and natural crises including such events as the West African food crisis of 2012; the 2007 Cameroon Kenya airway's aircraft crash in Douala; The 2007 Hurricane Katrina and the 2004 Indian Ocean Tsunami that all lead to loss of lives and destruction of property. It is important for Governments and citizens to know how to effectively manage and respond to these types of events. However, for a variety of reasons many countries are not prepared to respond to unexpected disaster events. This unpreparedness has been an issue across the African continent, especially sub-Saharan Africa, where disaster management systems have either been non-existent or inadequate. (Boya, 2009)

1.2 Statement of the problem

Virtually no airport has sufficient resources to respond to every emergency situation independently. Each airport must depend to some degree on the resources from its surrounding communities. According to Ayres (2009) it is essential to prepare for emergencies that face an airport in order to be able to respond quickly, efficiently and effectively. While every contingency cannot be anticipated and prepared for, a strong emergency preparedness program can assist in limiting the negative impact of these events, including liability and other post-emergency issues.

Lack of disaster preparedness has remained one of Kenya's enduring development challenges for decades. Most of the disaster response initiatives in Kenya tend to be ad hoc, uncoordinated and short term measures, mainly in the form of emergency relief services to the worst affected areas. There is lack of recognition of the interrelationship between disaster preparedness, unsustainable production and consumption patterns (GOK, 2009a).

In January 2012, a mysterious fire burnt down government VIP lounge at Moi international airport, Mombasa and in August 2013, there was fire at Jomo Kenyatta international airport where nobody including the airport staff could tell its source. Property worth hundreds of millions was destroyed as a result of this fire and the government of Kenya and other airport stake holders were left with a huge cost to pay reconstructing the airport. Besides an airport facility related disasters, a major aircraft disaster presents a scene where wreckage, bodies and survivors can be strewn over a wide area and further complicated by hazardous cargo. Adverse effects of such disasters are easily prevented or reduced by just adequately preparing

for the disasters. From security reports, Moi international Airport was under red alert due to terror threats from Al-Shabaab and Al-Qaeda given its proximity to the war torn Somalia. It was by this background that the researcher felt it necessary to do a research in this area to come up with factors affecting disaster preparedness in an airport.

1.3 Purpose of the study

The main purpose of the study was to establish the Factors affecting disaster preparedness at Moi International Airport, Mombasa County, Kenya.

1.4 Objectives of the study

1. To determine how communication and information management affects disaster preparedness at Moi international airport.
2. To establish how availability of facilities and equipment affect disaster preparedness at Moi international airport.
3. To determine how management, direction and coordination (MDC) affect the level of disaster preparedness at Moi international airport.
4. To assess how public education, staff training and rehearsals affects disaster preparedness at Moi international airport.

1.5 Research questions

The study was guided by the following research questions:

1. How does communication and information management affect disaster preparedness at Moi international airport?
2. How does availability of facilities and equipment affect disaster preparedness at Moi international airport?
3. How do management, direction and coordination (MDC) affect the level of disaster preparedness at Moi international airport?
4. How do public education, staff training and rehearsals affect disaster preparedness at Moi international airport?

1.6 Research hypothesis

H1 There is a relationship between communication, information management and disaster preparedness at Moi international airport

H2 There is a relationship between facilities, equipment and disaster preparedness at Moi international airport.

H3 There is a relationship between management, direction and coordination and disaster preparedness at Moi international airport.

H4 There is a relationship between public education, staff training and rehearsals and disaster preparedness at Moi international airport.

1.7 Significance of the study

The study of disaster preparedness at Moi international airport (MIA) is of great importance not only to those working in the field of disaster management, but also to the people served by the airport. This study determines the strengths and weaknesses of the current disaster preparedness capabilities of MIA and explores the opportunities for improving the effectiveness of organizations that work in areas that are prone to disasters.

To the Government and Policy makers, the study will give insight on the Government and its policy role especially in the Ministry of transport and infrastructures and that of special programs on the impact of the factors affecting disaster preparedness in different sectors of the economy. Development agencies and other stakeholders will be informed on how to create awareness on disaster preparedness and its significances especially in the Kenyan airports.

In recognition of the importance of disaster preparedness and management it is equally important to get prepared on disaster management. The study is important in the sense that findings from this research will be used to put policies in place to enable Kenya and other developing countries to be prepared in terms of disaster management. Knowledge got from the research will enable other researchers in the same area of interest to bridge gaps that still emerge in the areas by further doing the recommended researches.

To individuals, the study is expected to give insight in to the importance of management skills in regard with disaster and other misfortunes affecting Kenyans socially and

economically. To academicians, the study will contribute to the existing body of knowledge on management and preparedness for any disaster. It will also stimulate prospective researchers to replicate the study in other sectors of the economy and in other regions of the country.

1.8 Basic assumptions of the research

The researcher assumed that the sample size of 65 respondents will give the representative information as required by the researcher. The researcher assumed that all the information from the respondents will be true. The researcher assumed that all the respondents were conversant with matters related to disaster preparedness and management. The researcher assumed that questionnaires and the interview guides will capture adequately all the research objectives. The researcher assumed that the information from Moi international airport will give the actual picture on the ground that will be representative to other airports in Kenya where the research has not been done.

1.9 Limitations of the study

Though the methodology conceived earlier at the proposal stage remained unchanged, some adjustments related to context and to a small extent the content were done. Content adjustments included the more deliberate inclination towards qualitative data than quantitative without necessarily diluting role of the quantitative data. Context adjustments on the other hand had a lot to do with the ground dynamics including: accessibility of the study areas being a highly confidential area, airport operation schedule, population representativeness by the sample as well as the time and financial resource constrains.

The study areas were the airport area with the staff being the respondents to various questionnaire questions. This was due to the short period within which the study was done and logistical difficulties that possibly resulted from getting the required information from the airport staff. However, this particular limitation also presented an opportunity for the researchers to meet people of diverse knowledge in the airport operation systems. The scope of the study limiting to airport disaster preparedness also served to leave out a number of other possible beneficiaries such as railway stations, roads and other public gathering places whom some studies put at some unknown percentage of the disaster preparedness. However,

the survey was done with only 65 respondents which might not be adequate for the required information.

1.10 Delimitations of the study

The researcher being a staff at Moi international airport had vast knowledge of the airport operations and hence, an upper hand in terms of collecting the required information in the research. The researcher interviewed the airport staff, management team and other various experts who gave both professional information and the existing information on the situation as required by the researcher. The sample size of 65 was calculated as per the prescriptions of Yaro Yamane (1967) that recommends such sample size as appropriate in terms of the required information. Data analysis was for both qualitative non- restricted and open ended together with qualitative data which definitely portrayed the situation as it was on the ground. All the respondents interviewed in the research were professionally qualified staff and their understanding on English language used on the research was plus to the researcher. Data collection was done just in the airport and no data collected from outside that airport and this greatly saved time for the researcher hence eliminating unnecessary logistical complications.

1.11 Definitions of significant terms

Definitions are from the International Strategy for Disaster Reduction unless otherwise noted;

I. *Community based disaster management (CBDM):*An approach that involves direct participation of the people most likely to be exposed to hazards, in planning decision making, and operational activities at all levels of disaster management responsibility (for the purpose of this study this could mean the staff and other occupants of the Moi International Airport).

II. *Disaster:* A disaster is a serious disruption of the functioning of a society, causing widespread human, material, or environmental losses which exceed the ability of the affected society (or community) to cope using only its own resources. Disasters are often classified according to their speed of onset (slow or sudden), or according to their cause (natural, man-made or complex). The severity of the effects of a disaster may vary according to the degree to which man has created an environment susceptible to damage, that is, an environment in which life and property are at risk.

III. *Disaster risk management:* This is a systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies, and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and nonstructural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards.

IV. *Disaster risk reduction:* The conceptual frameworks of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.

V. *Mitigation:* Structural and Non-structural measures taken to limit the adverse impact of natural and technological hazards. Mitigation embraces measures taken to reduce both the effect of the hazard and the vulnerable conditions to it in order to reduce the scale of a future disaster. In addition to these physical measures, mitigation should also aim at reducing the economic and social vulnerabilities of potential disasters

VI. *Preparedness: Activities and measures taken in advance to ensure effective response* to the impacts of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations. That is to predict and where possible-prevent them, mitigate their impact on vulnerable populations, and respond to and effectively cope with their consequences.

VII. *Risk:* The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions. Beyond expressing possibility of physical harm, it is crucial to recognize that risks are inherent or can be created or exit within social systems. It is conventionally expressed by the equation:

$$RISK = HAZARD \times VULNERABILITY$$

VIII. *Vulnerability:* Vulnerability is the degree to which an individual, household, a community or an area may be adversely affected by a disaster, the conditions determined by physical, social, economic, and environmental factors or processes that increase the susceptibility of a community to the impact of hazards (Mulugeta et.al.

2007). The term vulnerability stems from the fact that certain communities or groups have settled in areas susceptible to losses resulting from the impact of a particular phenomenon or hazard.

1.12 Organization of the study

The study begun by reviewing the approaches used in implementing the disaster preparedness policy and dwelt on the ongoing challenges and successes. The literature review focuses on the background of the disaster preparedness and how it has changed to the current, including what factors has influenced this preparedness stand, political pressure and need to conform to the UN to achieve the MDG. Selected case studies will highlight the gaps in the disaster preparedness policy especially in the airports and how the airport authority are working together with various internal control units to ensure that there is adequate disaster preparedness in the airports. The interviews with the airport staff, management teams, engineers and other experts and stakeholders in the aviation field.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section summarizes the literature that is already in existence regarding disaster preparedness and management. It presents an overview of previous work on related topics that provide the necessary background for the purpose of this research.

2.2 Air disaster preparedness and recovery

Once a disaster has occurred, a set of activities have to be put in motion, aimed at satisfying the immediate needs of the victims, their rehabilitation and the reconstruction of any infrastructure that may have been damaged or destroyed. According to Kapoor (2009), the recovery measures, both short and long term, will include returning vital life-support systems to minimum operating standards; public information and health and safety education; economic impact studies; and counseling programs. This requires certain procedures, as haphazard response can be sometimes problematic. Policies and objectives should actually guide the recovery, which should have been put in place for some time, tested and proved beyond doubt (FEMA, 2006).

Coordination is an essential ingredient in a disaster preparedness plan. This means arrangements and preparations put in place not only to prevent a disaster, but also to be implemented once a disaster occurs. Such plans must be both horizontal and vertical in terms of duty allocation among all the people designated to be involved, should a disaster happen. The team should be on call 24hours a day so that in case of an emergency there is no delay in the response team (Salvano, 2002).

The necessary resources that add value to the professional training should back this team. Without this preparedness, the response and recovery operation will rapidly disintegrate. For effective response to be achieved, however, a structure for decision-making and coordination of the action plan, and the actual response must be put in place. In terms of disaster relief operations, the range of relief requirements is normally very extensive. Some of the major

requirements include shelter, food, medicine, a communication system, logistics system, social workers and counselors and a multiplicity of others (UN/ISDR, 2008).

Throughout all the activities that are meant to promote disaster preparedness, the ultimate objective should be to have plans in place that are not only agreed upon by stakeholders, but also implementable given the available resources both material and manpower. Over-ambitious plans, especially with inadequate resources, are bound to fail and lower the credibility of the organization in the eyes of the public. Indeed, any disaster preparedness plan must have adequate resources that have been committed and readily available (Salvano, 2002).

For disaster response and recovery plans to be effective and hence successful, it is important for the responders to know what to do and how to do it in case of a disaster, what is described as empowering the community to participate in disaster recovery (ISDR, 2003). For this reason, an essential part of disaster preparedness and recovery plan is the creating awareness among those who may be threatened by disaster such as an air crash at MIA. These could include people residing near the airport.

2.3 Airport safety management

The aviation industry has always quoted safety at the forefront of its priorities. As a general rule it has demonstrated diligence in learning from its mistakes and implementing changes that lead to further improvement. This somewhat reactive approach produced a steady decline in accident rates until the mid-1980s. Since then, the fatal accident rate in air transport operations has remained fairly stable, despite a growth in traffic during the same period. This trend implies little improvement in safety on the operation/accident ratio, and suggests that as traffic grows, the total number of accidents will grow accordingly (Ayres, 2009).

The ICAO, recognizing these facts and that “the public’s perception of aviation safety is largely based on the number of aircraft accidents rather than the accident rate”, issued a resolution to “reduce the numbers of accidents and fatalities irrespective of the volumes of air traffic”. The ICAO further provides guidance on how to achieve this resolution, including the recommendation to “develop a civil aviation safety management framework and recommendations for improving safety” (ICAO, 2004).

In recent years a great deal of effort has been devoted to understanding how accidents happen. It is generally accepted that most accidents result from human error. It would be easy to conclude that these human errors indicate carelessness or lack of skills on the job, but such a statement is not accurate. Accident investigators are finding that human error is only the last link in a chain that leads to an accident. Accidents cannot be prevented by changing people; they can be prevented only when we address the underlying causal factors (Ayres, 2009).

There are two ways of thinking about safety. The traditional way is that safety has been about avoiding costs. In this sense, many aviation organizations have been bankrupted by the cost of a single major accident. This makes a strong case for safety, but the cost of occurrences is only part of the story. Efficiency is the second way of thinking about safety. According to Ayres (2009) safety and efficiency are positively linked. Safety pays off in reduced losses, enhanced productivity and lower insurance costs.

While there are many models available, the model called "5M" (see Figure 1) is simple and recognizes the interrelationships and integration of the equipment, human, environment, and procedures to the objective of the system (ICAO, 2004). The model has five components, namely:

a. ***Mission****:* It is the airport activity or the reason that all the other elements are brought together. *Example:* operation for transporting baggage from parked aircraft to baggage claim area.
b. ***Man****:* This is the human element of a system. If a system requires humans for operation, maintenance or installation, this element must be considered in the system description. *Example*: an airport construction activity is conducted by contract workers and monitored by airport staff. This group of people and the people they interact with during the construction activity comprise the human element of this system.

Mission: centralpurpose or functions

- **Man** - Human element
- **Machine**: equipment
- **Media** - Environment: ambient and operationalenvironment
- **Management**: procedures, policies, and regulations

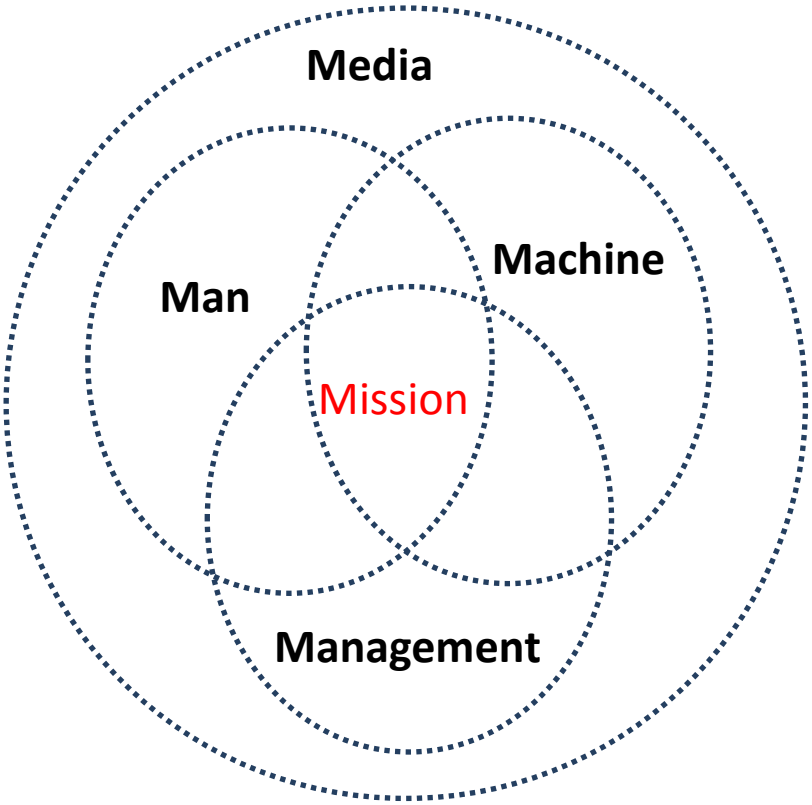

Figure 1: The '5M' Model (adopted from Ayres, 2009)

c. ***Machine:*** This is the equipment element of a system. *Example*: the operation to transport baggage on the ramp may require a baggage tug and baggage carts.

d. ***Media:*** It is the environment in which a system will be operated, maintained and installed. This environment includes operational and ambient conditions. Operational environment means the conditions in which the mission or function is planned and executed. Operational conditions are those involving things such as volume of traffic, communication congestion, workload, and more. Ambient conditions are those involving temperature, humidity, light, precipitation, visibility, and etcetera. *Example:* winter operation conditions.

e. ***Management:*** This element includes the organization, procedures, policy, rules, and regulations involved in operating, maintaining, installing, and decommissioning a system. *Example*: a construction activity will involve an organization comprised of engineers, contractors and inspection personnel, and can involve several procedures and construction specifications: escorting construction equipment on the airside signaling the construction area, specific procedures to mitigate Foreign Object Damage - FOD.

2.4 Phases of a disaster

Disaster management is a cyclical process; the end of one phase is the beginning of another, although one phase of the cycle does not necessarily have to be completed in order for the next to take place. Often several phases are taking place concurrently. Timely decision-making during each phase results in greater preparedness, better warnings, reduced vulnerability and/or the prevention of future disasters. The complete disaster management cycle includes the shaping of public policies and plans that either addresses the causes of disasters or mitigates their effects on people, property and infrastructure (Carrillo, 2010).

Mitigation and preparedness phase: The mitigation and preparedness phases occur as improvements are made in anticipation of an event. By embracing development, a community's ability to militate against and prepare for a disaster is improved. As the event unfolds, disaster managers become involved in the immediate response and long-term recovery phases.

Emergency/Disaster Phase: Disaster strikes. There is major disruption of the local community. Mitigating measures must immediately be taken against the disaster. Emergency response activities are those carried out during the actual emergency or immediately prior to it. This may involve emergency assistance during the disaster, and actions taken in the immediate aftermath during the time when the community is rather disorganized and basic services and infrastructure are not fully functioning. The impact phase of a disaster can vary from the slow, low-threat build-up associated with some types of floods to the violent, dangerous and destructive outcomes associated with tornadoes and explosions. The greater the scope, community destruction and personal losses associated with the disaster, the greater the psychosocial effects (Garatwa & Bollin, 2002).

Response phase: The response or relief phase refers to the time period for humanitarian assistance, when steps are taken to save lives and to provide essential supplies to those most affected. It includes such activities as search, rescue, evacuation, provision of shelters, first aid, emergency medical care and protection, temporary restoration of transportation and communication routes, preliminary repairs to essential public utility services and early actions to register victims and record damage to public and private property. This stage may vary in its duration but, in general, it is relatively brief, depending on the magnitude of the disaster (Garatwa & Bollin, 2002).

Rehabilitation phase: The rehabilitation or transition stage includes activities required to return normality to the affected areas and communities. It includes non-definitive repairs to housing and buildings, and to transport and public utility service infrastructure. Problems related to the emotional and psychological recovery of the inhabitants of the regions affected by the disaster are to be addressed here. Return to work, creation of new jobs, availability of loans and financial resources, and immediate start-up projects related to the consequences of the disaster are among recovery measures that most help the victims and affected communities. Finally, the reconstruction stage includes activities designed to rearrange the affected physical space and environment, and enable the allocation of resources in accordance with the new social priorities arising from the effects of the disaster (Garatwa & Bollin, 2002).

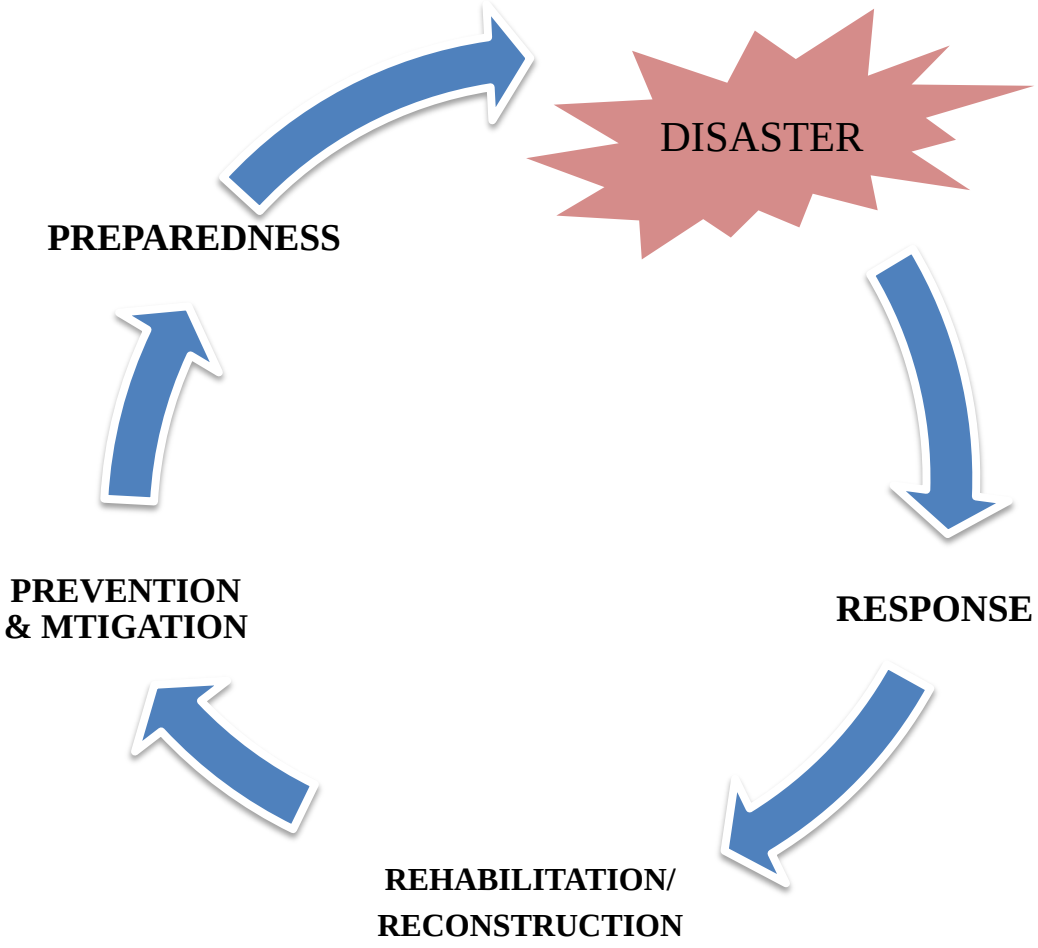

Figure 2: Disaster management cycle (Adopted from; Garatwa & Bollin, 2002)

An aviation accident is the worst nightmare of every pilot or passenger that has ever flown in an aircraft. Although air travel is one of the safest forms of transportation, accidents do happen with dramatic and terrifying results. The causes of these aviation accidents vary greatly depending on specific circumstances and problems that may develop during the flight process. Disaster management in Kenya has not developed to the extent where systems are fine-tuned to effectively and efficiently prevent, control and manage disasters. Mawanda (2003) puts it that locally resources are geared towards recovery and reconstruction, rather than prevention or appropriate response.

In addition, it would seem that air disasters have been left out in research, particularly in Kenya, as most previous studies have focused on other disasters. For example Kiema-Ngunnzi (2002) looked at recovery strategies for the 1998 Nairobi bomb blast victims within the Teachers' Service Commission. In order to prevent, control or even mitigate any disaster or any other problem for that matter, the causes of the problem must be brought to the fore.

While there have been impressive humanitarian relief efforts in times of crisis, particularly related to natural disasters in Africa, Holloway (2003) says that disaster vulnerability and risk have not been taken as an important area of sustainable development planning. In Kenya, more resources have actually been allocated to relief and rehabilitation efforts than prevention. This is a major shortcoming on the part of the government and other stakeholders in the disaster mitigation sector. For example, according to the Kenya Red Cross Society-KRCS (2009), a fire outbreak in Nakumatt downtown supermarket (Nairobi) in January 2009, saw many relief efforts. In actual fact, the city planners should have foreseen the possibility of such a disaster and advised on house plans.

2.5 Elements and Dimensions of Disaster Preparedness

As used in the disaster literature, the concept of preparedness has a variety of dimensions that are in turn supported by a number of activities. *Dimensions* of preparedness consist of the various goals or end-states that preparedness seeks to achieve. *Activities* are concrete actions that need to be taken in order to meet those goals. Sources vary in terms of how dimensions and activities are defined. Recommendations on public education campaigns for households emphasize four dimensions of preparedness; as noted above, FEMA's CAR specifies thirteen areas for targeted preparedness efforts; standards for business and industry focus on twelve

different dimensions, while efforts to create accreditation standards for communities have highlighted fifteen, and the Department of Homeland Security (DHS) has identified 37 "target capabilities" for all hazard preparedness. Despite these differences, common themes appear both in research on preparedness and in guidance documents. In the following section, we will discuss key dimensions of preparedness and their associated activities, with an emphasis on dimensions and activities that cut across different units of analysis. At the most general level, it is possible to identify eight dimensions or desired end-states for preparedness activities: hazard knowledge; management, direction, and co-ordination of emergency operations; formal and informal response agreements; resource acquisition aimed at ensuring that emergency functions can be carried out smoothly; life safety protection; property protection; emergency coping and restoration of key functions; and initiation of recovery activities. Descriptions that follow focus on each of these key dimensions and their associated activities (Gwada, 2010).

2.5.1 Hazard Knowledge

All preparedness activities must be based on knowledge about hazards, the likelihood of different types of disaster events, and likely impacts on the natural and built environment, households, organizations, community institutions and communities. Types of information that provide a focus for preparedness activities include the potential for detrimental impacts of the hazards on health and safety, continuity of operations and government, critical facilities and infrastructure, delivery of services, the environment, economic and financial conditions, and regulatory and contractual obligations. Loss estimation tools such as HAZUS and HAZUS-MH were designed specifically to help communities envision the potential impacts of future disasters and mitigate and prepare for such events. Community-based disaster scenarios also provide a solid basis for preparedness efforts. Community outreach and the development of plans for crisis communications and public information are vital for the continuity of operations in businesses and to ensure public trust within a community. Partnerships between public and private entities that have been established and maintained prior to a disaster event will influence the sharing of resources through mutual aid and enable a capability to deliver emergency public information through previously identified channels. Activities include the identification of publics that will be in need of information and developing communications plans and identifying private resources that can be used in service to the community for response and recovery (Gwada, 2010).

2.5.2 Formal and Informal Response Agreements

This dimension of preparedness consists of activities targeting the development of disaster plans and other agreements. Such plans can be either informal or formal. Households, for example, can plan informally to address challenges such as evacuation, sheltering in place, and reunification of family members who are separated when disasters strike. A family disaster plan consists of elements such as communications between family members, identifying safe locations for shelter, determining evacuation routes and how to reconnect when separated from loved ones. For organizations, multi-organizational response networks, and communities, preparedness activities center on the development and adoption of formal disaster plans, memoranda of understanding, mutual aid agreements, and other agreements that facilitate coordinated response activities. The concept of mutual aid, or the "sharing of personnel, equipment, and facilitate which occurs when local resources are inadequate to meet the needs of the disaster" is applicable across a wide spectrum of groups, organizations, and jurisdictional levels. (Wangwe, 2007)

2.5.3 Supportive Resources

Management activities and preparedness agreements are of little use unless resources are available to support response activities. The goal of resource management is to identify and establish internal and external resources necessary for disaster response and recovery. Identifying resource needs, acquiring resources, and storing and distributing resources are thus key preparedness dimensions. The resource management dimension of preparedness is closely tied to the planning dimension in that plans commonly involve strategies for resource sharing, such as mutual aid agreements. Included in the concept of resources are human, material, and informational sources of support. Skilled, well-trained personnel and staff constitute critical resources. Communications resources are critical for all response activities at all levels of analysis, although communications media can vary from low-tech to very high-tech. Disaster response tasks such as evacuation and other self-protective measures, search and rescue, emergency medical care, fire suppression, debris removal, emergency transportation, security and credentialing, and response coordination have specific resource and logistical requirements that must be taken into account during the planning process. Included in the concept of resources are human, material, and informational sources of support. Skilled, well-trained personnel and staff constitute critical resources. (Wangwe, 2007)

Technologies to assist with important crisis-relevant tasks such as public warning are also critical for effective response. Communications and warning systems are essential to any business operation or community emergency response. They are needed to report emergencies, warn personnel of the danger, keep families and off-duty employees informed about what's happening at a facility or within a department, coordinate response actions, and keep in contact with customers and suppliers. Preparedness for communications and warning include the development of a communications plan, the establishment of a warning system including developing protocols and procedures, regular testing and support, and addressing the interoperability of multiple responding organizations and personnel. (Wangwe, 2007)

The resource dimension also includes efforts designed at mobilizing resources to continue with operations when key resources are destroyed. Businesses and communities must prepare for the possibility that an alternate facility, in addition to the primary facility, will be needed for recovery and resumption of services following a disaster event. Emergency preparedness for a community may include an alternate emergency operations center, efforts to introduce redundancy into key response systems, and procedures to locate, acquire, store, and test back up resources. (Wangwe, 2007)

2.5.4 Life safety and property protection

A disaster is a natural or man-made (or technological) hazard resulting in an event of substantial extent causing significant physical damage or destruction, loss of life, or drastic change to the environment. A disaster can be extensively defined as any tragic event stemming from events such as earthquakes, floods, catastrophic accidents, fires, or explosions. It is a phenomenon that can cause damage to life and property and destroy the economic, social and cultural life of people. In contemporary academia; disasters are seen as the consequence of inappropriately managed risk. These risks are the product of a combination of both hazard/s and vulnerability. (Smith, 2004)

Hazards that strike in areas with low vulnerability will never become disasters, as is the case in uninhabited regions. Developing countries suffer the greatest costs when a disaster hits – more than 95 percent of all deaths caused by disasters occur in developing countries, and losses due to natural disasters are 20 times greater (as a percentage of GDP) in developing countries than in industrialized countries. The word *disaster* is derived from Middle French *désastre* and that from Old Italian *disastro*, which in turn comes from the Greek pejorative

prefix *δυσ*-, (*dus*-) "bad" (*aster*), and “star". The root of the word *disaster* ("bad star" in Greek) comes from an astrological theme in which the ancients used to refer to the destruction or deconstruction of a star as a disaster. (Smith, 2004)

Assessment of damage and loss is essential to understanding the extent and distribution of impact in terms of loss of life, property, infrastructure, livelihoods and impact on the economy. It should involve as many stakeholders and data sources as possible. It should be an iterative process where qualitative and quantitative information at regional or district level is progressively refined to establish accurate information across a broad set of parameters at a local level. Participatory assessments enable the needs and aspirations of those affected to be articulated and are essential in ensuring that the humanitarian response is flexible and appropriate. The type of transitional settlement or reconstruction that is possible, and the timescales in which it can be realized, will depend heavily on the availability of materials and skills. The latter includes the capacity of the public works department, built environment professionals, local NGOs and other relevant stakeholders. Assistance should be provided equitably, and the needs of the most vulnerable must be met. It is therefore critical to agree a clear policy on eligibility and responses across all agencies. The selection of individual beneficiaries should involve the whole community in a transparent process, and beneficiary lists should be coordinated and approved by government to avoid duplication. This can be a time-consuming and resource-intensive process involving village leaders and local government. The decision to work in several districts or sub-districts may also impact on mobilization costs and program (Smith, 2004).

There are many different ways in which shelter assistance can be provided to support reconstruction. Selection of an appropriate method of assistance depends both on the needs of the affected communities and on the type of assistance a particular agency is best placed to provide. The latter is based on the agency’s capacity, institutional knowledge and available resources and includes how reconstruction may overlap with other sectorial capacities within the organization (e.g. livelihoods, WAT-SAN, education). Different methods of assistance should be combined to create specific programs tailored to the needs of the affected communities and individual households. These may be unit-sectorial or multi-sectorial but should reflect the strengths of the agency whilst recognizing the need to recruit additional technical expertise or partner with others to fill skills gaps. It is highly unlikely that a single agency will be able to deliver all aspects of a transitional settlement or reconstructions

programme themselves. Aspects which fall outside their remit or core strengths will require partnerships with government, other agencies or local organizations. It is essential that the responsibility of each partner in contributing to the common goal of reconstruction is clearly defined and communicated (Okwaro, 2010).

2.5.5 Emergency coping and restoration of key functions

Boating is becoming commonplace. But communities are often surprised to discover that many owners of flooded homes not only want to return to their river-front vistas, but also intend to take the opportunity to replace the structures with larger, more modern units. In other cases, damaged flood prone property often represents the least desirable housing in the community due to its location, repetitive damage, and decreasing property values. Here, otherwise unaffected property owners may choose to "fight" any redevelopment plan, arguing that government should not help those that knowingly chose that risk to begin with. The propensity to strive for "a return to normal" Proposed post-disaster changes in land use, building codes, densities, infrastructure, property ownership, and redevelopment plans always take time. This is often seen as an unnecessary delay in what otherwise would be a recovery "back to normal," and can be an obstacle to utilizing recovery opportunities for community improvement. It is at this point that the concept of pre-disaster planning for post-disaster redevelopment makes the most sense to everyone involved. People say, "If we'd only figured this out *before* the disaster, it would be so easy to rebuild and recover to an improved state but now, since this all takes so long, maybe we'd be better off if we just put things back the way they were. Then we can look at making plans for recovering from the next disaster if we still want to." A lack of awareness of what the true redevelopment possibilities are" (Okwaro, 2010).

2.5.6 Initiation of recovery activities

Disaster assessments are critical for effective reconstruction and recovery planning. An assessment should document the extent, nature and implications of damage that occurred as a result of a disaster outline the investments that are required to repair or replace damaged or lost assets, restore access to services and determine the significance of economic losses. Assessments need to articulate how to return vital assets and services to functional status based on the needs and priorities of affected populations. The assessment should lead to a recovery framework for recovering from disaster and improving pre-disaster conditions in

order to advance long-term development goals and reduce the risks of future disasters. (Kolwa, 2010)

There are various methods used in disaster identification and assessment. The method to be employed depends on the objective of the disaster assessment.The DaLA (Damage and Loss Assessment) estimates the impact of a disaster and enables an initial quantitative estimation of the financial implications for post-disaster recovery and reconstruction, as well as for long-term disaster risk management in countries affected by disasters at national, sector, household and individual levels. The methodology measures some aspects of impact by estimating the value of destroyed assets and of the changes (losses) in the flows of the economy that arise due to the temporary absence of the destroyed assets. It identifies, at the very least, the financial requirements or needs to re-establish pre-disaster conditions of development (Mulwa, 2004).

The DaLA includes comparatively objective, quantitative information on the value of destroyed assets and of losses to the economy of the affected area or country. Qualitative or other interpretations of the broader human impacts of crisis are not estimated by the methodology. The methodology enables the estimation of the value of destroyed assets and the changes in the flows of the economy that may arise due to the disaster; it also measures the impact of the disaster at the macro-economic and sectorial levels. It is one tool to estimate the economic impact of the disaster at the personal or household levels as well as the possible aggravation of poverty. The DaLA methodology is based on the utilization of the system of national accounts that most countries have adopted for quantifying the value of economic and social activities. Therefore, it can be applied in nearly all countries of the world, regardless of their economic status. The level of geographic analysis of the results depends on the level of detail in the national accounts of the affected country allow; usually down from the national level, to provincial and, in some cases, district level. Before an impact analysis can be made a DaLA establishes baseline data for each sector of the economy. These data are usually available from census data, household surveys and sector-specific periodic reports (Mulwa, 2004).

The HRNA reflects the concerns and priorities of disaster-affected individuals and stakeholders to recover their full potential and to lead productive, creative lives according to their needs, rights and interests. Based on these perspectives, the HRNA for each sector

estimates requirements for, *inter alia,* restoration of governance and social service systems, post disaster capacity building, measures to ensure the fulfilment of rights as well as access to reconstructed infrastructure, approaches to fully restore livelihood systems, and strategies to enhance resiliency against future disaster risks. This includes measures required, for example, to restore gender equity in school enrolments, reversing disaster-induced destitution, protection and regeneration of natural resources affected not only by disasters but also by reconstruction programs (Abibo, 2004)

In addition to baseline data, post-disaster remote sensing analysis and other information, the HRNA assessment approaches often include the collection and analysis of primary data from household or similar unit of analysis surveys, focus groups, key informant and other combined quantitative and qualitative approaches. For example, whereas the DaLA will estimate the cost to rebuild a school, HRNA will address those measures required to ensure the re-enrolment of children, the proper placement of teachers, and related (often multi-year) *social mobilization efforts* required to promote an enabling environment for the education of all children(Abibo, 2004).

2.6 Communication and Information Management

Disaster preparedness and response depend on gathering, analyzing and acting on timely and accurate information before (hazard and early warning information), during (disaster needs assessment) and after disasters (progress of post-disaster recovery). This requires that National Societies pre-determine what information they need, how it will be collected, who will collect it, who will analyze it and how it will be integrated into a timely decision making process. If National Societies are to respond to disasters in a timely fashion, they will need to develop procedures and mechanisms for obtaining, analyzing and responding to early warning information related to hazard detection, forecasting and alerts (NCEP, 2008)

Once a disaster strikes, National Societies must conduct initial assessments that are timely and that inform emergency responders about critical and immediate life-saving needs. Disaster needs assessments should develop a picture of where people are, what condition they are in, what they are doing, what their needs and resources are, and what services are still available to them. After an initial assessment, more in-depth needs assessments should collect information related to critical sectors and technical areas of concern (NCEP, 2008)

Emergency communications is defined as the ability of emergency responders to exchange information via data, voice, and video as authorized, to complete their missions. Emergency response agencies at all levels of government must have interoperable and seamless communications to manage emergency response, establish command and control, maintain situational awareness, and function under a common operating picture, for a broad scale of incidents (NCEP, 2008)

Emergency communications consists of three primary elements:

i. *Operability:* the ability of emergency responders to establish and sustain communications in support of mission operations.
ii. *Interoperability:* The ability of emergency responders to communicate among jurisdictions, disciplines, and levels of government, using a variety of frequency bands, as needed and as authorized. System operability is required for system interoperability.
iii. *Continuity of Communications*: The ability of emergency response agencies to maintain communications in the event of damage to or destruction of the primary infrastructure.

Disasters require the attention of every level of society, from individuals, families, and neighborhoods to city, state, and national agencies as well as international organizations. The content and flow of information is critical at every stage, from policy development to preparation, search and rescue, recovery and the reconstruction of vital infrastructures. Therefore, to some extent, everyone may be called upon to participate in various the aspects of this pattern, not only in the area of immediate impact but in the formal development of policies, procedures and systems as well as informal, voluntary emergency responses that help to extend the safety net for those directly affected (NCEP, 2008)

2.7 Availability of Facilities and equipment

To support the emergency response organization, emergency managers must acquire and maintain the resources needed for effective operations. This includes the construction and equipping of EOCs and the acquisition and maintenance of equipment.

2.7.1 Emergency Operations Centers (facilities)

Emergency operation centers (EOCs) are facilities that provide technical assistance to emergency responders at the scene of an incident. EOCs, which are permanently located in areas expected to be safe from hazard exposures, provide support for the performance of emergency response functions at the incident scene. An EOC is important because the resources needed to respond to an incident are often widely dispersed, so the specific resources needed to respond to a particular type of incident at a given location cannot be predicted with certainty in advance. Moreover, many organizations participate in the incident response and each organization must have a capability for obtaining and processing timely information about the incident. This capability is established by collocation of essential personnel with telecommunications and information processing equipment in an EOC that will provide an effective division of labor while maintaining coordination of action. Lessons learned in previous incidents suggest that considerable decision-making authority should be allocated to organizations close to the incident site because of their superior knowledge of local conditions. However, greater technical knowledge and resources generally are available at higher levels. Thus, close coordination is needed among organizations at all levels (Stambaugh, 2009)

A jurisdiction's EOC should be sited at a location that provides ready access by those who are essential to a timely and effective emergency response. This includes both those who have technical knowledge as well as those with policymaking responsibilities. In the case of a transportation incident, an IC establishes a Command Post at the incident scene and maintains regular communication with the local EOC (if necessary). In addition, the Incident Command Post directs the emergency response by coordinating the activities of field teams from the shipper or carrier with local government response teams such as fire fighters who are attempting to terminate the emergency and minimize population exposures (Stambaugh, 2009)

2.7.2 Equipment Acquisition and Maintenance

Each agency should identify the equipment it needs to perform its assigned tasks, paying special attention to tasks that are only performed during emergencies. Special purpose equipment that is not used routinely will require personnel to be trained and periodically

tested in its proper use. In addition, such equipment might need periodic preventive maintenance, battery checks, and recalibration. An emergency manager should maintain a computer database of emergency-relevant equipment under his jurisdiction. To provide a capability for rapid search during an emergency, this database should contain fields listing the equipment's name, model and manufacturer, names and contact numbers for personnel authorizing release of the equipment, names, and contact numbers for qualified operators, contact numbers for repairs, and critical dates such as preventive maintenance, battery check, and recalibration (FEMA, 2006)

2.8 Management, Direction, and Coordination (MDC)

This dimension of preparedness centers on strategies that make it possible for households, organizations, and other units of analysis to manage both preparatory activity and response processes. The MDC dimension includes identifying lines of authority and responsibility and specifying how resources will be managed, information analyzed, and decisions made. For example, guidance documents advise businesses to prepare for disaster by organizing an emergency management group that includes representation from the affected area, security, safety and health, environment, maintenance, human resources, planning and logistics, and public relations. Local emergency management agencies and crisis-relevant organizations must now adopt the National Incident Management System (NIMS) which requires the identification of organizational roles, titles, and responsibilities for each incident management function specified in the emergency operations and response plan. The MDC dimension also includes activities that are designed to ensure that emergency operations will be carried out effectively when disaster strikes. These activities include training, drills and exercises, and educational activities for members of the public, households, and businesses. MDC also includes developing policy, vision, and mission statements; developing and using enabling authorities; setting performance objectives; and assigning responsibilities in areas such as oversight and coordination. (FEMA, 2006)

Effective disaster response requires mutual trust and coordination of efforts and resources among the many agencies and people involved in emergency response; including the affected local population and local community based organizations, and government emergency structures, fire brigades, health departments and clinics, Red Cross Societies, international

agencies, NGOs and others. Coordination of activities is required to ensure that the maximum number of people is assisted in the shortest possible time and to avoid unnecessary duplication of services. One person from each response team should have responsibility for each major type of response activity. Through direct coordination, response teams can clearly divide responsibility for different operations and plan their actions accordingly. Working on disaster preparedness planning prior to the disaster helps involved response teams better understand each other's aims, objectives and capacities. Such understanding and communication result in more coordinated efforts, and help avoid duplication and identify gaps and weaknesses in necessary services during an actual emergency response. Memoranda of understanding, institutional policies, and joint preparedness planning can serve as the basis for coordination. National Societies should also review national legislation or policies delineating the role and relationship between public and non-public institutions, and any specific references dealing with the National Society's role and access to government resources. Besides their involvement on the national, division and local level disaster committees, National Societies can also liaise actively with the appropriate government ministries and agencies (IFRC, 2008)

2.9 Public education, staff training and rehearsals

Disaster preparedness must be supported by public education campaigns, training of response teams and rehearsals of emergency response scenarios. The aim of public awareness and education program is to promote an informed, alert and self-reliant community, capable of playing its full part in support of and in co-operation with government officials and others responsible for disaster management activities. An essential part of a disaster preparedness plan is the education of those who may be threatened by a disaster. As the preparedness plan is being developed, and upon completion, it is important to rehearse its major elements. Rehearsals invariably expose gaps that otherwise remain overlooked. Rehearsals are most effective when they are system wide and engage as many of the disaster response players as possible. Rehearsals also keep the plans fresh, during extended periods of time when no disaster strikes. Rehearsals might simulate search and rescue operations, first aid provision, response or needs assessment, coordination meetings between major organizational players and population leaders, relief transport and logistics, and many other aspects of an emergency response (Ayres, 2009)

Disaster preparedness and response are not solely the work of experts and emergency responders from National Societies and government disaster organizations. Local volunteers, citizens, organizations and businesses have an active and important role to play before, during and after major emergencies and disasters. Community-based disaster preparedness (CBDP) is a process that seeks to develop and implement a locally appropriate and locally "owned" strategy for disaster preparedness and risk reduction. Local populations in disaster-stricken areas are the first to respond to a disaster. They are usually involved in search and rescue activities as well as in providing emergency treatment and relief to their families, friends and neighbors. National Societies, ideally in partnership with other community organizations and networks, can play an important role in improving the skills and knowledge of these “spontaneous” disaster responders by providing them with education and training in preparedness measures, basic rescue techniques, and first aid and emergency treatment (Ayres, 2009)

It is also essential that training include tests of the proposed response operations. As noted above, emergency drills and exercises provide a setting in which operational procedures can be tested. They also facilitate inter-organizational contact, thus allowing individual members to better understand each other’s professional capabilities and personal characteristics. Furthermore, multifunctional exercises constitute a simultaneous and comprehensive test of emergency plans and procedures, staffing levels, personnel training, facilities, equipment, and materials. Finally, multifunctional exercises produce publicity for the broader emergency management process, which informs community officials and the public that disaster planning is underway and preparedness is being enhanced (FEMA, 2006)

2.10 Conceptual framework

The following framework outlines independent variables relate with dependent variables in the research study.

The conceptual framework involves the relationship between disaster preparedness at Moi international airport being the dependent variable and the series of independent variables including:

- communication and information management
- availability of facilities and equipment

– management, direction and coordination
– public education, staff training and rehearsals

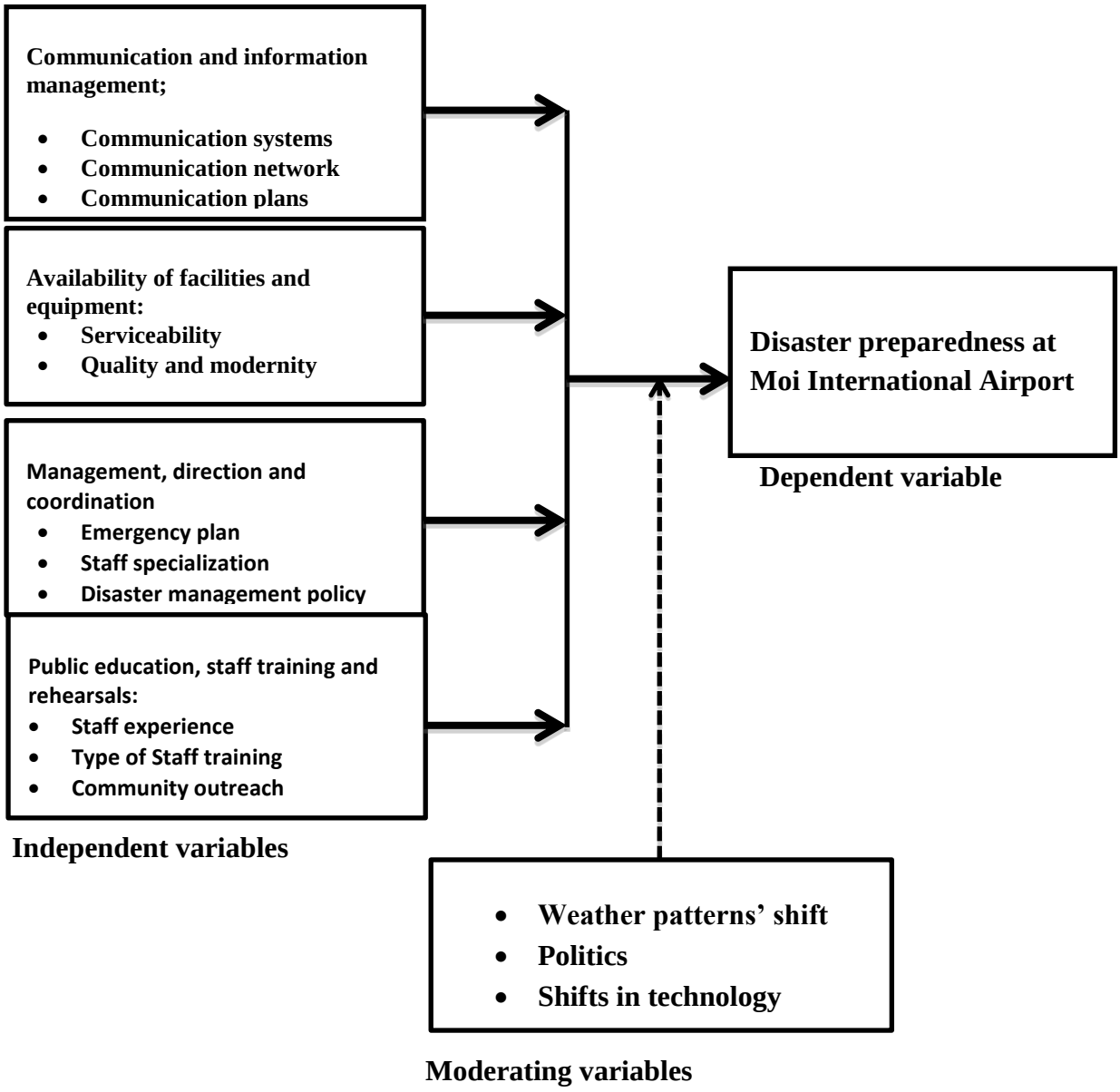

Figure 3: Conceptual framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodology used in the research; it talks about the research design, population of the study, sample size and sampling method, data collection instruments, pilot testing of the instruments, validity of the instrument, reliability of the instrument, data collection procedures, Data analysis and presentations and Ethical considerations. Since no study of this nature and scale had been conducted before in Kenya, the research was largely exploratory, gathering and analyzing evidence from multiple sources across Moi international airport and other relevant secondary data, using triangulation techniques, where necessary, to identify the broad range of barriers to disaster preparedness. It carefully examined the linkages or relationships and interactions among several factors. The researcher employed participatory methodologies that adequately responded to the issues in question as well as the context of Kenya in general and Moi international airport specifically. The methodology was grounded in frameworks that are relevant to both social physical sciences.

3.2 Research design

According to Kerlinger (1981) research design is the plan, structure and strategy investigations used to obtain answers to research questions. The research used descriptive research design. A survey design was used because the researcher depended entirely on the opinions of the respondents. Variables were used as they are without manipulation.

3.3 Target population

The research target population were the employees of Moi international airport from departments related to disaster management i.e. Air Traffic Control (ATC) department; fire and rescue department; airline operators; security department and the airport management who were approximated by the administrative records to be about 277 in number. It was from this population that the researcher collected data.

3.4 Sample size and sampling technique

The sample size and technique will be derived from 277 Moi International Airport staff mostly those involved in disaster management that is, Air traffic control department; fire and rescue department; airline operators; security department and the airport management.

3.4.1 Sample size

The study sample size was calculated using Yamane formula (1967). In this formula, sample size can be calculated at 3%, 5%, 7% and 10% precision (e) levels. Confidence level used is 95% with degree of variability (p) equivalent to 50% (0.5).

$n = \frac{N}{1+Ne^2}$ n = sample size

N= study population (277)

e = margin error of 10%

In the proposed study, the sample size was calculated at precision level of 10% (e = 0.1) and therefore a confidence level of 90%.

Sample size in this study is

$$n = \frac{277}{1 + (277 \times 0.1^2)}$$

$$n = \frac{277}{3.77}$$

$$n = 73.47 \approx 73$$

Therefore the sample size will be 73 people, but due to the homogeneity of the target population, resource and time constraints, the researcher selected a sample size of 65 which is 89% of the sample size.

3.4.2 Sampling procedures

Purposive sampling was used since the researcher only interviewed staff in departments associated with disaster management. The researcher used his discretion to determine whether a staff member had relevant knowledge for the research. Such personnel was then interviewed by the researcher.

3.5 Data collection instruments

Questionnaire was selected and set according to the objectives of the study, it was preferred since it is easy to interpret, saves time, and provides uniformity as per information collected. Interviews, observations and informal discussion were also applied appropriately in data collection.

3.5.1 Pilot testing of the instruments

Pilot testing to the research instruments was done to check for reliability of the research instruments. The data collection questionnaire and the interview guide was pilot tested with a total of 8 questionnaires to check for its accuracy. The interview guides was tested on only 3 respondents.

A pilot study was conducted on a few personnel based at Ukunda Airstrip to measure the validity and reliability of the research instrument. Those selected for piloting, were not part of the main study sample as they were from a different airport though within Mombasa but managed by the same authority.

3.5.2 Validity of the instrument

Validity of the research instrument measures how accurate the instruments are and how relevant they are to the research; this was conducted by pre-testing the instruments to ensure that data collected using both the research questionnaire and the interview guide was accurate and covered all the research questions. The researcher also contacted experts in research methodology field on the design of the instruments. More help was also obtained from the University supervisors concerned with the thesis.

3.5.3 Reliability of the instrument

The data collection instruments were made in such a way that all the research objectives and the corresponding research questions are all covered and addressed by the instruments. During data collection at the end of each day, data collected was reviewed on a daily basis to check on the quality of data collected by ensuring completeness of the questionnaires. The research questionnaire was made in such a way that the qualitative questions are quantified to give statistical measures of the views.

3.6 Data Collection procedures

Primary data was obtained by the use of questionnaires, interviews, observations, taking photographs and informal discussion. Questionnaires were selected and set according to the objectives of the study and it is preferred as it is easy to interpret, saves time, and provides uniformity as per information collected. Key Informant Interview (KII) was also conducted using a checklist to collect information from key stakeholder such as airport engineers. This is because both techniques are simple and effective for collecting information and also minimizes researcher biases in assessing impact of the study. Data was collected through varied approaches. For the qualitative data, information was collected through interviews with different individuals as well as from focus group discussions with selected staff members. Data was also collected through observation in circumstances where objective response was difficult to obtain from respondents. For the quantitative data, information was collected at the office level with any person eligible for response. In either approaches, instruments were designed by the researcher and used for data collection. For the qualitative, though structured, the instruments were open ended to allow for self-expression by the respondents but even importantly to allow a free discussion with the tangent of discussion not limited to prescribed notions. The quantitative questionnaires were pre-coded and structured.

3.7 Data analysis and presentations

Quantitative data collected was then entered into the computer, and analyzed using descriptive analysis mainly; Statistical Package for Social Scientists (SPSS). Qualitative data was analyzed using content analysis method and opinion of majority was summarized. The data collected was summarized and the results recorded in form of tables, charts and graphs.

Data collection analysis and report writing: Data was collected from three levels, namely; the staff members, the management level and professional level including airport engineers. Data collected was consequently analyzed, using appropriate techniques, to reveal patterns in access, participation and achievement, as well as the factors affecting both aggregate demand and effective demand for disaster preparedness. The report produced must be both descriptive and analytic, reflecting the linkages among the factors, and identifying the gaps in the existing policy framework. It must offer a clear set of actionable recommendations for the different players in disaster management. The draft report shall be submitted for review and

discussion by the ministry of special programs and key partners in the airport, and comments emanating from the review and discussion were incorporated into the final report.

3.8 Ethical considerations

As per the Social Research Association (2003) ethical guidelines will enable researchers to make individual ethical judgments and decisions that comply with principles of research. The researcher observed ethics in data collection. Permission was sought from the administration of the airport as well as from the respondents with explanations on how the research contributes towards enhancing proper disaster preparedness and management at the airport level. Privacy, confidentiality and dignity of the respondents were considered during the research. Names of the respondents were not exposed and codes used instead. The respondents were assured that a feedback session will also be organized in order to disseminate the research findings to the organizations and other stakeholders as well as to thank the government agencies for their assistance during the research.

3.9 Operation definition of the variables

Variables will be exploited the way they are and if necessary they will be quantified to help in measurement in the research.

Table 3.1: operational definition of the variables

Objective	Variables	Measurement scale	Tools of analysis	Type of analysis
Effect of communication and information management on disaster preparedness	Existence of emergency communication plan. Communication systems available. Efficient communication network.	Nominal	Frequencies	Descriptive statistics
Availability of facility and tools on disaster management	Availability and serviceability of the equipment. Quality of equipment. Modernity of equipment.	Nominal	Frequencies	Descriptive statistics
Management direction and coordination on disaster preparedness	Existence of disaster management policy and program Staff specialization	Nominal	Frequencies	Descriptive statistics
Public education, staff training & rehearsals on disaster preparedness	Number of trainings Community awareness	Nominal	Frequencies	Descriptive statistics

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents analyzed results of the research conducted on 65 respondents from core stakeholders in disaster management at Moi International Airport, Mombasa: Management (5), security department (8), airport fire and rescue department (13), ATC Department (18), Airline operators (13) and safety department (8).

The analyzed data is presented in charts, bar graphs, tables in frequencies and percentages where applicable. Data collected is analyzed and discussion on the results initiate

4.2 General characteristics of the respondents

A total of 65 respondents from various departments of key importance to research were interviewed as shown in analysis below.

4.2.1 Departmental distribution of the respondents

The respondents were distributed as per their departments as shown in the table 4.1 below.

Table 4.1: Respondents per department

Department	Frequency	Percentage (%)
Management	5	8
Security	8	12
Fire and rescue	13	20
ATC	18	28
Airline operators	13	20
Safety	8	12
Total	**65**	**100%**

From the available data 8% of the respondents were from the management, 12% from safety department, other 12% from security department, 20% from fire and rescue department, other 20% from airlines who represents the airport consumers and the remaining 28% from ATC section. Most of the respondents were from ATC section which initiates most of the safety and emergency procedures and activities.

4.2.2 Distribution of the respondents by age group

The respondents were distributed by their age groups as shown in the table 2 and below:

Table 4.2: Respondents by age

Age group	Frequency	Percent
20-30 years	13	20%
31-40 years	31	48%
Above 40 years	21	32%
Total	**65**	**100%**

The above information shows that majority of the respondents were 31-40 years of age 31(48%). Those while those above 40 years followed at 21(32%) and the least of all at age 20-30 years were 13(29%).

4.2.3 Distribution of the respondents by their gender

The research respondents were distributed by their gender as shown on the table and below:

Table 4.3: Respondents by gender

Gender	Frequency	Percent
Females	29	43%
Males	38	57%
Total	**65**	**100%**

The informaton above shows that majorityof the respondents interviewed were males 38(57%) while the number of the females interviewed were only 29(43%) of the respondents. This shows that most of the staff of the Air port were males.

4.2.4 Distribution of the respondents by their level of education

The respondents were distributed by their level of education as shown in the table below;

Table 4.4: Respondents by level of Education

Level of education	Frequency	Percentage
Secondary	10	15
Tertiary college	35	54
University	20	31
Total	**65**	**100%**

The above analysis shows that most of the respondents interviewed were educated up to tertiary college level 35(54%) while those educated up to University level followed at 20(31%) of the respondents and while the least of all being those educated up to secondary level at 10(15%) of the respondents. This shows that most of the respondents interviewed had a higher level of education so as to understand disaster management and preparedness.

4.2.5 Nature of employment

The respondents' natures of employment either as a casual, contract or permanent were as follows in the table and chart below.

Table 4.5: Respondent and nature of Employment

Nature of employment	Frequency	Percentage
Casual	5	8%
Contract	20	31%
Permanent	40	61%
Total	**65**	**100%**

The above information shows that most of the respondents were parmanent employees 40(61%). Those who were on contract employment were 20(31%) where as those who were employed on a casual basis were only 5(8%). Majority of those who were interviewed were parmanent employees.

4.3 Objective based information and findings

This section describes the research findings as per the research objectives;

4.3.1 Communication and information management on disaster preparedness at MIA

The various variables related to this objective that were tested by the researcher are discussed giving the statistics of the result.

4.3.1.1 Existence of emergency communication plan

When the respondents were asked on the existence of emergency communication plans, they responded as follows:

Table 4.6: Existence of emergency communication plan

Existence of emergency communication plan	Frequency	Precents
There is no emergency communication plan	4	6%
There is emergency communication plan	61	94%
Total	**65**	**100%**

The information shows that almost all the respondents were for the opinion that there exists emmergency communication plan at the Moi International Airport in fact 61(94%) of the respondents were for that opinion and only 4(6%) of the respondents were for the opinion that there is no emmergency communication plan in place at the Moi International Airport. From this argument, it can be concluded that there is emmergency communication plan put in place to enhance disaster preparedness at the Airport.

4.3.1.2 What does your organization's emergency communication plan consist of?

Components of emergency communication plans were discussed by the respondents as shown below.

Table 4.7: Emergency communication plan

Components of emergency communication plans	Frequency	Percent
Alternate location for employees to meet	13	20%
Emergency number for employees to check organization's status	10	15%
Internet site for employees to check organization's status	11	17%
Method of accounting for employees in a disaster	9	14%
Method of actively communicating to employees (e.g., phone tree)	22	34%
Total	**65**	**100%**

Majority of the respondents were for the opinion that method for actively communicating status to employees' e.g. phone tree constituted the component of emergency communication

plan for the airport 22(34%). Those who considered alternate location for employees to meet were 13(20%) while those considering internet site for employees to check organization's status were 11(17%). 10(15%) of the respondents considered emergency number for employees to check organization's status and only 9(14%) of the respondents considered method for accounting for employees in a disaster as a component of communication.

4.3.1.3 Are you aware whether MIA has a telephone exchange office?

When the respondents were asked whether they were aware that MIA has a telephone exchange office they responded as follows in the table 4.8 below:

Table 4.8: telephone exchange office awareness

Awareness of telephone exchange office	Frequency	Percent
Yes am aware of existence of telephone exchange office at MIA	63	97%
No am not aware of existence of telephone exchange office at MIA	2	3%
Total	**65**	**100%**

The above information shows that majority of the respondents 63(97%) were aware of the existence of telephone exchange office at the MIA while only 2(3%) of the respondents were not aware of the existence of the telephone exchange office at the MIA. This shows that there exist both disaster awareness and preparedness in terms of equipment at the MIA.

4.3.2 Availability of facilities and equipment at MIA.

This section addresses the availability of Equipment at the MIA and how it influences disaster preparedness at the airport.

4.3.2.1 Overall, how would you rate your organization's preparedness for a disaster or crisis?

The overall rating of the organization's disaster preparedness in terms of facilities and equipment available was as follows in the table 4.9 below.

Table 4.9: Rating on disaster preparedness

Rating on disaster preparedness	Frequency	Percent
Very well prepared	45	69%
Well prepared	18	28%
Not well prepared	1	2
Not at all prepared	1	2
Total	**65**	**100%**

Majority of the respondents were of the opinion that in terms of equipments and facilities MIA was well prepared in terms of disaster management 45(69%). Other 18(28%) of the respondents were for the opinion that MIA was well prepared for disaster in terms of equipments and machinery while only 1(2%) of the respondents were for the opinion that MIA was not well prepared in terms of equipment for disaster. From the above information, it is clear according to the opinion of the majority that MIA was well prepared in terms of disaster management.

4.3.2.2 Is the airport equipped with necessary tools for disaster management?

When the respondents were asked whether the airport was equipped with necessary tools for disaster management, they responded as follows.

Table 4.10: Level of equipment for disaster management

Level of Equipment for disaster management at the airport	Frequency	Percent
Yes the Airport is equipped with necessary tools for disaster management	48	74%
No the Airport is not equipped with necessary tools for disaster management	17	26%
Total	**65**	**100%**

According to the above information majority of the respondents 45(74%) were for the opinion that MIA was equipped with necessary tools for disaster management while only 17(26%) of the respondents were for the opinion that the airport was not well equipped with tools for disaster management. From the information, it can be concluded that MIA is well equipped with tools and equipment for disaster management according to the opinion of the majority.

4.3.2.2 How do you rate MIA disaster preparedness?

When the respondents were asked how they rated disaster preparedness at MIA, they responded as follows in the table 11.

Table 4.11: Level of disaster preparedness

Level of disaster preparedness at MIA	Frequency	Percent
Satisfactory	60	92%
Unsatisfactory	5	8%
Total	**65**	**100%**

The information above clearly shows that the level of disaster preparedness in terms of tools and equipment was satisfactory according to the opinion of the majority 60(92%). Only 5(8%) of the respondents were for the opinion that the level of disaster preparedness at the MIA was unsatisfactory.

4.3.2.3 Is there a disaster response center at MIA?

Inquiry about disaster response centre as a facility was made and the respondents reacted as shown in the table below.

Table 4.12: Existence of disaster response centre

Existence of disaster response centre	Frequency	Percentage
Yes there is disaster response centre	61	94%
No there is no disaster response centre	4	6%
Total	**65**	**100%**

From the above information majority of the respondents were for the opinion that there is disaster response centre at the MIA 61(94%) while only 4(6%) of the respondents were for the opinion that there was no disaster response centre. From the results, it can be concluded that there is a disaster response centre at MIA according to the opinion of the majority.

4.3.3 Management, direction and coordination at MIA

To establish the above research objective questions of the following categories were posed to the respondents.

4.3.3.1 Does your organization have any employees who are specifically tasked with playing a leadership role in the event of a crisis?

This is out to seek whether there are clear structures of management and coordination when it comes to disaster preparedness. The response parameters were as tabulated in Table 13 below;

Table 4.13: employees with special roles during disaster

Employees with roles during crisis	Frequency	Percent
There are such employees	60	92%
There are no such employees	5	8%
Total	**65**	**100%**

The above information shows that there are employees at MIA who are in charge during disaster and crisis as responded to by 60(92%) of the respondents and this shows that there is management direction and coordination in case of disaster at the MIA.

4.3.3.2 What functions does your organization perform in MIA disaster preparedness plans?

The Airport currently lacks a disaster management policy. There is need for a clear policy on disaster management. This is likewise lacking in other airports. If it exists, it is not clearly spelt out to all stakeholders, and every stakeholder needs this sensitization to the policy. This is necessary for guidance on what to do when any situation arises that relates to the risks and threats at the airport in relation to the aircraft accidents and other airport hazards. Planning for an effective response to disaster at or near an airport requires particular co-ordination between emergency services, for both short-term and long-term response; it should encompass such aspects as the accessibility of potential accident sites near the airport to emergency vehicles. Experience has also shown the critical importance of effective and comprehensive debriefing following emergency exercises. Such debriefing should include all staff that has a role in the disaster response, and is essential if KAA is to evaluate its disaster preparedness and to learn how to improve its disaster planning.

4.3.4 Public education, staff training and rehearsals at MIA

To establish the above research objective the researcher interviewed the respondents in the following questions which needed their response to come up with the majority opinion.

4.3.4.1 Experience with a disaster at the airport

When the respondents were asked for any experience with the disaster at the airport, they responded as shown in the table below;

Table 4.14: Experience with a disaster at the airport

Experience with any disaster at the airport	Frequency	Percentage
Yes I have experienced a disaster at the airport	32	49%
No I have not experienced any disaster at the air port	33	51%
Total	**65**	**100%**

The above information indicates that most of the staff at the airport had not experienced any disaster at the airport 33(53%). Only 32(49%) of the respondents had had an experience with a disaster at the airport. This is an indicator that there is less experience of the airport staff with disaster at the airport.

4.3.4.2 Training of the staff on disaster management.

When the staff were asked on whether they have undergone any form of training as pertains to disaster management, they responded as tabulated in the Table 15 below;

Table 4.15: Staff training on disaster management

Training on disaster	Frequency	Percent
Yes I have undergone training on disaster	50	77%
No I have not undergone any training on disaster	15	23%
Total	**65**	**100%**

The above table and chart shows that majority of the respondents had undergone some training on disaster management 50(77%) while only 15(23%) of the respondents had not undergone any training on disaster management. This shows that in terms of training a majority of the staff were well off in disaster management.

4.3.4.3 Type of training conducted

On asking the respondents the various types of disaster preparedness trainings they underwent, the responded as shown in Table 16 below;

Table 4.16: Type of training conducted

Type of training conducted	Frequency	Percent
CPR(Cardio-Pulmonary Resuscitation) and/or first aid training	12	18%
Crisis management	9	14%
Fire suppression	2	3%
Training in organization-specific disaster response plan	5	8%
Training in assisting persons with disabilities during a disaster	1	2%
Training in dealing with hazardous materials	23	35%
Training in helping keep others calm in a crisis	13	20%
Total	**65**	**100%**

The above information shows that most of the respondents 23(35%) were trained on dealing with hazardous materials and dangerous goods. Those who were trained on helping keep other calm in a crisis were 13(20%). 12(18%) of the respondents were trained on CPR (Cardio-Pulmonary Resuscitation) and/or first aid training while 9(14%) of the respondents were trained on crisis management. Only 5(8%) of the respondents got training in organization-specific disaster response plan and 2(3%) of the respondents got training on fire suppression.

4.3.4.4 Existence of community outreach disaster management program at MIA

When the respondents were asked on existence of any community outreach disaster management program at MIA, they responded as follows in Table 17;

Table 4.17: Existence of community outreach program on disaster management

Existence of community outreach program	Frequency	Percentage
There are no community outreach programs at MIA	63	97%
There are community outreach programs at MIA	2	3%
Total	**65**	**100%**

The information above shows that there were no community outreach disaster management programs at the MIA since 63(97%) of the respondents were for the opinion while only 2(3%) of the respondents were for the opinion that there are community outreach disaster programs.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter deals with how the research findings were summarised in line with the objectives; how the conclusions were made and the recommendations based on further research areas. To determine how communication and information management affects disaster preparedness at Moi international airport, to establish how availability of facilities and equipment affect disaster preparedness at Moi international airport, to determine how management, direction and coordination (MDC) affect the level of disaster preparedness at Moi international airport, to assess how public education, staff training and rehearsals affects disaster preparedness at Moi international airport.

5.2 SUMMARY OF FINDINGS

5.2.1 Demographic information

A total of 65 respondents from various departments of key importance to research were interviewed as shown in figure 4 below. From the available data 8% of the respondents were from the management, other 8% from safety department, 12% from security department, 20% from fire and rescue department, 24% from airlines and the remaining 28% from ATC section. Most of the respondents were from ATC section. The above information shows that majority of the respondents were 14-40 years of age 31(48%). Those while those above 40 years followed at 21(32%) and those who were aged 20-30 years were 13(29%).The iformaton above shows that majorityof the respondents interviewed were males 38(57%) while the number of the females interviewed were only 29(43%) of the respondents. This shows that most of the staff of the Airport were males.The above information shows that most of the respondents interviewed were educated up to tertiary college level 35(54%) while those educated up to University level were 20(31%) of the respondents and those educated up to secondary level were 10(15%) of the respondents. This shows that most of the respondents interviewed had a higher level of education so as to understand disaster management and

preparedness. The aboveinformation shows that most of the respondents were parmanent employees 40(61%). Those who were on contract employment were 20(31%) where as those who were employed on a casual basis were only 5(8%). Majority of those who were interviewed were parmanent employees.

5.2.2 Objective based Information

5.2.2.1 Communication, information management and disaster management at MIA

When the respondents were asked on the existence of emergency communication plans, they responded as follows: The information shows that almost all the respondents were for the opinion that there exists emmergency communication plan at the Moi International Airport in fact 61(94%) of the respondents were for that opinion and only 4(6%) of the respondents were for the opinion that there is no emmergency communication plan in place at the Moi International Airport. From this argument, it can be concluded that there is emmergency communication plan put in place to enhance disaster preparedness at the Airport. Majority of the respondents were for the opinion that method for actively communicating status to employees' e.g. phone tree constituted the component of emergency communication plan for the airport 22(34%). Those who considered alternate location for employees to meet were 13(20%) while those considering internet site for employees to check organization's status were 11(17%). 10(15%) of the respondents considered emergency number for employees to check organization's status. Only 9(14%) of the respondents saw method of accounting for employees in a disaster as a component of communication. The above information shows that majority of the respondents 63(97%) were aware of the existence of telephone exchange office at the MIA while only 2(3%) of the respondents were not aware of the existence of the telephone exchange office at the MIA. This shows that there exist both disaster awareness and preparedness in terms of communication and information management at the MIA.

5.2.2.2 Availability of facilities and Equipment and disaster management at MIA

Majority of the respondents were of the opinion that in terms of equipments and facilities MIA was very well prepared in terms of disaster management 45(69%). Other 18(28%) of the respondents were for the opinion that MIA was well prepared for disaster in terms of equipments and facilities while only 1(2%) of the respondents were for the opinion that MIA

was not well prepared in terms of equipment for disaster. From the above information, it is clear according to the opinion of the majority that MIA was well prepared in terms of disaster management. According to the above information majority of the respondents 45(74%) were for the opinion that MIA was equipped with necessary tools for disaster management while only 17(26%) of the respondents were for the opinion that the airport was not well equipped with tools for disaster management. From the information, it can be concluded that MIA is well equipped with tools and equipment for disaster management according to the opinion of the majority. The information above clearly shows that the level of disaster preparedness in terms of tools and equipment was satisfactory according to the opinion of the majority 60(92%). Only 5(8%) of the respondents were for the opinion that the level of disaster preparedness at the MIA was unsatisfactory. From the above information majority of the respondents were for the opinion that there is disaster response centre at the MIA 61(94%) while only 4(6%) of the respondents were for the opinion that there was no disaster response centre. From the results, it can be concluded that there is a disaster response centre at the MIA according to the opinion of the majority.

5.2.2.3 Management, direction and Coordination and disaster management at MIA

The Airport currently lacks a disaster management policy. There is need for a clear policy on disaster management. This is likewise lacking in other airports. If it exists, it is not clearly spelt out to all stakeholders, and every stakeholder needs this sensitization to the policy. This is necessary for guidance on what to do when any situation arises that relates to the risks and threats at the airport in relation to the aircraft accidents and other airport hazards. Planning for an effective response to disaster at or near an airport requires particular co-ordination between emergency services, for both short-term and long-term response; it should encompass such aspects as the accessibility of potential accident sites near the airport to emergency vehicles. Experience has also shown the critical importance of effective and comprehensive debriefing following emergency exercises. Such debriefing should include all staff that has a role in the disaster response, and is essential if KAA is to evaluate its disaster preparedness and to learn how to improve its disaster planning.

5.2.2.4 Public education, Staff training and rehearsals on disaster management

The above information indicates that most of the staff at the airport had not experienced any disaster at the airport 33(53%). Only 32(49%) of the respondents had had an experience with a disaster at the airport. This is an indicator that there is less experience of the airport staff with disaster at the airport.The statistics in chapter four shows that majority of the respondents had undergone some training on disaster management 50(77%) while only 15(23%) of the respondents had not undergone any training on disaster management. This shows that in terms of training a majority of the staff were well off in disaster management. The analysis shows that most of the respondents were trained on dealing with hazardous materials 23(35%) of the respondents. Those who were trained on helping keep other calm in a crisis were 13(20%). 12(18%) of the respondents were trained on CPR (Cardio-Pulmonary Resuscitation) and/or first aid training while 9(14%) of the respondents were trained on crisis management. Only 5(8%) of the respondents got training in organization-specific disaster response plan and 2(3%) of the respondents got training on fire suppression.The information above shows that there were no community outreach disaster management programs at the MIA since 63(97%) of the respondents were for the opinion while only 2(3%) of the respondents were for the opinion that there are community outreach disaster programs.

5.3 Conclusions

The ever growing traffic congestions and forecasts of continued growth into the next decade put a strain on MIA capacity. IATA, for example predict an average annual passenger traffic growth rate of 5.0% during the next 20 years. There is also, public tolerance of the environmental effects of air traffic around airports such as noise, air pollution and third party risk would appear to have decreased. These conflicting trends lead airports, airlines, air traffic control organizations and the aircraft and equipment industry to devise new technologies and innovative ways of operating airports and aircraft in order to meet both the capacity demands and the environmental limitations. Consequently, new hazards emerge and existing hazards become difficult to contain unless adequate attention is given to safety aspects in this combination of emerging trends. In addition, a new dimension, third party risk, presented itself as a safety concern in a growing number of airport community. Airports are hubs in the air transport system. Consequently, their presence causes a convergence of air traffic over the area surrounding the airport. For the population living in the vicinity of an airport this implies

involuntary exposure to the risk of aircraft accidents. Although the probability of an accident per flight is very small, according to the Statistical Summary of Commercial Jet Airplane Accidents, 1959 - 2008, chances of an accident are 1 in 9.2 million per flight if you fly one of the 25 safest airlines. Local risk levels around airports are higher than one might expect, which are caused by the fact that while the probability of an accident per take-off or landing is very small, the number of landings and take-offs is often very large (typically several hundred a day). The resulting annual probability of an accident at MIA is therefore much greater than the small probability of being involved in an aircraft accident as a passenger. In addition, accidents tend to happen during the take-off and landing phases of flight and hence close to an airport. Safety data from studies show that approach and landing phase accidents account for a significant proportion of fatal air transport accidents. Historical data confirms that aircraft accidents involving considerable numbers of third party victims occur several times a year. Probably the best known example is the tragic accident of a Boeing 747 in suburban Amsterdam in 1992.

It is indicated that MIA has a 24 hour first aid clinic within the airport and also a well-equipped port health clinic. Enough standby ambulances were also reported to be in existence at the airport. The airport has a fully equipped 24 hour fire fighting station/department with enough well maintained fire extinguishers and portable extinguishers available at the airport. Effective fire outbreak control systems with functional equipment are in place at the airport. The fire equipment is at strategic points known to the police, stakeholders and KAA employees. In terms of airport security, there is 24 hour police patrol and back-up and well trained airport security personnel both in the police unit and KAA. There are good security alert systems and electronic security aid (CCTVs). MIA also has well trained air traffic controllers under the KCAA. Very few high level trained personnel on disaster management exist within the airport, and this is an area of great concern if disaster preparedness is to be enhanced.

From the study findings, the airport has experienced a few incidences in security lapses which in future might bring risk to the airport. The lack of frequent disaster preparedness drills and also lack of disaster management control centre that is operational throughout, puts the airport community in a wanting situation. Very few disaster preparedness drills are done to prepare people for any eventuality. MIA tenants and KAA need to improve their linkages on matters of disaster preparedness since there is inadequate knowledge on disaster

management/preparedness in MIA. There is no forum incorporating all stakeholders involved within the airport on disaster preparedness initiatives. Not everyone is involved at the same forum, and KAA usually discusses issues of disaster preparedness with various stakeholders at different forums and times, for example peripheral stakeholders and core stakeholders hold different forums. The airport has inadequate fire/emergency escapes routes and few trained personnel in fire fighting. Some safety equipment is under-serviced, for example fire extinguishers. Generally, the equipment is inadequate compared to the number of people. The parking lot is too congested with taxi operators and visitors to the airport. Owing to the inadequacy of some equipment some of the officers working for the airport are likely to be corrupt and can let in drugs and terrorists.

5.4 RECOMMENDATIONS

From the study, the following recommendations are put forward for the improvement of MIA disaster preparedness.

5.4.1 Training, security & safety and policy for disaster preparedness and mitigation

The study strongly recommends that there should be adequate training for the airport staff to be equipped with knowledge geared towards disaster preparedness and mitigation. In providing training there should be joint operations between various security agents under Kenya Airport Authority. This will promote the being together in working towards disaster preparedness and mitigation, and make the workforce more effective. A common, high disaster preparedness standard at MIA can be achieved by a group of stakeholder since the level of preparedness at the airport is, to a large extent, managed by the interaction of multiple organizations. An integrated disaster management system involving all organizations operating at the airport is thus required. The MIA, the main airlines, a representative and management team of all other airline operators, ground handling providers, refuelling services and the air traffic control organization should work together to improve disaster preparedness at MIA. To that end, stakeholders have to establish a Terms of Reference, have regular meetings and use a common Operational Airport Information System. All participating organizations could be connected to this system and capture information about air and ground incidents into a common database. This information exchange, the regular meetings and common objectives provide the necessary premises for the early identification

of disaster preparedness bottlenecks, the design of achievable corrective and mitigative measures and their effective implementation. Consideration needs to be given on how this approach could be developed on a national level. There is need for a clear policy on disaster management. This is likewise lacking in MIA. If it exists, it is not clearly spelt out to all stakeholders, and every stakeholder needs this sensitization to the policy. This is necessary for guidance on what to do when any situation arises that relates to the risks and threats at the airport in relation to the aircraft accidents and other airport hazards. Planning for an effective response to disaster at or near an airport requires particular co-ordination between emergency services, for both short-term and long-term response; it should encompass such aspects as the accessibility of potential accident sites near the airport to emergency vehicles. Experience has also shown the critical importance of effective and comprehensive debriefing following emergency exercises.

5.4.2 Suggestion for further study

Since the study was done at Moi International Airport, the researcher finds it necessary that other studies be done in the newly established airports in Kenya like Kisumu International airport. Another study should be done on the airport to determine how staff knowledge, attitudes and practices affect air safety. A similar research should be carried out with a worldwide view with the aim of determining the disaster preparedness and management level at airports to improve safety globally. Another study should be put in place to compare airport disaster preparedness among selected third world countries.

REFERENCES

Abibo J. Amanda, (2002) "Effective factors enhancing disaster management success in African countries and South Asia"

Ayres, M. 2009: *Guidebook for Airport Safety Management Systems*. Applied Research Associates and International Safety Research Inc. Retrieved from www.national-academics.org/trb (2003/2014)

Brooks J.D, (2000) Good preparation as a way of improving disaster management in sub-Saharan Africa."

Booker Roberts (1992) "Promoting positive assessment of disaster in third world countries".

Benson & Smith (2004) "Understanding of disaster relation in the concept of preparedness in the third world countries" Second edition

Carrilo, G. 2010: *Introduction to disaster management*; Course manual; Virtual University for Small States of the Commonwealth (VUSSC) - Disaster Management 1.0. Retrieved from, www.col.org/vussc (13/03/2014).

Clifford Okwaro, (2000) 'Elementary understanding of the differences between disaster and risk management."

Enon, J.C (1998): Educational Research, Statistics and Measurement. Nairobi: Makerere University Press.

Encyclopedia of Nations, 2010: *Kenya-location, size and extent.* Retrieved from www.nationsencyclopedia.com (28/03/2014)

FEMA, 2006: *Disaster management overview*; Department of environmental health and safety; Federal Emergency Management Agency. Retrieved from, www.fema.gov (21/01/2014).

Fraenkel, J.R. and Wallen, Ne (2000): How to Design and Evaluate Research in Education. Boston: McGraw-Hill

Farnado, L. 2003. "UN Support to Disaster Management Reduction in Kenya" *Disaster Reduction in Africa* Issue no.1 of 2003. Nairobi: International Strategy for Disaster Reduction

Foddy, W. (1993) Constructing Questions for interview and questionnaires: Theory and practice in Social Research. Cambridge University Press

Garatwa W. & Bollin, C. 2002. *Disaster risk management*; A working concept Deutsche Gesellschaft fur, O.K. KOPIE, Gmbit, Eschborn [Online]. Retrieved from, www.gtz.de (26/03/2014).

Global General, 2010. *A look at world's deadliest air disaster*. Retrieved from www.chinadaily.com.cn, (4/02/2014).

GoK, Ministry of State for Special Programs (MSSP) and Ministry of Provincial Administration and Internal Security - National Disaster Operation Centre (NDOC): *national disaster response plan, 2009*.

GoK (2009a): *National disaster response plan*; Office of the president, Ministry of states for special programme and ministry of states for provincial administration and internal security.

GoK 2010: *Leading economic indicators.* Kenya national bureau of statistics September, 2010

George, Mulwa. P (2004) "Developing disaster management by combining both preparedness and equipment provision."

Holloway, A. 2003: *Rising Vulnerability, Increasing Risk.* Disaster Risk Reduction

ICAO, 2003: *International Civil Aviation Organization Resolution A, 33-16.* Retrieved from, www.icao.org (8/04/2014).

ICAO.2004. *Annex 14 to the convention on international civil aviation aerodromes*- International standards and recommended practices, 4th ed., ICAO Vol.1. Montreal, Canada. Retrieved from www.icao.org (25/03/2014)

ICAO Doc. 9137 PART 7: EN - Airport services Manual – Part 7 Airport Emergency Planning – Second Edition, 1991.

ICAO, 2004: *International civil aviation organization, global safety plan*. Retrieved from, www.icao.org (8/04/2014)

International Federation of Red Cross and Red Crescent, 2000: Participant resource and learning module; Disaster Preparedness training program; *Introduction to disaster Preparedness.*

KAA, 2014: Moi International Airport; Retrieved from www.kenyaairports.co.ke/kaa (28/02/2014).

Kapoor, M. 2009. *Disaster Management,* New Delhi, India: Motilal Banaisidasi Publishers Private Limited.

KCAA 2013: *Rules of the air and air traffic control regulations*, Kenya Civil aviation Authority.

Kenya Advisor, 2010: *Kenya Airports* Overview. Retrieved from www.kenya-advisor.com (14/02/2014)

Kerlinger, (1981) "Research methods and analysis

Kiema-Ngunnzi J. 2002: "An Assessment of Recovery Strategies of the 1998 Nairobi Bomb Disaster Victims: A Case Study of the Teachers' Service Commission" Unpublished MA Project Paper, Department of Sociology, University of Nairobi.

Kwiatkowski, K. 2001: *Expeditionary Air Operations in Africa, Challenges and solutions.* Air university press, Maxwell air Force Base, Alabama

Lindsay N. 2001: Australian Journal of Emergency Management, International Society of Air Safety (ASASI), 2000 Conference, Shannon, Ireland. *Aircraft accident emergency planning and Emergency Management*

Mulugeta G., Ayonghe S., Daby D. &Durrheuim R. 2007: Natural and human induced hazards and disasters in sub Saharan Africa. International council for science (ICSU); Regional office for Africa

Mutimba S. 2010. *Climate change vulnerability and adaptation preparedness in Kenya*. Heinrich Boell: shifting East and Horn of Africa, Camco Advising Services (K) ltd. Retrieved from, www.boell.org.ke (4/03/2014).

Nathan A.J, (2005) "Introduction of management courses and their effects in Africa and Europe"

Olive M. Mugenda & Abel G. Mugenda, 2003: Research Methods – Quantitative and Qualitative Approaches. Acts press, Nairobi.

Salvano, B. 2002: *Gender mainstreaming in disaster reduction; International strategy for disaster reduction*. Retrieved from, www.unisdr.org (15/13/2014).

Stambaugh, H. (2009): *An airport guide for regional emergency planning for CBRNE events;* Airport cooperative research program; Report 12, Washington. Retrieved from*www.national-academics.org/trb*, (03/04/2014).

Suda, C. 2000: Natural disaster preparedness, environmental degradation and sustainable development in Kenya; Institute of African Studies, *African study monograph* 21 (3) 91-103; Retrieved from *www.insightkenya.com*(08/03/2014).

UN/ISDR 2008: Towards national resilience. Good practices of national platforms for disaster risk reduction, United Nations secretariat of the international strategy for disaster reduction. Geneva, Switzerland. Retrieved from, www.unisdr.org (25/01/2014).

APPENDIX I: LETTER OF TRANSMITTAL

Mr. Amboka A. T. Meshack,

P. O. Box 104827 – 00101,

Nairobi.

Date ……

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: DATA COLLECTION

I am Mr. Amboka Andera T. Meshack, a student at the University of Nairobi (UoN), School of Continuing and Distance Education (SCDE) pursuing a Degree of Masters of Arts in Project Planning and Management.

It is a requirement of the course that I collect data from the field with which a research project report will be prepared for presentation. My research topic is ***FACTORS AFFECTING DISASTER PREPAREDNESS IN KENYAN AIRPORTS: A CASE OF MOI INTERNATIONAL AIRPORT, MOMBASA.***

All the data collected is related to the research topic afore mentioned and it is purely for academic purposes. Moreover, the information gathered will be treated with utmost confidentiality.

Your cordial cooperation and sincerity will be highly appreciated.

Yours faithfully,

Amboka A. T. M.

REG.: L50/61864/2013

APPENDIX II: QUESTIONNAIRE

General instructions: This research is meant to determine factors affecting disaster preparedness at Moi International airport. Kindly answer the questions in the spaces provided. Your contribution towards the success of this research will be highly appreciated.

GENERAL INFORMATION

1. Age group
   [ ] 20-30 years [ ] 31-40 years [ ] above 40 years
2. Gender
   [ ] male [ ] female
3. Level of education
   [ ] secondary [ ] tertiary college [ ] university
4. Nature of employment
   [ ] casual [ ] contract [ ] permanent

PUBLIC EDUCATION, STAFF TRAINING AND REHEARSALS AT MIA

5. Have you ever experienced any disaster in this airport? [ ] Yes [ ] No
6. If yes what types of disaster have you experienced?
   [ ] Aircraft Accident
   [ ] Fire
   [ ] Explosion
   [ ] Acts of terrorism
   [ ] Other - Specify? _____
7. Have you undergone specific training to help deal with fire/plane crash or other emergencies at MIA? [ ] Yes [ ] No
8. What type of special training do you receive? (Please select all that apply.)
   □ CPR (Cardio-Pulmonary Resuscitation) and/or first aid training
   □ Crisis management
   □ Fire suppression
   □ Training in organization-specific disaster response plan
   □ Training in assisting persons with disabilities during a disaster
   □ Training in dealing with hazardous materials
   □ Training in helping keep others calm in a crisis

9. What is your level of disaster preparedness?

Preparedness activity	**Have done**	**Plan to do**	**Not done**	**Unable to do (why?)**
Involved in fire-fighting and first aid drills				
Involved on public education on airport emergencies				
Attended meetings on disaster management				
Read disaster management materials				
Done a course in early warning system				

10. Is there a community outreach disaster management program at MIA?

    [ ] Yes [ ] No [ ] Don't Know

AVAILABILITY OF FACILITIES AND EQUIPMENT AT MIA

11. Overall, how would you rate your organization's preparedness for a disaster or crisis?

    [] Very well prepared

    [ ] Well prepared

    [ ] Not well prepared

    [ ] Not at all prepared

12. Is the airport equipped with necessary tools for disaster management?

    [ ] Yes [ ] No

13. What is the nature of equipment and machinery for disaster management?

    [ ] Modern [ ] Ancient

14. How often are equipment and machinery serviceability checked?

    [ ] daily [ ] weekly [ ] monthly [ ] not sure

15. Does your organization have specific guidelines and/or equipment in place to help evacuate persons with disabilities such as blindness or limited mobility in the event of a disaster? [ ] Yes [ ] No [ ] Not sure
16. Does your organization have a fire/evacuation plan? [ ] Yes [ ] No
17. How do you rate MIA disaster preparedness? [ ] Satisfactory [ ] Unsatisfactory
18. Is there a disaster response center at MIA? [ ] Yes [ ] No [ ] Don't Know.
    If yes, how technically well-equipped is it in handling airport emergencies
    [ ] Very well equipped [ ] fairly equipped [ ] Not all well equipped
19. Please rate the compliance of any disaster preparedness facilities at MIA

	Facility	**Fully compliant**	**mostly compliant**	**Occasionally compliant**
a)				
b)				

COMMUNICATION AND INFORMATION MANAGEMENT AT MIA

20. What type of communication does your organization have for emergency alerts?
    - Telephone emergency tie lines
    - Emergency sirens/alarms and bells
    - Emergency lights and video display alerts
    - Emergency audiobroadcasting system
    - Other (please specify): _____
21. Does your organization have an emergency communication plan?
    [ ] Yes [ ] No
22. What does your organization's emergency communication plan consist of? (Please select all that apply.)
    - Alternate location for employees to meet
    - Emergency number for employees to check organization's status
    - Internet site for employees to check organization's status
    - Method of accounting for employees in a disaster

□ Method of actively communicating status to employees (e.g., phone tree)

□Other (please specify): _____

23. Are you aware whether MIA has a telephone exchange office?

[ ] Yes [ ] No [ ] Not sure

If yes, how easy is it to access the telephone exchange office in case of an emergency?

[ ] Very easy [ ] fairly easy [ ] Not easy [ ] Not sure

MANAGEMENT, DIRECTION AND COORDINATION AT MIA

24. Does your organization have any form of formal disaster preparedness plan in place (e.g., a plan for what to do in case of an emergency or disaster)? This would include fire drills, shelter-in-place drills, emergency communication plans, business continuity plans, etc.

[ ] Yes [ ] No

25. Does your organization have any employees who are specifically tasked with playing a leadership role in the event of a crisis? [ ] Yes [ ] No

26. How these employees are primarily selected?

□ Nomination

□ Part of job description

□ Seniority in organization

□ Volunteer

□ Others (please specify): _____

_____

27. Do you think there is a disaster preparedness/management policy for MIA

[ ] Yes [ ] No

28. What functions does your organization perform in MIA disaster preparedness plans?

□ Communicates information about available assistance programs

□ Communicates plans and procedures to employees

□ Coordinates "drills" (e.g., fire drills, etc.) to prepare employees in case of emergency

□ Coordinates offsite work location

□ Evaluates effectiveness of disaster preparedness plan

□ Trains employees in disaster plans

□ Others (please specify): _____

_____

29. Does MIA have mechanisms in place to coordinate operations with these organizations [ ] Yes [ ] No
30. Mark in the appropriate box, your opinion on JKIA disaster preparedness

Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
MIA emergency action plan helps deal with severe air crash/ fire related emergency					
MIA is well prepared and has well trained manpower to handle terror emergencies					
I am well prepared to handle any kind of disaster here at the airport					
There are good refresher courses and drills offered at MIA to enable handle any emergencies/disasters					
MIA has facilities and is well prepared to handle terror emergencies at the airport					
Foreign trained workers are better equipped to handle airport disasters than locally trained workers					

APPENDIX IV: INTERVIEW GUIDE FOR KEY INFORMANTS

1. Is there a disaster management policy for MIA?
2. If yes, what are its core highlights?
3. What disaster management programs exist at MIA?
4. What disaster resource infrastructure and possible risks/hazards exist at MIA?
5. How is existing disaster preparedness plans implemented?
6. What are the achievements in the last one year in disaster preparedness?
7. Have there been any past emergency incidents at MIA and how were they handled?
8. What future plans are there for MIA disaster preparedness?
9. Are there mechanisms to evaluate disaster preparedness activities?
10. What is the criterion for recruitment of disaster management personnel at MIA?
11. What qualities, competencies, skills and knowledge should such personnel possess?
12. What on job training/refresher training are such personnel exposed to?
13. Where are such trainings conducted (abroad or locally, probe why)?
14. What disaster management facilities exist at MIA?
15. Is there a disaster management center at MIA?
16. If yes, how is it managed (staffing, facilities, strategies)?
17. What disaster relief mechanisms are in place at MIA?
18. What are the major organizations outside MIA that collaborate in disaster preparedness andresponse with MIA (area and nature of collaboration agreement)
19. What mechanisms are in place to coordinate operations with these organizations?
20. Is there a community outreach disaster management program at MIA? Whatstrategies exist for public awareness on disaster management?
21. If yes how do you interact with the community on issues of disaster preparedness?
22. What early warning systems are in place at MIA and how are these communicated to otherorganization?