

THE UNIVERSITY OF NAIROBI

SCHOOL OF THE BUILT ENVIRONMENT

DEPARTMENT OF ARCHITECTURE & BUILDING SCIENCE

EMERGENCY RESPONSE FACILITIES FOR PERSONS IN TRAUMA

A case Study of Nairobi City

Written Thesis.

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University of Nairobi Academic year 2016/2017

Declaration

This is my original work and to the best of my knowledge it has not been presented anywhere else for award of degree.

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Signature..... Date.....

This thesis is submitted in partial fulfillment of the examination requirements for the award of Bachelor of Architecture degree, Department of Architecture & Building Science, University of Nairobi.

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Acknowledgements

This written thesis would not have been achieved without the guidance and the help of several individuals who, in one way or another, contributed and extended their valuable assistance in the preparation and completion of this study.

First and foremost, to Prof. Robert Rukwaro for accepting to be my tutor and for his patience in guiding me throughout this written thesis. Thank you for the much advice and encouragement that always inspired me throughout my Architectural academic journey.

To the Chairman Department of Architecture Arch. Musau Kimeu, Year Master Arch. Erastus Abonyo, to Prof. T. J. C Anyamba, Prof Magutu, Arch. Adnan Mwakulomba and the entire team of lectures at the department of Architecture for the much knowledge that you impacted on me during my 6 years studies.

To my Classmates for their social impact, academic critic and general support throughout my studies. To the Aga Khan University hospital, The Mater hospital and Kenyatta National Referral Hospital administrations, To Edon International Consultants Architects Under the Principal Arch. Jerry Ndong for their mentorship.

Dedication

First and foremost, to the Almighty God for protecting and guiding me all throughout my life as well as I pursue my career in Architecture.

To my Mother Hellen Chavulimu, my Sister Callary and my brother Simon for their patience, inspiration, encouragement and support as a family during my studies.

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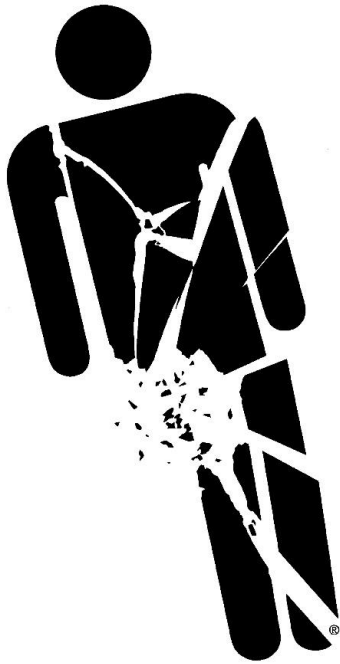
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Abstract

The main purpose of this study was to examine the current state of facilities for trauma response. This was achieved through establishing the current urban planning considerations and spatial design requirements for such facilities and thus being able to establish the challenges being encountered as well as consider appropriate interventions for efficient trauma care. Currently, the network of major medical emergency facilities in Nairobi were designed and built decades ago which are currently facing challenges of medical care due to growth in population and advancement of treatment technology in the County of Nairobi. Many facilities have already existed beyond their useful shelf life. It is for this reason that most of these facilities are not able to fully address the current challenges of trauma / emergency. Relevant literature on the study topic from different primary and secondary sources have been reviewed with intent purpose of informing the researcher. Case study approach was the most suitable for this research and it's from this that the major findings identified were issues to do with expandability and flexibility of the case study hospitals which included Kenyatta National referral hospital, Mater hospital and The Aga Khan University hospital. The key recommendations for addressing the current state of emergency facilities were established as accessibility, circulation and spatial organization which influence its efficiency.

01

INTRODUCTION



1 CHAPTER ONE - INTRODUCTION

1.1 Background of the study

Trauma is a leading cause of death and disability worldwide. Out of more than five million trauma related deaths that occur each year, more than 90% occur in low and middle-income countries (LMICs) Given the magnitude of this inequality, research efforts over the last decade have highlighted the needs for trauma care system. National governments and World Health Organization (WHO) have been emphasized to strengthen trauma care globally. (World Health Assembly, 2007 Resolution 60.22 - health Systems Emergency care).

Decreasing the burden of injury is among the main challenges for public health in this century. The World Health Organization is playing an important role in meeting this challenge. In particular, the Department of Injuries and violence prevention has spearheaded efforts to improve the spectrum of injury control activities. This includes improving and standardizing injury surveillance systems; promoting injury control policy initiatives for violence, traffic and other major sources of injury and promoting low-cost improvements in injury care, in both pre-hospital and hospital based setup. All of these efforts are needed to adequately confront the injury problem (Guidelines for essential trauma care, Geneva,2004)

Injury has been a leading cause for deaths and disabilities in Kenya and in spite of this, trauma care facilities have not been implemented adequately in order to curb cases of arising emergencies. Currently, Kenyan medical institution depends heavily on Accident and Emergency departments in case of any tragedy which has always been overwhelmed depending on the magnitude of the occurrence.

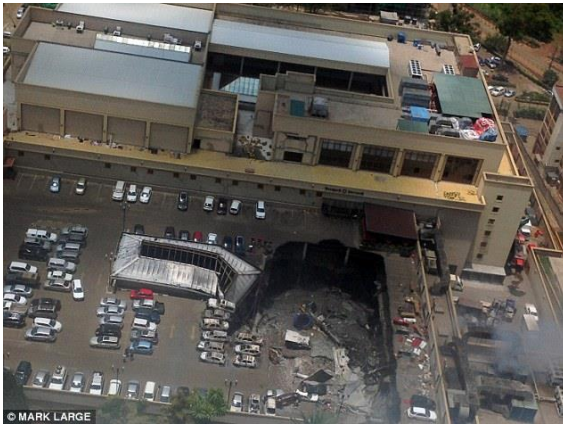


Figure 1-1 Pictured is the aftermath at Westgate Shopping Mall where the roof of the car park collapsed crushing three floors.

Source: Standard newspaper media



Figure 1-2 Collapsed in the early hours of Tuesday, 12 May 2015 in Nairobi Huruma Estate after floods and torrential rain.

Source. Kenya Red-Cross

Traumatic events are widespread and the effects of these shocking incidents permeate through the lives of individuals affected. Disasters such as road accidents, natural disasters, terrorism (Figure 1-1), fire, Industrial accidents, war, military combat injuries etcetera occur every day in every part of the world in this current generation. Responses and reactions in Kenya to these traumatic events has been in-efficient thus resulting to more deaths and poor medical emergency management.

Kenya's vision 2030 for health is to provide “equitable and affordable health care at the highest affordable standard” to her citizens. Under the Vision, Kenya will restructure the health delivery system and also shift the emphasis to “promotive” care in order to lower the nations' health burden. This will improve access and equity in the availability of essential health care and result in a healthy population that will effectively participate in the development of the nation. This improvement will be achieved by a shift from curative care in large hospitals to lowering the incidence of preventable diseases, control of environmental threats to health, and research that targets the medical needs of communities in their specific circumstances.

1.2 Problem Statement

The functional aspect of Trauma facility is very key in its planning, it is therefore important to consider that each specific space must be designed to ensure that there is safe and efficient delivery of healthcare to the critically injured patients. Treatment spaces must be determined from their individual functional activities being carried out, ergonomics of equipment installations and staff work stations. The number of staff and patients that are likely to be utilizing a specific room at a given time must also be considered e.g. during an operation procedure at the theatre. Placement of support service spaces such as ambulatory access,



Figure 1-3 An accident scene being attended by St John Ambulance paramedics

Source: St John Ambulance

laboratories, X-ray units, intensive care units, laboratories etcetera must be within the shortest distance access. It is also necessary to consider the spatial relationships between these activities at the facility. Direct access from one specific room within the Emergency Department to another is often required, and it is therefore important to consider that swift access/circulation for both medical staff and patients. Trauma care system should consist of an organized approach to facilitate and coordinate a multidisciplinary system response to provide its services.

During mass casualty after a disaster has taken place, response initiatives have always suffered a shortage of Emergency Medical Services (EMS). At approximately 12:30 pm on Saturday September 21, 2013, armed assailants attacked the upscale Westgate shopping mall in the Westland's area of Nairobi, Kenya. Using the seven key Major Incident Medical Management and Support (MIMMS) principles, command, safety, communication, assessment, triage, treatment, and transport, emergency departments (ED) within Kenyatta National Hospital, the Nairobi Hospital, the Aga Khan University Hospital (Nairobi) and others not included successfully coordinated the reception and care of all the casualties brought in by paramedic rescue teams. Individual hospitals could not handle mass casualties due to limited capacity of facilities such as Intensive Care Units (ICU), Surgical theatres etc. that were of much need during that period of emergency.

Accidents casualties along major highways such as Mombasa to Nairobi and Nairobi to Kisumu have also faced challenges of accessing medical services due to the proximity of hospitals. Due to this, majority have ended up dying as a result of delay in getting to the hospitals. According to *National Transport & JANUARY, 2016*, it clearly states that an estimated

3,000 deaths from road crashes occur annually in Kenya and about 40 % are pedestrians. This is an urgent issue to be addressed too.

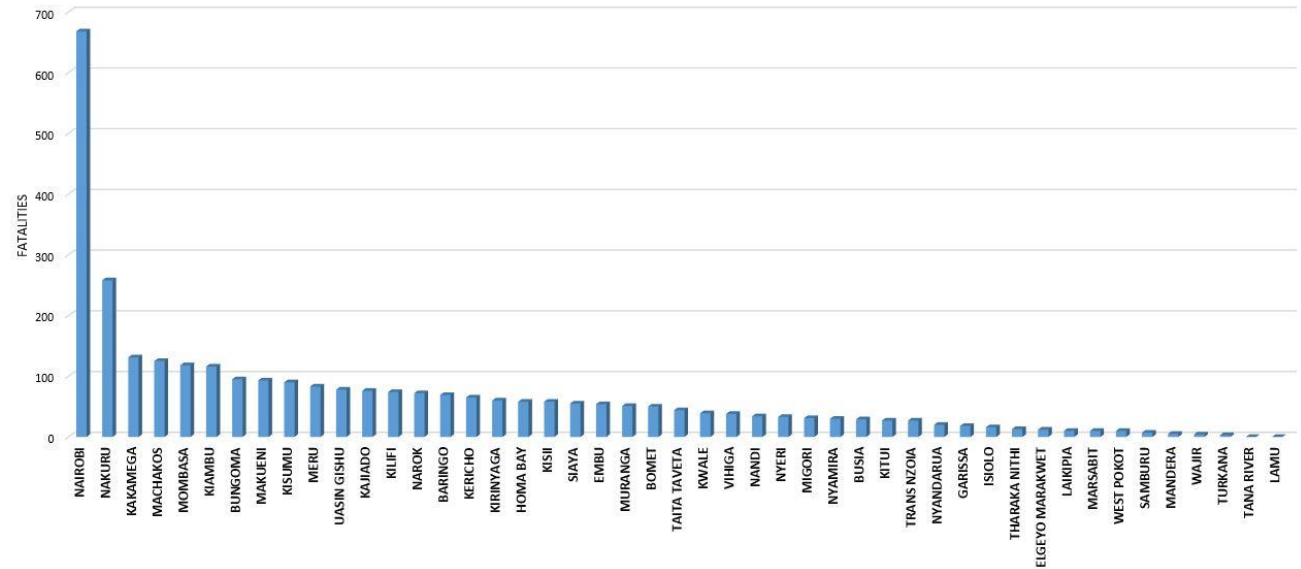


Figure 1-4 Distribution of absolute number of Road fatalities as per Counties in 2015

Source: National Transport Safety Authority(NTSA) Kenya.

The aim of this study is to critique the performance of spatial layouts and planning of Accidents and emergency facilities of existing hospitals in Nairobi and to establish the built environment challenges that they are facing in handling emerging mass disasters in the country.

1.3 Research Questions

The research questions for this study are

- i. What is the current state of facilities for trauma response?

- ii. What are the Urban design considerations for location of facilities for trauma response?
- iii. What are the spatial design requirements for facilities of persons in traumatic state?
- iv. What are the appropriate design interventions and considerations for design of facilities for persons in traumatic state?

1.4 Objectives of the Study

The objectives of this study are;

- i. To examine the current state of facilities for trauma response.
- ii. To establish the urban design considerations for location of facilities for trauma response.
- iii. To identify the spatial design requirements for facilities of persons in traumatic state
- iv. To establish the appropriate design interventions and considerations for design of facilities for persons in traumatic state.

1.5 Justification of the Study

Healthcare Planning and design in Nairobi has faced significant challenges in delivering emergency services. The benefits of successful this research shall be implementation of its findings. This shall lead to:

- i. Reduction in deaths caused by trauma especially road accident casualties.
- ii. A reduction in the number and severity of disabilities caused by trauma
- iii. An increase in the number of productive economy
- iv. A decrease in the costs associated with initial treatment and continued rehabilitation of trauma victims

- v. A reduced burden on local communities as well as the government in support of disabled trauma victims
- vi. A decrease in the impact of trauma on the “second Trauma “victims (family members and friends)

1.6 Significance of the Study

There is need to establish the current status of trauma systems in the area of study (Nairobi County) in order to improve on the concepts of how to handle the critically injured persons. The expected outcome of this study shall be of beneficiary to Architects and Planners on how best to approach the spatial design and urban planning of trauma facilities for an efficient impact in the society.

The findings of this study shall have a vital impact in creating policies that must be adhered to when setting up trauma systems or trauma facilities across the entire country. This shall improve the wellbeing of the injured persons in the society thus reducing the mortality rate. Due to limited study materials, this research also grants the privileged of adding more data in the literature archives for future academic and professional reference. This study could also provide new insights into accident and emergency (A&E) facilities thus facilitating more effective and efficient project execution in the near future. The study could also open a new forum of further studies on the unforeseen gaps in this research as discussed in chapter five conclusions and recommendations.

1.7 Scope and Limitations of the Study

This study was limited to accident and emergency trauma departments within the selected case study hospitals due to time factor, financial resources and distanced geographical location of other trauma facilities. This led me to sample out three major hospitals as my case studies which are distanced apart within Nairobi as guiding models of this study. This has been elaborated clearly in chapter Four of this study. Past theses have also extensively researched on medical facilities especially on the Nursing section and the healing environments Architecture. This study has focused broadly on the clinical section (A&E) of the three hospitals with intent purpose of understanding the challenges posing Emergency services for the critically injured persons.

The study was also limited due to difficulty of obtaining permission for carrying out the field research and photography due to the nature of activities at the A&E environment. In addition, there was very little information published on this area of study hence consuming much time to get it clearly during this research.

1.8 Definition of Terms

Trauma - Trauma is a life threatening body wound or shock produced by sudden physical injury due to an accident. It can also be a difficult or unpleasant experience that causes someone to have mental or emotional problems usually for a long time, thus trauma can either be physical or psychological medical health situation.

Trauma centre - a specialized hospital facility distinguished by the immediate availability of specialized surgeons, physician specialists, anaesthesiologists, nurses, and resuscitation and life support equipment on a 24-hour basis to care for severely injured patients or those at risk for severe injury

Emergency Department - The term "Emergency Department", rather than A&E, is the term recognised internationally by the specialty of emergency medicine. However, A&E remains the official term in use within the Department of Health (DH) and as such is used in this document.

Mass casualty – An incident is an event which causes disruption of emergency and health care services due to the large number of victims (WHO/PAHO 2001). It can also be defined as an event which overwhelms the locally available resources used for routine procedures, due to the event generating more patients/casualties than can be managed at one time, thereby requiring special and additional emergency arrangements (WHO, 2007).

1.9 Organization of the Study

Chapter one of this study gives the reader a brief introduction of the subject matter of the study. It informs the reader on the research content from a glimpse and what to expect at the end of the study.

Chapter two consists of critical assessment of existing literature on trauma response facilities from different sources such as published and non-published sources of data that focuses on the study topic. This is with intent purpose of informing the researcher on the area of the study. The parameters obtained from the literature data for this study shall be used to inform the

researcher during the field work (Research and data analysis) in chapter Four. The data collected shall also be used to conduct a comparison of the existing facilities studied so as to establish future approach in designing such facilities.

Chapter three shall entail data collection methods from existing case studies as the main research methodology which shall be used for comparison with global trends in each of the case. The data collection will focus on both local and international case studies in developed countries. It shall provide the criteria to be used in data collection for the study.

Chapter Four shall draw analysis of three case studies chosen with regard to understanding the user (critically injured persons) spatial dynamics and the functional aspects revolving around trauma facilities. These hospitals include Kenyatta Referral hospital, Mater hospital and The Aga Khan University hospital. The chapter shall outline the most efficient ways of handling critically injured trauma patients towards a functional operational facility.

Chapter Five shall recommend and outline key considerations for the design and construction of efficient trauma facilities. It shall also conclude by highlighting all the strengths and challenges noted during the study. Areas that will not have been addressed in this study shall be highlighted hence giving an opportunity for more research areas within trauma medicine.

