



UNIVERSITY OF NAIROBI

**SEVERITY AND QUALITY OF LIFE AMONG ADULT HAND INJURY PATIENTS
SEEN AT KENYATTA NATIONAL HOSPITAL**

BAT-HEIF OMAR AWADH

H58/10978/2018

**This dissertation is submitted in partial fulfillment of the requirement for the award of
the degree of Master of Medicine in Orthopaedic Surgery at the University of Nairobi.**

© Department of Surgery

2023

Declaration

1. I understand what plagiarism is and I am aware of the university's policy in this regard
2. I hereby declare that this dissertation is my original work and has not been presented as dissertation at any other university. Where other people's thought has been used, this has properly been acknowledged and referenced following the university of Nairobi requirements.
3. I understand that any false claim in respect of this work shall result in disciplinary action per University plagiarism policy

Signed.....

Date..... 8/8/2023.....

BAT-HEIF OMAR AWADH

Principal investigator

H58/10978/2018

Supervisor approval

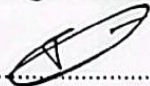
This dissertation is being submitted with the approval from the following supervisors

TOM MOGIRE

MBChB, MMed (Ortho), FCS (ECSA), Consultant Orthopaedic and Trauma Surgeon

Senior lecturer, thematic unit of orthopedic surgery, Department of Surgery, Faculty of Health Sciences, University of Nairobi, consultant orthopedic surgeon in division of Orthopedic Surgery, Kenyatta National Hospital

Email: tom.mogire@uonbi.ac.ke


Signature.......... Date..... 8/8/2023

FRED CHUMA SITATI

MBChB, MMed (Ortho), FCS (ECSA), Dip SICOT, PhD (Ortho, UoN), Consultant Orthopaedic and Trauma Surgeon

Senior lecturer, thematic unit of orthopedic surgery, Department of Surgery, Faculty of Health Sciences, University of Nairobi, consultant orthopedic surgeon in division of Orthopedic Surgery, Kenyatta National Hospital

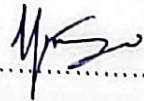
Email: fchuma@uonbi.ac.ke

Signature.......... Date..... 7/8/2023

Departmental approval.

This is to certify that this is the original work of BAT-HEIF OMAR AWADH (H58/10978/2018) having been presented at the dissertation meeting of the Orthopaedic Surgery Thematic Unit on 20th August 2022. It was subsequently approved for submission to Kenyatta National Hospital and University of Nairobi Ethics and Research Committee (KNH/UON-ERC).

This work has been done under the guidance of my supervisors and this is to confirm that this dissertation has not been presented at the University for any Ward

Signature.....  Date 10/08/2023

VINCENT MUTISO

Thematic head Orthopedic Unit, Department of surgery

Email: mutiso@uonbi.ac.ke

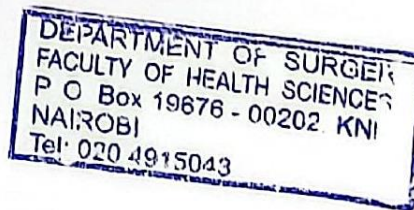
jr Signature.....  Date 15-8-2023

JULIUS KIBOI

Chairman Department of Surgery

Faculty of Health sciences

University of Nairobi



Acknowledgement

I would like to acknowledge the input and guidance of my supervisors Dr. Tom Mogire and Dr. Fred Sitati which has been very valuable and for the support they have given me through all the stages of my thesis.

Dedication

I would like to dedicate this thesis to my parents Mr. Awadh Swaleh Bat-heif and Mrs.Sahale Abdallah Bakhshuwein for their unwavering love and support. To my wife Dr. Janan Malik who has been my companion and constant support throughout this period and to my son Eihab Omar Bat-heif for being the joy of our lives. To my siblings Mrs. Swabah Awadh Bat-heif and Mr. Swaleh Awadh Bat-heif for their unwavering support.

I would also like to dedicate it to my colleagues, who have been my mentors, my collaborators and my friends. Your guidance, feedback and encouragement have been invaluable to me throughout this journey. I am grateful for the opportunities to learn and grow alongside you.

Table of contents

| | |
|---------------------------------------|-------------------------------------|
| Declaration..... | Error! Bookmark not defined. |
| Supervisor approval..... | Error! Bookmark not defined. |
| Departmental approval..... | Error! Bookmark not defined. |
| Acknowledgement | v |
| Dedication..... | v |
| Table of contents..... | vi |
| List of tables..... | x |
| List of Figures..... | xi |
| Acronyms..... | xii |
| ABSTRACT..... | xiii |
| 1. INTRODUCTION | 1 |
| 1.1. Background | 1 |
| 1.2. Problem statement..... | 5 |
| 1.3. Study Justification..... | 6 |
| 1.4. Research question..... | 6 |
| 1.5. Objectives..... | 7 |
| 1.5.1. Broad objective | 7 |
| 1.5.2. Specific objectives | 7 |
| 2. LITERATURE REVIEW | 8 |
| 2.1. Epidemiology of hand injury..... | 8 |

| | | |
|--------|---|----|
| 2.2. | Nature and severity of hand injuries | 9 |
| 2.2.1. | Severity of hand injury using the Modified Hand Injury Severity Score (MHISS).. | 11 |
| 2.3. | Quality of Life among hand injury patients | 13 |
| 2.4. | Factors associated with quality of life among hand injury patients | 15 |
| 2.5. | World Health Organization quality of life BREF | 18 |
| 2.6. | Validation of WHOQOL-BREF..... | 19 |
| 2.7. | Modified hand injury severity score (MHISS)..... | 19 |
| 2.8. | Conceptual framework | 20 |
| 3. | METHODOLOGY | 21 |
| 3.1 | Research design..... | 21 |
| 3.2 | Study setting | 21 |
| 3.3 | Eligibility Criteria | 21 |
| 3.3.1 | Inclusion Criteria..... | 21 |
| 3.3.2 | Exclusion Criteria | 22 |
| 3.4 | Sample Size | 22 |
| 3.5 | Sampling procedure..... | 23 |
| 3.6 | Recruitment procedure | 23 |
| 3.7 | Research instruments..... | 23 |
| 3.7.1 | Quality of life | 24 |
| 3.7.2 | Modified Hand Injury Severity Score (MHISS) | 25 |
| 3.8 | Validity and Reliability | 25 |
| 3.9 | Data collection procedure..... | 26 |

| | |
|---|----|
| 3.10 Variables in the Study | 26 |
| 3.11 Quality Assurance | 26 |
| 3.12 Data management and analysis | 27 |
| 3.12.1 Data entry | 27 |
| 3.12.2 Data storage and archival | 27 |
| 3.12.3 Data Analysis | 27 |
| 3.13 Ethical consideration | 28 |
| 3.14 Study Strengths | 28 |
| 3.15 Study Limitations and delimitation | 29 |
| 4. RESULTS | 30 |
| 4.1. Characteristics of hand injury patients attending orthopaedic clinic at Kenyatta National Hospital..... | 30 |
| 4.1.1. Demographic characteristics of hand injury patients | 30 |
| 4.1.2. Hand injury related characteristics among patients attending orthopaedic clinic at Kenyatta National Hospital..... | 31 |
| 4.2. The level of severity among adult hand injury patients attending orthopaedic clinic at KNH | 33 |
| 4.3. The quality of life for adult hand injury patients attending orthopaedic clinic at KNH | 34 |
| 4.3.1. Domains of quality of life among hand injury patients..... | 34 |
| 4.3.2. Overall quality of life among hand injury patients | 35 |
| 4.4. Factors associated with quality of life among adult hand injury patients attending orthopaedic clinic at KNH..... | 35 |
| 5. DISCUSSION | 37 |

| | |
|---|----|
| 6. CONCLUSION AND RECOMMENDATIONS..... | 43 |
| 6.1. Conclusion..... | 43 |
| 6.2. Recommendations | 43 |
| REFERENCES | 44 |
| APPENDICES | 51 |
| Appendix A: Questionnaire/data tool..... | 51 |
| SECTION A: Patient characteristics | 51 |
| Appendix B: Informed consent | 62 |
| Kiambatisho C: Hojaji ya masomo | 68 |
| Appendix D: UON/KNH ERC Approval..... | 72 |
| Appendix E: Nacosti research License..... | 74 |
| Appendix F: Similarity Report..... | 75 |

List of tables

| | |
|--|----|
| Table 1: Demographic characteristics of hand injury patients attending orthopaedic clinic at Kenyatta National Hospital..... | 30 |
| Table 2: Domains of quality of life among hand injury patients | 34 |
| Table 3: Factors associated with quality of life among adult hand injury patients attending orthopaedic clinic at KNH. | 36 |

List of Figures

| | |
|---|----|
| Figure 1: Mechanism of injury | 31 |
| Figure 2: Site of injury | 32 |
| Figure 3: Type of injury | 32 |
| Figure 4: Site of limb injury..... | 33 |
| Figure 5: The level of severity of hand injury | 34 |
| Figure 6: Overall quality of life among hand injury patients..... | 35 |

Acronyms

| | |
|-------------|---|
| CISS..... | Cold intolerance severity score |
| DASH..... | Disability of the arm, shoulder, and hand |
| HISS..... | Hand injury severity score |
| KNH..... | Kenyatta national hospital |
| MHISS..... | Modified hand injury severity score |
| PTSD..... | Post traumatic stress disorder |
| QOL..... | Quality of life |
| RTA..... | Road traffic accident |
| SDI..... | Socio-Demographic Index |
| UON..... | University of Nairobi |
| WHO..... | World health organization |
| WHOQOL..... | World health organization quality of life |

ABSTRACT

Background: Hand injuries encompass a wide range of conditions, including fractures, dislocations, lacerations, crush injuries, amputations, and nerve or tendon injuries. The severity of these injuries can vary significantly, with some requiring simple first aid and others necessitating complex surgical interventions and extensive rehabilitation. Majority of these being occupational based injuries. This means that these injuries have a direct impact on patient financial, social and psychological wellbeing. The severity of the injury has also been found to have a greater influence on individual wellbeing. The quality of life among hand injury patients has not been fully investigated in the local context with existing literature showing fractures as common type of hand injury.

Purpose of the study: To determine the association between level of severity and quality of life among hand injury patients attending orthopaedic clinic at Kenyatta national hospital

Methodology: This was an analytical cross-sectional study conducted at Kenyatta National hospital. A consecutive sampling technique was used to sample 76 patients attending clinic after three months since injury to the hand occurred. The Modified Hand Severity Score (MHISS) and the World Health Organization Quality of Life (WHOQOL) were used to measure severity and quality of life respectively. A structured questionnaire including these validated tools and patient specific information such as demographic characteristics, cause of injury and nature of injury were used.

Data analysis: Median with interquartile range were used to describe characteristics of the study participants. Categorical data were analyzed using frequencies and percentages. Logistic regression analysis was used to investigate factors associated with quality of life

among hand injury patients. *P value* <0.05 was considered statistically significant. A Stata version 16 was used to analyze data.

Results: The median age was 33 (IQR: 27 – 42.5) years with 61.8% (n =47) of them aged ≤35 years and 80.3% (n =61) were male. In investigating the mechanism of injury, 31.6%(n =24) of hand injuries were caused by machinery while 21.1%(n =16) had motor vehicle accident, 69.7%(n =53) were injured on right hand. The median MHISS score was 56(IQR: 33.5 – 90.8). The categorization of the MHISS established that 40.8%(n =31) had severe injury, 35.5%(n =27) had moderate injury, 13.2%(n =10) had major injury while 10.5%(n =8) had minor injury. The mean quality of life based on the WHOQOL tool was 46.7±11.12 with 38.2%(n =29) classified as good quality of life while majority 61.8%(n =47) classified as having poor quality of life. Female patients, OR =5.16, 95%CI:1.07 – 24.86, p =0.041, having secondary level, OR =6.72, 95%CI:1.17 – 38.50, p=0.032, patients who had fracture injuries, OR =6.91, 95%CI:2.39 – 19.95, p<0.001 and those with minor or moderate injury, OR =8.22, 95%CI:2.84 – 23.82, p<0.001 were significantly associated with poor quality of life.

Conclusion and recommendations: Most of the hand injury patients had severe or major injuries with many of the patients having poor quality of life. Female patients, having secondary level of education, fracture injury and severe or major injuries were significantly associated with poor quality of life. Provide counselling sessions to hand injury patients by focusing on their physical, psychological, social and environmental wellbeing.

1. INTRODUCTION

1.1. Background

Hand injuries comprise between 6.6% and 28.6% of body injuries. Despite the small proportion of these injuries, hand injuries pose a significant risk of causing long-term physical and functional disability, as well as emotional impairment (1). Among the young adults, the main cause of work-related disabilities is hand injuries. On aetiologies to these work-related hand injuries, operating machines without adequate training is the main contributor (2). The burden of these injuries in the young adult population is far reaching including workplace absence, and need for professional re-orientation, both which are associated with considerable social economic implications (3). A recent study on global burden of disease has maintained that global trends of hand trauma and injuries have showed a gradual decline in hand injuries. The age-standardized incidence of hand and wrist fractures was 179 per 100 000 in 2017, with a 95% uncertainty interval (UI) ranging from 146 to 217. On the other hand, the incidence of less common injuries such as thumb and non-thumb digit amputation was 24, with a 95% UI ranging from 17 to 34, and 56, with a 95% UI ranging from 43 to 74, respectively. Injury rates can vary substantially from place to region, and advances have not been delivered in an even manner. Countries with a high socio-demographic index (SDI) have the greatest reported prevalence of hand trauma while countries with a low-middle or middle SDI have recorded hand injury prevalence of up to 25% (4).

In the United State of America (USA), the incidence of hand injuries among workers range from 5% to 11% while in the United Kingdom, the hand injuries are estimated to affect between 5% and 30% of the workers every year with lifetime prevalence of these injuries estimated to range from 15% and 46%. Hand injuries involved the thumb representing over

50% of all the hand injuries. In most of those with the hand injuries, the main risk factors included performance of manually operated appliances, routine workloads, attending to a high client flow, working while unhealthy, finger muscles weakness, phalanges hypermobility, and thumb joint instability (5).

In Poland for instance, it was found that injuries to the hand frequently led to tendon damage (56.1%), particularly in the finger flexors (79%) and skin loss (37.8%). Amputations were necessary in 24.1% of the patients, while fractures accounted for 9.6% and injury to nerves or joints accounted for just 5.5%. Using the Hand Injury Severity Score (HISS) system, the severity of the injuries was moderate in 28.6% of the cases, severe injuries were sustained by 25.5% or more of the patients (26.5%), and minor injuries were relatively uncommon in 19.4% of the instances (6).

The burden of hand injuries in low resource settings has been found to be significantly higher (9). A recent study in a Uganda tertiary hospital it was found that the workplace accounted for 36 percent of all injuries, followed by the home (28 percent) and then traffic crashes, which accounted for 23 percent. The second most prevalent cause of injuries was shattered glass (10%), followed by knives (10%). The most common cause of injuries was machines (21.3%). At the one month mark, 63 patients (or 51% of the total) continued to experience pain negatively impacting their quality of life (7). In Nigeria it has been identified that hand injuries account for 54.4 percent with higher prevalence in male.

The quality of life among and injury patients has not been investigated despite the clear direct relationship between hand injuries and individual ability to work and wellbeing of patients. Today, World Health Organization (WHO) defines Quality of Life (QoL) as “perception by individuals of their position in life, in the context of the culture and value systems in which

they live and in relation to their goals, expectations, standards and concerns.” Hand trauma sequelae are often serious, but a significant majority of the patients survive with disability which requires gradually recovery, progressive hand function assessment for improvement. In addition, these injuries impact negatively on personal holistic health status, occupation satisfaction but with time, they witness progressive improvement on quality of life (9). Hand injuries lead to time off work. In a recent study, persons who hand injuries had missed to report to work on average 8 weeks while they were also on regular rehabilitation program for an average 9 weeks (10). In addition, the study identified injury severity, times of operation, nature of operation, and compensation claims as the main factors determining the length of absence from work place secondary to hand injuries. Another important finding was that the absence from work was significantly shorter compared to the duration of rehabilitation among those with minor and moderate severe injuries while those with major severe injuries reported longer days off work and rehabilitation days (10).

Several studies have illustrated a strong relationship between quality of life and severity of hand injury. Marinkovic *et al.* (10) in investigating the quality of life and hand injury severity found that there was a negative correlation on all the four domains of quality of life (WHOQoL BREF) and severity of the injury (10). Similarly, Reitan *et al* (11) also found that individuals who had severe hand injuries had low quality of life majorly because they were highly dependent (11). Kovacs *et al.* (12) also found that in investigating quality of life and the severity of hand injury, patients who experienced pain and pressure sensations had significantly lower levels of life satisfaction, lower levels of health satisfaction, higher levels of anxiety and depression, and higher levels of body dysmorphic disorder than patients who did not experience pain and pressure sensations. General life satisfaction in this hand-injury study group was highly dependent on the patients' satisfaction with their health and

appearance as well as self-confidence (12). However, there is paucity of data on the association between quality of life and hand injury severity in local context.

In a survey conducted at KNH accident and emergency department, 8 – 12% of trauma cases attended to were hand injuries (13). A recent study at KNH revealed that the bulk of hand injuries were fractures, accounting for 42.5% of the total, followed by tendon injuries, accounting for 25% of the total, and traumatic amputations of the fingers, accounting for 22.5% of the total (14). According to the Modified Hand Injury Severity Scoring method, the majority of patients (37.5% of them) sustained minor injuries. The least number of patients sustained serious injuries (14%), while major injuries contributed 26%, moderate injuries provided 23%, and severe injuries contributed 14% (14). However, assessment of the quality of life among these patients has not been documented.

1.2.Problem statement

Available evidence indicate that hand injuries pose a serious problem to the patient, impairing the activities of daily living as well as affecting the quality of life. The impairment affects the level of hand functioning, compromising the person's productivity level before adapting and improving overtime for some. For the hand injuries, the main affected parts are the fingers as was demonstrated by an analysis of the data from National Electronic Injury Surveillance System (NEISS) database from the USA. In that analysis, there were 444 finger injuries compared to 200 shoulder injuries and 181 wrist injuries in 100000 persons (15).

The effects of hand injuries can be serious touching on a person's productivity and health capacity, despite the fact that some of those injured can recover with time. In assessing the recovery process, the main areas of focus include hand function, job performance satisfaction, perceived health status, and overall quality of life. The mental impact of hand injuries is manifested by the statistics indicating that nearly one out of three of those with hand injuries meet the diagnostic criteria for PTSD, depression, and anxieties (7)(8). Over and above the health implications resulting from hand injuries, the patients also witness an average 8 weeks job absence, 9 weeks of rehabilitation, heavy financial burden, and compensation claim challenge. The severity of the injuries is significantly associated with the time a patient will be away from work and rehabilitation period (12). Hand injuries are common in Kenya; however, the quality of life of these patients has not been documented. This provides the basis for this study which seeks to investigate the association between level of severity and quality of life of hand injury patients.

1.3.Study Justification

Hand injuries are one of the commonest injuries presenting in hospitals accident and emergency departments globally (16). Having hand injury limit an individual to perform their work effectively which can have a negative implication on their general wellbeing (17). In addition to technical skills of the surgeon, total recovery from hand injury is dependent on committed physical therapy and compliance to recovery plan (18). The contemporary treatment for hand injuries are much more holistic in approach and target not only averting short-term morbidity but also long-term outcomes, patient wellbeing, reduced delays to resuming work, minimizing cost implications, and improving the quality of life. Following severe or major hand injury, a person`s adaptation evolves over time. An effective pathway for achieving high standards quality of life relies on patient being able to balance limits after the injury and possibilities within the patient scope as the patient identifies them (12). The patient should also be advised that adaptation after an injury is an evolving longitudinal process, which varies from one patient to the other. Pain, depression, anxiety and pressure sensations have been associated with low quality of life among hand injury patients (11). However, there is a dearth of literature exploring the severity of injuries and the impact these injuries have on various aspects of their lives. Understanding the severity of hand injuries and quality of life is essential in developing better recovery and management approaches which can help improve efficiency and improved personal wellbeing among hand injury patients.

1.4.Research question

What is the association between level of severity and quality of life among adult hand injury patients attending orthopaedic clinic at Kenyatta National Hospital?

1.5.Objectives

1.5.1. Broad objective

To determine the association between level of severity and quality of life among hand injury patients attending orthopaedic clinic at Kenyatta National Hospital (KNH)

1.5.2. Specific objectives

- i) To determine the level of severity of hand injury patients attending orthopaedic clinic at KNH
- ii) To evaluate the quality of life for adult hand injury patients attending orthopaedic clinic at KNH.
- iii) To determine factors influencing the quality of life among adult hand injury patients attending orthopaedic clinic at KNH.

2. LITERATURE REVIEW

2.1.Epidemiology of hand injury

The increasing rate of industrialization and machine reliance has been a significant mover of the incidences of hand injuries, which accounting for 10–15% of the outpatient injury cases seen at the emergency departments in developed countries (19). Interestingly, over 70% of these hand injuries result from machine operations, and can be adequately prevented through proper machine training and adjusting variables at workplace to lower the risks (19). The prevalence varies from country to country, with data indicating that roughly 18 million people report hand injuries annually in the USA. A study conducted in Uganda’s largest referral facility showed that 6% of trauma cases seen at accident and emergency department were hand injuries (9). The negative impacts associated with hand injuries go beyond the health issues to incorporate loss of jobs, financial implications due to care, low productivity at work, missing workplace due to either sick leave or due to being in rehabilitation program. The undeniable impact of hand injuries at personal, organizational and community level calls for more effort on creating awareness and improving management of hand injuries, especially in developing countries where such injuries are managed by non-specialists (20).

An injury to the hand can instantly reduce a patient's ability to execute the activities of daily living, as well as make such activities increasingly difficult for the patient over time (12). The avoidance of these injuries will contribute to the reduction of disabilities, which will in turn lead to an increase in the levels of production attained by individuals, families, and society as a whole. The majority of hand injuries that occur in developing nations are typically avoidable, whereas the majority of hand injuries that occur in developed countries are either congenital or the result of accidents involving heavy machinery (1). It is critical to have a

critically wounded hand well-handled so that infections can be avoided, injured tissues can be saved, healing can be accelerated, and function can be restored (21). In order to make the necessary corrections, inventive surgical skills are required, such as those offered by reconstructive hand surgery (22).

2.2.Nature and severity of hand injuries

The type and nature of the hand injuries determine the quality of remnant hand functioning. Hand injuries can range from minor injuries such as soft tissue injuries with examples of bruises, lacerations, and injuries to tendon, nerves or blood vessel to complicated injuries such as fracture of the hand bones, and traumatic amputations. A retrospective study by Dinesh *et al.* (23) the most injured phalanges were the little finger (25.6%) and the ring finger (21.1%). In the same study, the mainly affected region during hand injuries was the distal phalanx. Also, majority of the injuries were described as combined injuries, given they involved tissue injuries, open fractures, and dislocations. Moderate grade of HISS was observed in 53.3% of cases.

In terms of the affected hand, Abebe et al(24) reported the right hand as the most affected hand compared to the left hand. However, this could be misconstrued given that right-handed persons are the majority in a population. In that study, tendon injuries were the most prevalent hand injuries followed by injuries to the tip of the fingers. The rate of hand injuries was noted to multiply by two between injuries seen in the first year and those recorded in the second year of the study period (24). Al Husuny (25) revealed that 62.1% of the respondents had finger injuries while 32.4% had open fractures (25). According to Sorock *et al.* (26) 83% of the patients had one type of injury while 13% had two injuries with laceration being the

common type of injury. In investigating the location of injury on the finger, distal finger was the common location of injury (57.6%), medial (26.6%) and proximal (15.8%).

A cross sectional study by Altan et al (27) assessing severity of hand injuries revealed that the average HISS score was 37.1 which indicate a moderate injury. The findings further established that the average return to work time was 80 days with a range of 7 to 300 days, returning to their previous places of work with 79% changes the job activities (27). Echchaoui *et al.* (28) investigating occupational hand injuries established that open fractures (27%) and tendon injuries (19%) were the two types of injuries that occurred most frequently. The range of patients who were found to have a partial permanent handicap after they had recovered was from 5% to 45%. At the 8-month follow-up, 60.4% patients had returned to the occupation they had held before the illness.

Wairegi *et al.* (14) study conducted at Kenyatta National Hospital assessing pattern of hand injuries, it was found that the most of hand injuries were fractures, accounting for 42.5% of the total, followed by tendon injuries, accounting for 25% of the total, and traumatic amputations of the fingers, accounting for 22.5% of the total. According to the Modified Hand Injury Severity Scoring method, the majority of patients (37.5% of them) sustained minor injuries. The least number of patients sustained serious injuries (14%), while major injuries contributed 26%, moderate injuries provided 23%, and severe injuries contributed 14%..

Another study conducted in the United States Saxena *et al.* (29) assessing the severity of hand injuries using the hand injury severity score found that majority of the patients had severe hand injuries (53%). Further, a single centre study conducted in Poland by Dębski and Noszczyk (6) in 2021 revealed that 56 percent had tendon damage with 79% of them being

finger flexors and 37.8 percent in skin loss. The findings also revealed that based on HISS assessment tool, 28.6 percent of the patients had moderate hand injuries, 25.5 percent had severe injuries while 26.5 percent had major injuries.

Kaisha and Khainga (13) found that the most common causes of hand injuries were those that occurred on the job and as a result of physical violence. The majority of victims suffered from lacerations, fractures, and tendon injuries. The most prevalent places for damage to occur on the digits were the distal phalanges of the ring finger and the long finger.

2.2.1. Severity of hand injury using the Modified Hand Injury Severity Score (MHISS)

Hand injuries encompass a wide range of conditions, including fractures, dislocations, lacerations, crush injuries, amputations, and nerve or tendon injuries. The severity of these injuries can vary significantly, with some requiring simple first aid and others necessitating complex surgical interventions and extensive rehabilitation (30).

Lacerations and abrasions are some of the most common hand injuries. Lacerations are deep cuts or tears in the skin and underlying tissues, often caused by sharp objects. Abrasions, on the other hand, are superficial injuries resulting from friction or scraping. Treatment for these injuries involves cleaning the wound, suturing (if necessary), and providing appropriate wound care to prevent infection.

Hand fractures involve the breakage of bones in the hand, which can occur in the fingers (phalanges), metacarpal bones (bones of the palm), or carpal bones (wrist bones). Fractures can result from direct impact, falls, or crush injuries. Treatment options vary depending on the type and severity of the fracture but may include casting, splinting, or surgical fixation.

Dislocations occur when the bones of a joint are forced out of their normal position. In the hand, common dislocations include the metacarpophalangeal (MCP) joint dislocation. Treatment involves prompt reduction (repositioning) of the joint to restore proper alignment. Sprains and strains involve injuries to the ligaments or muscles in the hand. These injuries are often the result of overstretching or twisting the hand during activities. RICE (Rest, Ice, Compression, Elevation) therapy is commonly used to manage sprains and strains (1).

Measuring the severity of hand injuries typically involves assessing factors such as the type and extent of the injury, the involvement of bones, tendons, nerves, and blood vessels, and the impact on hand function and mobility. Various scoring systems and assessment tools, such as the Hand Injury Severity Score (HISS) or the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire, are commonly used to quantify the severity of hand injuries and guide treatment decisions (31).

The Modified Hand Injury Severity Score (MHISS) is another validated tool used to assess the severity of hand injuries. It consists of six domains: wound size, wound location, nerve injury, tendon injury, bone injury, and joint injury. Each domain is scored on a scale of 0 to 4, with a higher score indicating a more severe injury. The scores from each domain are then added together to give a total MHISS score, which ranges from 0 to 24 (32).

The severity of hand injury can be categorized based on the MHISS score as follows:

- Minor: MHISS score of 0-20
- Moderate: MHISS score of 21-50
- Severe: MHISS score of 51-100
- Major: MHISS score of > 100

The MHISS considers a wider range of injury types than the MHISS, including nerve, tendon, bone, and joint injuries. However, it is important to note that the MHISS is just one tool used to assess the severity of hand injuries and should be used in conjunction with other clinical assessments and imaging studies to make a comprehensive diagnosis and treatment plan (33).

Capkin *et al.* conducted a retrospective study assessing initial injury severity, the findings revealed that the mean overall MHISS was 125.23 (5–880). The average overall upper extremity disability ratio (UEDR) was 17.64 (0 – 94), and the mean overall total body disability ratio (TBDR) was 10.57 ± 13.45 (0 – 56). A majority of the patients (92.5%) resumed to work with an average duration before returning to work of 138.69 (35–365) days. The findings further established that the duration of absence from work was significantly influenced by MHISS (18).

Similarly, Tezel *et al.* in a study conducted in Turkey assessing the association between injury severity, hand function and return to work within a year revealed that the MHISS average score was 84.5 which show a severe injury. The scores ranged between 20 to 151 highlighting that some of the patients had major hand injuries (34). These findings illustrated that severity of hand injury was associated with hand functions and pinch strengths.

2.3. Quality of Life among hand injury patients

In the current literature, the concept of quality of life is quit complex but with notable similarities on how different persons attempt to define the concept. Schumacher bemoans that the concept of quality of life in health perspective is a latent construct that is difficult to observe directly. He agrees that the assessment of quality of life is best indicated by indirect indicators such as emotional status, physical health, physical ability, social interactions,

cognitive function, and life satisfaction (33). Patrick, in his article concurs with Schumacher postulation on quality of life, but goes a step further to subdivide concept into four categories. The first category focus on an individual's disease related physical complaints and considers this component as crucial to primary determinant of impairment of one's quality of life (12). The second category as by Patrick relates to the psychological condition, which encompasses aspects of emotional status, general wellbeing and life satisfaction. The third category relate to the disease related functional impairments touching on the daily scenarios such as profession, household and leisure time. Lastly is the interpersonal relationships and social interactions in terms of affiliated disease impairments (3).

A study conducted by Kovacs *et al.* in Germany investigating quality of life after severe hand injury utilized (DASH (Disability of the Arm, Shoulder, and Hand), FLZ(M) ('Fragen zur Lebenszufriedenheit'), HADS (Hospital Anxiety and Depression Score), BDDE-SR (Body Dysmorphic Disorder Examination-Self Report which assessed quality of life. Their results showed that patient who experienced pain and pressure sensations reported low scores on life satisfaction, health status satisfaction, increased anxiety, signs of depression, and elevated concerns of dysmorphic disorder. Patients who did not experience pain and pressure sensations had significantly higher levels of life satisfaction (12).

In their systematic review study, Grob *et al.* analysed data from nine articles, mainly longitudinal cohort studies or cross-sectional studies, retrieved from Medline, Psych INFO, PubMed, EMBASE, and CINAHL databases that were published from 2008 through 2020 on quality of life and hand injuries. The nine articles had a total of 503 participants, with majority reporting high levels of anxiety (71%) and 7% identified with depression. Post-traumatic stress disorder was identified among 3% to 95% of the patient involved in the study. The severity of the injury, discomfort, limb dysfunction, unfavourable evaluations of

injured limbs, poor coping techniques, and insufficient social support were indicated as factors that predicted psychological sequelae of hand injuries. The symptoms continued to be present even after long durations of follow-up, however they became significantly less severe after three months had passed (36).

A study conducted in Germany investigating quality of life among hand injury patients utilized the EuroQol five-dimensional (EQ-5D) descriptive system. The findings established that the quality of life based on the five dimensions was high with a median value of 0.898 with a minimum of 0.8 and a maximum of 1 (17). Another study conducted in Netherlands investigating health related quality of life among hand injury patients established that health-related quality of life improved from 2.5 to 24 months although it remained low compared to quality of life in general populations. The more proximal upper extremities injuries had a lower health related quality of life and a slower recovery of health related quality of life than distal injuries (37). Reitan *et al.* in a study conducted in Sweden established that majority of hand injury patients had lower quality of life with majority of the patients stating that their inability to work and provide for their families were major challenges (11).

2.4. Factors associated with quality of life among hand injury patients

A descriptive survey study conducted in Norway assessing factors associated with quality of life among hand injury patients, Quick DASH, SF-36, Visual Analogue Scale (VAS) and Cold Intolerance Severity Score (CISS) were measured (29). The findings revealed that patients with more severe injuries (Modified HISS) had a higher Quick DASH and CISS score as well as a greater degree of functional impairment ($p < 0.05$) (29). The findings reported no significant differences when compared the groups within their different characteristics such as age, gender, past occupation, and the injured hand. However, men

compared to women had reported significantly milder functional impairment in Quick DASH assessment (29). In their study, Kovacs *et al.* identified satisfaction in health status, body image, and self-confidence were significant factors influencing the perception of general life satisfaction among those with hand injury (12). Progressively, those with injured hand reported improvements in quality of life despite the hand remaining impaired (12).

Another cross-sectional study by Marinkovic *et al.* (10) in Serbia in 2015 assessed quality of life of patients with hand and arm injuries using the World Health Organization Quality of life (WHOQL) tool. Among those with minor hand injuries, there was a weak correlation associating MHISS and quick DASH score, but other groups did not report any association in the two parameters. The physical domain recorded the least score on quality of life with social domain being associated with highest score. Significantly, the four domains of the WHOQL BREF tool had a negative correlation in reference to quick DASH parameters for the involved groups. These findings have showed that quality of life was less influenced by the severity of injury compared to patient's perception of disability.

A retrospective study conducted by Reitan *et al.* (11) in a study conducted in Sweden in 2019, it was found that it was discovered that patients with more severe injuries (Modified HISS) had a higher Quick DASH and CISS score as well as a greater degree of functional impairment ($p < 0.05$). Groups' characteristics such as age, gender, past jobs, and the injured hand were found to have no major differences. However, male patients recorded fewer functional impairment cases than female with hand injuries. In an overall assessment, patients who had the hand injury at or after 65 years old reported high-level quality of life and minimal functional impairment.

Hand injuries have been associated with increased psychological impact which negatively influences their quality of life. According to Turkington, persons who are motivated and psychologically stable tend to recover well from hand injuries, regardless of how severe the injuries are. Successful therapy options have been presented for individuals who struggle mentally to manage. There is increasing need to help patients with hand injuries to cope with changing interaction and their inability to meet personal needs (38).

Working with patients who have sustained severe hand injuries has a major emphasis on their psychological wellbeing which has a direct influence on their life. Patients with hand injuries related to their jobs avoided going back to work more frequently after six months than patients with injuries unrelated to their jobs (39). This could be brought on by a variety of things, such as post-traumatic stress disorder (PTSD), flashbacks to the initial injury, anxiety about being judged by co-workers or employers, and concerns about one's looks. Long after the wound has healed, patients may continue to keep their hands in their pockets or wear bandages and splints (40).

In their study, Putter *et al.* (41) evaluated the financial and economic impact around hand injuries. The findings showed that the heaviest economic burden in hand injury resulted from amputation injury and complex lacerations in terms of care and loss of working days. Unlike injuries occurring during leisure activities, those happening at workplace are often more serious, complex, and required high-level rehabilitation services in order to regain the work-related hand skills. As such, work-related hand injuries are costlier. In addition, the true economic implications of hand injury are highly underestimated, especially if labour cost is unaccounted when estimating the cost.

2.5. World Health Organization quality of life BREF

There are numerous generic tools available to assess life quality. The WHOQOL, a tool created by the World Health Organization (WHO), measures a variety of subjective elements of quality of life (42). One of the most well-known tools for comparing quality of life across cultures is the WHOQOL-BREF, which is accessible in more than 40 languages (43). The United States, the Netherlands, Poland, Bangladesh, Thailand, India, Australia, Japan, Croatia, Zimbabwe, and other more nations, including Kenya, have embraced it. It was highlighted throughout the process of developing the WHOQOL that quality of life is a multidimensional notion (44). With accordance with the internationally recognized criteria of the WHO, which includes both forward and backward translations as well as discussions in focus groups (45). In clinical trials, when only brief measurements are required, an abridged version of the WHOQOL-BREF that comprises only 26 items is appropriate. This form can also be used in epidemiological research, where quality of life may be one of several variables that are used to determine the results. The WHOQOL BREF examines four distinct aspects of an individual's quality of life. Validation of the WHOQOL across cultures is now being conducted by the WHOQOL group (46).

The WHOQOL-BREF has 26 items distributed across four domains. The physical health domain has seven items, the psychological health domain has six items, and the social relationships have three items while environmental health has eight items. In addition, the WHOQOL-BREF contains items pertaining to quality of life and general health. Each individual item of the WHOQOL-BREF is assigned a score ranging from one to five on the scale (47). After that, a linear transformation is used to convert the scores to a 0 –100 scale. Mobility, daily activities, functional ability, energy, pain, and sleep are some of the topics included in the physical health area of the questionnaire. Measures of the psychological

domain include mentality, learning ability, memory focus, religion, and self-image, as well as negative ideas, good attitudes, and self-esteem (48).

2.6. Validation of WHOQOL-BREF

This tool has been validated across different parts of the world where comparable level of validity and reliability have been assessed. In a study conducted in the United States assessing validity of quality of life scale established that both the internal consistency of the WHOQOL-100 (US version) and its reproducibility are satisfactory, with alpha values ranging from 0.82 to 0.95 across domains within two weeks retest (42). Projected score change, effect size, among women after delivery shows that the score improves with time. This was done in order to determine whether or not it was responsive to change in clinical settings. The construct validity of the instrument was proven by (1) its connection with the Subjective Quality of Life Profile and the Short Form-36, and (2) its ability to differentiate across the various samples used in this investigation (49). A Swahili version of WHOQOL-BREF tool is available.

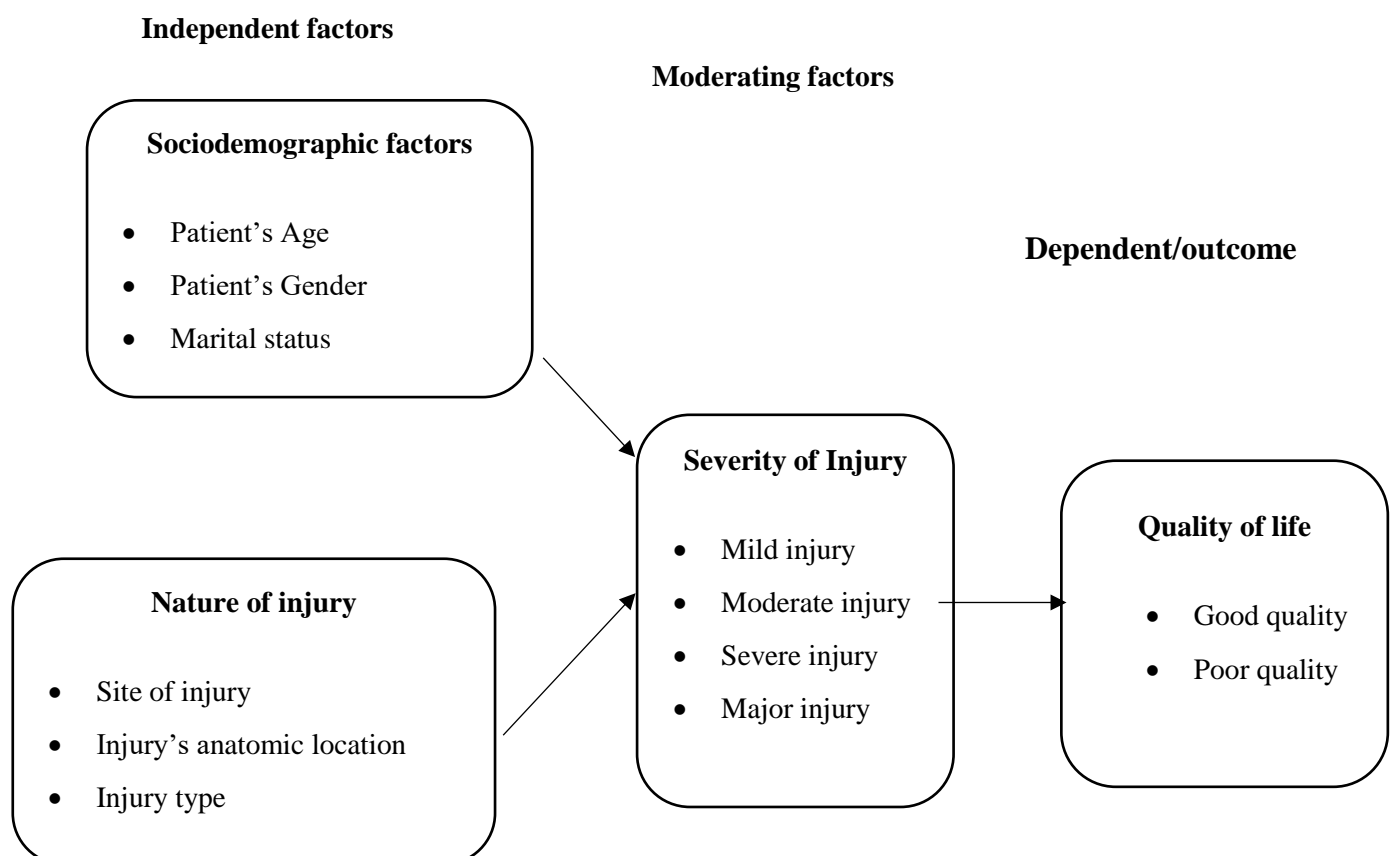
2.7. Modified hand injury severity score (MHISS)

The HISS scoring system was updated to incorporate injuries proximal to the carpus to create the MHISS, which is based on the HISS scoring system previously described (32). Hand and forearm injuries are assessed for severity based on the scale of affected integument, skeletal, motor, and neurovascular systems (ISMN). In such evaluation, the each of the ISMN component is assessed for absolute scores and weighted scores based on the significance of the injury on each of the affected rays as per their functions (32). For illustration's sake, hand injuries affecting the thumb functioning have higher weighted scores than those affecting the little finger. In the event that additional elements are present, such as wound contamination, a

compound fracture, crush, or avulsion, the total score for each component was increased by a factor of two. Amputations result in the scoring of any and all missing structures as damaged (50). The overall MHISS is calculated by adding up all of the component scores from the ISMN. Minor, Moderate, Severe, or Major injury are the four classifications that are assigned to the MHISS score, just as they were assigned to the HISS by Campbell and Kay (MHISS 20 indicates a minor injury; MHISS 21–50 indicates a moderate injury; MHISS 51–100 indicates a severe injury; and MHISS >101 indicates a major injury).

The MHISS has been validated across different parts of the world which have showed high level of validity and reliability the Cronbach alpha values of between 0.85 to 0.97 (33). Another study conducted in the United Kingdom also showed high level of validity with internal consistency of 0.92 which presented a broader understanding on its use in investigating hand severity (51).

2.8. Conceptual framework



3. METHODOLOGY

3.1 Research design

This study adopted an analytical cross-sectional study. The study sought to investigate the association between level of severity and quality of life of hand injury patients.

3.2 Study setting

The study was conducted at the orthopaedic clinic at Kenyatta National hospital. Kenyatta National hospital is the largest referral hospital in Kenya with a bed capacity of 1,800 and approximately 6,000 staff. The hospital is located in Nairobi County in the upper hill region in Kenya. The Orthopedic department clinic attends to 40 patients in each of the three weekly sessions. Based on information from the health information department there are approximately 143 admissions in a month and 426 in three months. The orthopedic clinic runs from Monday to Friday every day with each day having specific area of focus. Every day there is a running trauma clinic. Every week there are approximately 6 patients with hand injuries attending clinic in both orthopedic and plastic surgery clinics?

3.3 Eligibility Criteria

3.3.1 Inclusion Criteria

1. Adult patients 18 years and above with hand injuries.
2. Adult patients attending clinic three months after injury. The three-month period is appropriate and has been greatly used in Literature. It allows healthcare providers to evaluate the long-term impact of the injury on the patient's daily life and functional abilities. After three months, many hand injuries have reached their

maximum level of healing and the patient may have returned to work or other daily activities. By this time, any residual symptoms or functional deficits may become more apparent, and the patient may have a better understanding of the long-term effects of their injury.

3. Patients who agree to participate in the study.

3.3.2 Exclusion Criteria

1. Patients with pre-existing hand injuries.
2. Patients with other injuries.

3.4 Sample Size

The study sample size was calculated based on a formula by Fischer

This was based on a previous study conducted in a tertiary hospital in Sub-Saharan Africa which revealed that the prevalence of hand injuries was 4.7% (7).

Therefore;

$$N = \frac{Z^2 P (1-P)}{d^2}$$

N = Sample size

z = Value corresponding to desired confidence level (95%) from probability tables = 1.96

d = Margin of error, which is 5%

P = Estimated proportion, which is 4.7%

$$N = \frac{1.96^2 * 0.047 (1 - 0.047)}{0.05 * 0.05} = 69$$

Thus, including a 10% non-response rate, the sample size was 76 patients with hand injuries.

3.5 Sampling procedure

Consecutive sampling was used. The researcher with the help of two research assistants approached patients who meet the inclusion criteria and recruit them into the study. Recruitment was done consecutively until the sample size was attained. Consecutive sampling technique provided an equal opportunity for all those who meet the inclusion criteria equal chance of being recruited with the study duration period.

3.6 Recruitment procedure

Recruitment of the study participants was done by the principal investigator with the help of research assistants. The research assistants were trained beforehand on filling the data collection tool and obtaining informed consents. The researcher approached guardians at each respective study area and explain the purpose of the study and administer consent. The eligible persons were then recruited into the study.

3.7 Research instruments

The study utilized a structured questionnaire which included three sections. **Section A** included patient characteristics (demographic and clinical characteristics). **Section B** included the modified hand severity score (MHISS) which was used to investigate hand severity. This tool was included in the study because it evaluates multiple aspects of hand injuries, including wound size, wound location, nerve injury, tendon injury, bone injury, and joint injury. This allows healthcare providers to obtain a comprehensive assessment of the severity of the injury and to guide appropriate treatment planning. Similarly, studies have shown that the MHISS score can be predictive of functional outcomes, including the ability to return to

work and perform daily activities. This information can be valuable for setting appropriate expectations and developing realistic treatment goals. **Section C** included the World Health Organization brief (WHOQOL-BREF) was used to investigate patient quality of life. This tool was adopted in this study because it evaluated the physical, mental, social, and environmental aspects of a person's quality of life. In addition, validity and reliability of this tool has been greatly tested and validated across different settings.

3.7.1 Quality of life

In this study, quality of life among those with hand injury was assessed using the World Health Organization Quality of Life (WHOQOL) tool. In managing the patients, the tool came in handy in determining what part the patient was mostly affected by the injury, and arrived at the precise diagnosis. The use of treatments approaches that help to improve the quality of life, such as palliative care, are usually inexpensive but effective, which makes them perfect for developing countries (52). Combined with other relevant tools, WHOQOL-BREF assisted the health care providers evaluate the changes in quality of life for the patient throughout the treatment course.

A quality of life profile was generated by the WHOQOL-BREF questionnaire. There are four different domain scores that can be derived. There are also two items that are evaluated independently, the first one assessed the person's perception on quality of life while the second one evaluated the impression on overall health status (53). The individual's perception of quality of life in each of the four different domains was reflected in each person's score for that domain. Scores on each domain were scaled upward, with higher scores indicating a higher overall quality of life. When calculating the total score for each domain, the mean score of the elements in that domain is considered. The next step was to multiply the mean

scores by four in order to make the domain scores similar with the ratings that are utilized in the WHOQOL-100. The first technique of transformation changes the score to a range that is comparable to the WHOQOL-100, which is between 4 and 20. The second way of transformation involves converting domain scores to a scale ranging from 0 to 100 (48).

3.7.2 Modified Hand Injury Severity Score (MHISS)

The Modified Hand Injury Severity Score (MHISS) that was adapted from the Hand Injury Severity Score (HISS) (54), was used in categorizing the severity of the hand injury. This categorization was mainly dependent of the description of the injury from the patient's medical file. The score was mainly derived from assessing the injuries, involve hand sections, and involved hand structures. Campbell and Kay developed the HISS in 1996 to aid in identifying the injury severity based on a descriptive scoring method mainly for injuries occurring distal to carpus (54). The applying of the HISS system, the different hand rays, were assessed separately, and the overall score for each ray obtained by multiplying the ray's score by weighting factor. The ultimate HISS score for the hand injury was then arrived at by adding the weighted scores for all the hand rays assessed. The injury was then classified on severity scale with a score below 20 (Minor), scored between 21 – 50 (Moderate), a score on 51 – 100 (severe) and a score over 100 (major) (16).

3.8 Validity and Reliability

A pre-test was conducted at the Kenyatta National Hospital orthopedic clinic .The Pretest emphasized on ensuring that the research instrument selected contained all the necessary questions that helped in attaining better outcomes in improving research validity. In enhancing the reliability, expert surgeon reviewed the study data collection instrument in

relation to the study objectives. An expert statistician was also be contacted to review the data collection tool.

3.9 Data collection procedure

Data collection process began after KNH-UoN Ethics review committee approval, permission to collect data from KNH administration and department of surgery. The researcher with the two research assistants approached patients at the the orthopaedic clinic. They explained the purpose of the study and administer consent. Once the consent was granted, the questionnaire was administered which assessed the severity of hand injury and quality of life.

3.10 Variables in the Study

- **Control variables:** age, marital status, gender, and highest education level
- **Independent variables:** Injury type, anatomical location and nature/severity
- **Moderating variable:** Severity of hand injury
- **Dependent variable:** Quality of life

3.11 Quality Assurance

Appropriate and relevant training with be offered to the research assistance to ensure they understand the study particular expectations. The two-day training involved going through the document to understand the study background, objectives, population, eligibility criteria, data collection procedure, and quality data parameters. Even though the research assistants were involved in the data collection, the principle investigator supervised the process and appraise the quality of the data entered in real-time for purposes of avoiding unnecessary careless mistakes that can compromise the quality of the data. To avoid duplicate findings, the questionnaires were assigned serial numbers. Following collection, the data was reviewed

on a weekly basis to ensure completeness. Continuous data entry was made into a password-protected Epi data database. The Principal Investigator recruited a qualified statistician who reviewed, cleaned and analyzed the data to achieve the intended goals.

3.12 Data management and analysis

3.12.1 Data entry

After the data was collected, it was entered in a template prepared from Epi-data 3.1. The entries were serialized for ease of linkage and tracing. The data was then exported to Stata version 14 for analysis.

3.12.2 Data storage and archival

The security and confidentiality of the data was reinforced by storing the questionnaires in lockable cabinet, which can only be accessed by the principle investigator and the research assistant. The data in soft copy were secured by a password in a protected laptop. The Principle investigator(PI), statistician and study supervisors had access to the data. The PI had the rights to share the study data set with any other interested party for the purpose of learning and knowledge management. The research data will be maintained for five years, after which the hardcopies will be shredded.

3.12.3 Data Analysis

Data were analyzed using both descriptive and inferential analysis. Categorical data was grouped and analyzed in terms of frequencies and percentages while continuous variables were assessed using mean and standard deviation.

The Pearson chi-square test or Fischer's exact test were used to compare categorical variables and quality of life. Independent samples t-test were used to compare continuous variables and the study outcome variables. Binary logistic regression was used to compare patient characteristics, associated factors and quality of life.

3.13 Ethical consideration

Permission: The study commenced after approval from the KNH-UoN Ethics committee which reviewed the ethical aspects of the study. Permission was also be sought from the KNH administration to access patient health information in the files.

Consenting: In addition, only those who agree to consent to the study were recruited. Consent obtained helped in accessing patient medical file and registers. Thus, only health information of those who agree to consent accessed.

Confidentiality and privacy: Confidentiality, anonymity, and privacy was fully guaranteed throughout the study. The data obtained was used for the purpose of this research only and was not shared with any platform. Strict confidentiality and anonymity was observed when collecting, storing, processing data, and handling the results.

Risks and benefits: There were no risks involved in participating in this study considering that it is non-invasive. Patient did not incur any cost by participating in this study.

3.14 Study Strengths

- I. The study was assessing level of severity and quality of life among hand injury patients which has not been investigated in local setting.

- II. This study also investigated the underlying association between severity of hand injury and quality of life which has not been assessed in the local context despite high rate of hand injuries.
- III. The study was conducted at Kenyatta National hospital which is the largest referral hospital. Thus, the hospital received patients from across the country which increases the diversity of the study participants.

3.15 Study Limitations and delimitation

The study was a single center which is likely to create problems with generalizability of findings. However, the study was conducted in Kenyatta National hospital which is the leading referral hospital in the country hence receives patients from across the country which made it possible to generalize and reflect the situation of hand injury patients locally.

4. RESULTS

The study investigated the association between level of severity and quality of life among hand injury patients attending orthopaedic clinic at Kenyatta National Hospital (KNH). A total of 76 hand injury patients were enrolled into the study. All the questionnaires were completely filled and returned for analysis representing a 100% response rate.

4.1.Characteristics of hand injury patients attending orthopaedic clinic at Kenyatta National Hospital

4.1.1. Demographic characteristics of hand injury patients

The median age was 33 (IQR: 27 – 42.5) years with 61.8% (n =47) of them aged ≤ 35 years, 80.3%(n =61) were male, 56.6%(n =43) had secondary education as their highest level while 61.8%(n = 47) had average monthly income of between Ksh.10,000 and ksh.30,000 as shown in Table 1.

Table 1: Demographic characteristics of hand injury patients attending orthopaedic clinic at Kenyatta National Hospital

| Factors | Frequency | Percent |
|---------------------------|------------------|----------------|
| Age, Median (IQR) | 33(27 – 42.5) | |
| ≤ 35 years | 47 | 61.8 |
| >35 years | 29 | 38.2 |
| Gender | | |
| Male | 61 | 80.3 |
| Female | 15 | 19.7 |
| Level of education | | |
| Primary | 13 | 17.1 |
| Secondary | 43 | 56.6 |
| Tertiary | 20 | 26.3 |
| Monthly income | | |
| $<10,000$ | 15 | 19.7 |
| 10,000 - 30,000 | 47 | 61.8 |
| >30000 | 14 | 18.4 |

4.1.2. Hand injury related characteristics among patients attending orthopaedic clinic at Kenyatta National Hospital

4.1.2.1. Mechanism of injury among hand injury patients

In investigating the mechanism of injury, 31.6%(n =24) of hand injuries were caused by machinery while 21.1%(n =16) had motor vehicle accident. Further, 14.5%(n =11) had motor cycle accident, 14.5%(n =11) had injury from violence encounter as shown in Figure 1.

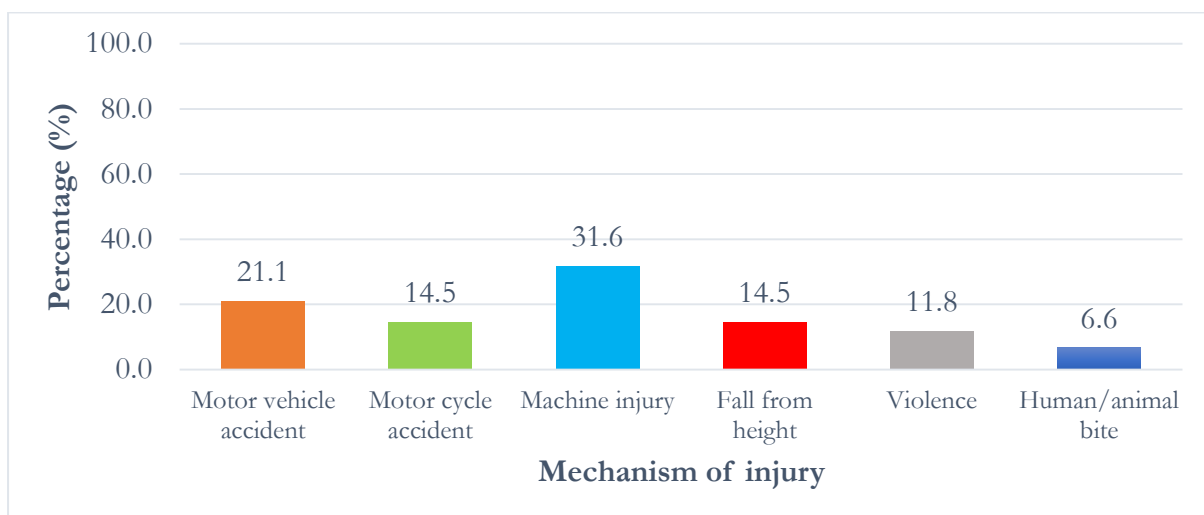


Figure 1: Mechanism of injury

4.1.2.2.Site of injury

The findings show that 69.7% (n =53) were injured on right hand, 30.3%(n =23) had injury on their left hand as shown in Figure 2.

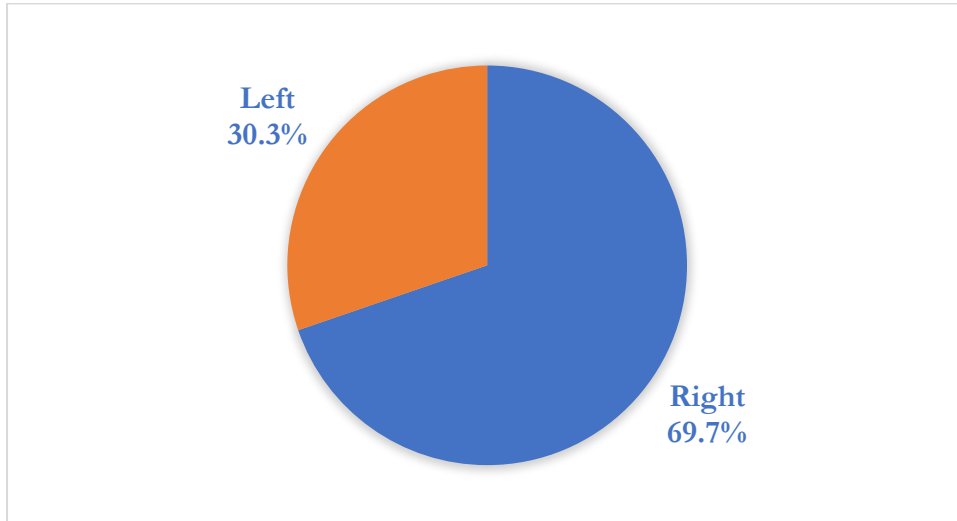


Figure 2: Site of injury

4.1.2.3.Type of injury

Analysis of type of injury revealed that 68.4%(n =52) had fractures, 25%(n =19) had soft tissue injury while 6.6%(n =5) had dislocation as shown in Figure 3.

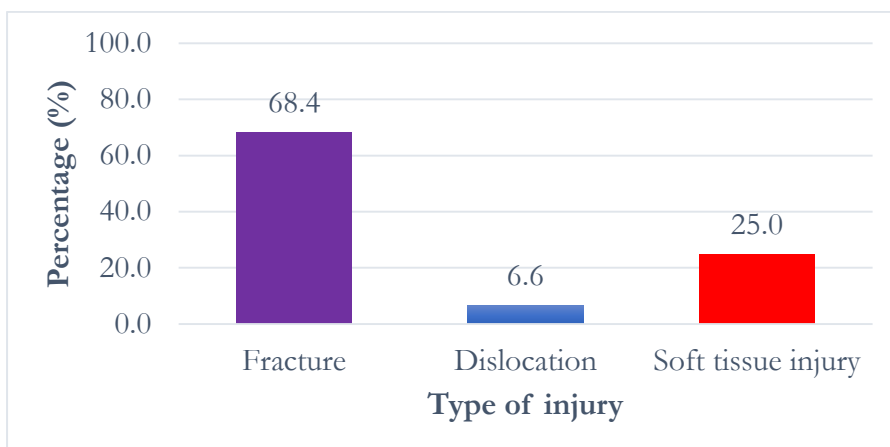


Figure 3: Type of injury

Site of limb injury

The findings also showed that 67.1%(n =51) had injured their phalanges injuries. Other sites of injuries included hand 44.7%(n =34), knuckles 28.9%(n =22) and wrist 15.8%(n =12) as shown in Figure 4

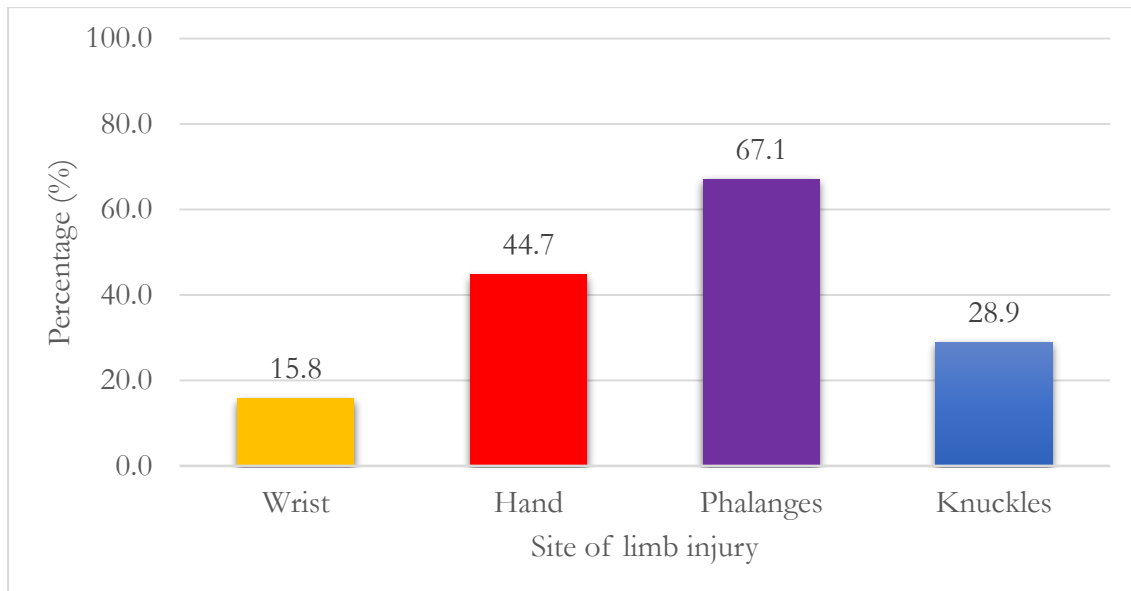


Figure 4: Site of limb injury

4.2.The level of severity among adult hand injury patients attending orthopaedic clinic at KNH

The level of severity among adult hand injury patients was done using MHISS. The median MHISS score was 56(IQR: 33.5 – 90.8). The categorization of the MHISS established that 40.8%(n =31) had severe injury, 35.5%(n =27) had moderate injury, 13.2%(n =10) had major injury while 10.5%(n =8) had minor injury as shown in Figure 5.

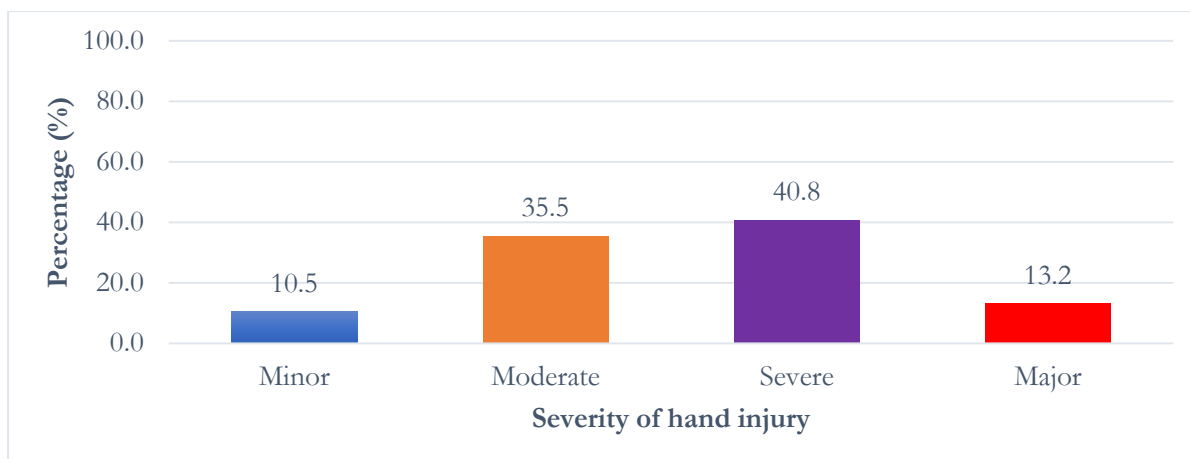


Figure 5: The level of severity of hand injury

4.3. The quality of life for adult hand injury patients attending orthopaedic clinic at KNH

4.3.1. Domains of quality of life among hand injury patients

The average physical health score was 43.5(SD±9.7)% with 75% (n =57) had poor physical health. The findings also showed that the average score on psychological health was 50.1(SD±11.7)% with 51.3%(n =39) had poor psychological health. The average score on social relationships was 47.03(SD±15.8)% while the average score on environmental domain was 47.0(SD±15.8)% as shown in Table 2.

Table 2: Domains of quality of life among hand injury patients

| | Frequency | Percent |
|----------------------------------|------------|---------|
| Physical health, Mean (SD)% | 43.47±9.71 | |
| Good | 19 | 25.0 |
| Poor | 57 | 75.0 |
| Psychological health, Mean (SD)% | 50.1±11.72 | |
| Good | 37 | 48.7 |
| Poor | 39 | 51.3 |
| Social relationships, Mean (SD)% | 47.03±15.8 | |
| Good | 37 | 48.7 |
| Poor | 39 | 51.3 |
| Environment, Mean (SD)% | 47.0±15.78 | |
| Good | 38 | 50.0 |
| Poor | 38 | 50.0 |

4.3.2. Overall quality of life among hand injury patients

The findings established that the mean quality of life based on the WHOQOL tool was 46.7 ± 11.12 . The findings also revealed that 38.2% (n =29) had good quality of life while majority 61.8% (n =47) had poor quality of life as shown in Figure 6.

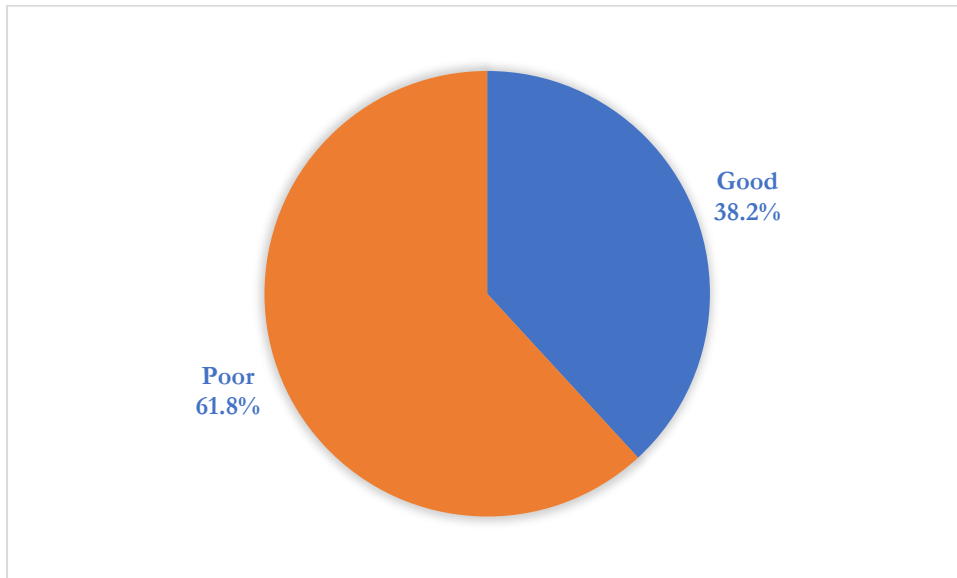


Figure 6: Overall quality of life among hand injury patients

4.4. Factors associated with quality of life among adult hand injury patients attending orthopaedic clinic at KNH.

The findings established that female patients were five times more likely to have poor quality of life as compared to male hand injury patients, OR =5.16, 95%CI:1.07 – 24.86, $p=0.041$. Those who had secondary level of education were 6.7 times more likely to have poor quality of life as compared to those who had secondary level education, OR =6.72, 95%CI:1.17 – 38.50, $p=0.032$. Patients who had fracture injuries were 6.9 times more likely to have poor quality of life, OR =6.91, 95%CI:2.39 – 19.95, $p<0.001$. The study also investigated the association between severity of hand injury established that those with severe or major injury were 8.22 times more likely to have poor quality of life compared to those with minor or moderate injury, OR =8.22, 95%CI:2.84 – 23.82, $p<0.001$ as shown in Table 3.

Table 3: Factors associated with quality of life among adult hand injury patients attending orthopaedic clinic at KNH.

| Factors | Quality of life | | OR(95%CI) | P-value |
|--------------------------------|-----------------|----------|--------------------|------------------|
| | Good | Poor | | |
| Age | | | | |
| ≤35 years | 20(69.0) | 27(57.4) | 1.65(0.62 - 4.37) | 0.317 |
| >35 years | 9(31.0) | 20(42.6) | Ref | |
| Gender | | | | |
| Male | 27(93.1) | 34(72.3) | Ref | |
| Female | 2(6.9) | 13(27.7) | 5.16(1.07 - 24.86) | 0.041 |
| Education level | | | | |
| Primary | 2(6.9) | 11(23.4) | Ref | |
| Secondary | 16(55.2) | 27(57.4) | 6.72(1.17 - 38.50) | 0.032 |
| Tertiary | 11(37.9) | 9(19.1) | 2.06(0.70 - 6.05) | 0.187 |
| Monthly income | | | | |
| <10,000 | 7(24.1) | 8(17.0) | Ref | |
| 10,000 - 30,000 | 16(55.2) | 31(66.0) | 0.86(0.20 - 3.71) | 0.837 |
| >30000 | 6(20.7) | 8(17.0) | 1.45(0.43 - 4.91) | 0.548 |
| Mechanism of injury | | | | |
| RTA | 9(31.0) | 18(38.3) | 0.73(0.27 - 1.94) | 0.521 |
| Machinery | 14(48.3) | 21(44.7) | 1.16(0.46 - 2.92) | 0.76 |
| Site of injury | | | | |
| Right | 21(72.4) | 32(68.1) | 1.23(0.44 - 3.41) | 0.69 |
| Left | 8(27.6) | 15(31.9) | Ref | |
| Type of injury | | | | |
| Fracture | | | | |
| Yes | 12(41.4) | 39(83.0) | 6.91(2.39 - 19.95) | <0.001 |
| No | 17(58.6) | 8(17.0) | Ref | |
| Soft tissue | | | | |
| Yes | 10(34.5) | 9(19.1) | 2.22(0.77 - 6.39) | 0.175 |
| No | 19(65.5) | 38(80.9) | Ref | |
| Site of limb injury | | | | |
| Wrist | 4(13.8) | 8(17.0) | 0.78(0.21 - 2.86) | 0.487 |
| Hand | 13(44.8) | 21(44.7) | 1.01(0.40 - 2.55) | 0.588 |
| Phalanges | 19(65.5) | 32(68.1) | 0.89(0.33 - 2.38) | 0.505 |
| Knuckles | 7(24.1) | 15(31.9) | 0.68(0.24 - 1.94) | 0.604 |
| Severity of hand injury | | | | |
| Severe or major | 7(24.1) | 34(72.3) | 8.22(2.84 - 23.82) | <0.001 |
| Minor or moderate | 22(75.9) | 13(27.7) | Ref | |

5. DISCUSSION

This section presents a detailed assessment of the findings in relation to prior literature while making meaningful conclusions. The present study sought to investigate the severity of hand injury and quality of life among hand injury patients at Kenyatta National hospital. The median age was 33 years ranging between 27 and 42 years with majority of the patients (61.8%) were aged ≤ 35 years. These findings are in line with those from an earlier study in similar setting by Wairegi *et al.* (14) who found that majority of patients with hand injury were aged less than 40 years. Similarly, another study in Germany by Grob established that the median age among hand injury patients was 37 years (55). The higher occurrence of hand injury within individuals around this age is mainly due to the assertion that people in this age group are often more active and engaged in activities such as sports, manual labor, or other physically demanding jobs that put them at a higher risk of hand injuries. The present study also found that majority of the patients (80.3%) were male. Male patients are more likely to be involved in activities such as using machinery which increase the risk of hand injury. These findings align with those from Kovacs *et al.* (12) who found that 87% of the patients were male. Wairegi *et al.* (14) in a study in Kenya also revealed that 80% of the hand injury patients were male.

The common causes of hand injury among patients included machine operator (31.6%) and motor vehicle accidents (21.1%). These findings are comparable to a study in urban hospital in Nairobi which established that, 69% of the hand injury patients were machine operators (56). Another study conducted in Uganda by Makobore *et al.* (7) also found comparable findings where road crashes accounted for 23% of hand injury patients while 21.3% of hand injury patients were caused by machines.

The present findings established that 69.7% of the patients had injured their right hand. These findings are consistent with those from a study in Portugal by Frazad *et al.* (57) who found that 57% of the injuries were on the right hand. These findings also align with those from a study in Hong Kong China by Chow *et al.* (58) which revealed that 68% of the patients injured their right hand. Majority of people have their right hand as the dominant hence tend to use it more compared to their left hand. This explain the higher proportion of injury on the right hand.

The present findings further established that 68% of the patients had hand fractures with 25% having soft tissue injuries and 6.6% having dislocations. However, these findings were higher compared to those from a study by Wairegi *et al.* (14) in Kenya who found that less than half of the hand injury patients 42.5% had hand fractures.

In investigating the site of limb injury among patients in the present study, 67% of them had injuries on their phalanges. These findings are consistent with Wairegi *et al.* (14) who found that 70.6% of patients hand phalangeal as their common site of limb injury. Another study in Kenya by Kaisha and Khainga revealed that 72.4% of the fractures involved the phalanges (13). The fingers are located at the end of the hand and are therefore more exposed and vulnerable to injury, especially during activities such as sports or manual labor.

5.1 Severity of hand Injury

The present study assessed the severity of hand injury using MHISS tool. The median score was 56 with majority ranging between 33.5 and 90.8. Further, 40.8% had severe injury, 35.5% had moderate injury, 13.2% had majority injury while 10.5% had minor injury. These findings are comparable to a study in the United States by Saxena *et al.* (29) which established that most of the patients (53%) had severe hand injuries. Most of the injuries in the present study were due to machinery which tend to be more severe based on the impact

associated with machines. Further, in many cases, hand injuries caused by machines occur because the worker was not wearing proper protective equipment, such as gloves or safety guards. This can increase the severity of the injury.

These findings however are inconsistent with those from a study in Turkey by Tezel *et al.* (34) which found that MHISS average score was 84.5 which show a severe injury. The scores ranged between 20 to 151 highlighting that some of the patients had major hand injuries. Further, a single centre study conducted in Poland by Dębski and Noszczyk in 2021 revealed that, 28.6 percent of the patients had moderate hand injuries, 25.5 percent had severe injuries while 26.5 percent had major injuries (6). Similarly, Wairegi study conducted at Kenyatta National Hospital utilizing the Modified Hand Injury Severity Scoring method, the majority of patients (37.5% of them) sustained minor injuries. The least number of patients sustained serious injuries (14%), while major injuries contributed 26%, moderate injuries provided 23%, and severe injuries contributed 14% (14). The difference could be attributed to different in the time frame within which the studies were conducted. Severity of hand injuries varies significantly across different patients. Hand injuries can range from minor cuts and bruises to complex fractures, dislocations, and soft tissue injuries. The severity and outcome of each injury can vary depending on the type and location of the injury, as well as individual factors such as age and overall health.

5.2 Quality of life among hand injury patients

The current study also established that among hand injury patients, majority 61.8% had poor quality of life. The quality of life was low on all of the components that were investigated which included physical health, psychological health, social relationships and environment. These findings align with those from Kovacs *et al.* (12) in Germany who found that the quality of life among hand injury patients was low. Their results showed that patient who

experienced pain and pressure sensations reported low scores on life satisfaction, health status satisfaction, increased anxiety, signs of depression, and elevated concerns of dysmorphic disorder. Further, another comparable findings were obtained by Reitan *et al.* (11) in a study conducted in Sweden which showed that majority of hand injury patients had lower quality of life with majority of the patients stating that their inability to work and provide for their families were major challenges. However, the findings from present study contrast those from a study conducted in Netherlands assessing quality of life which revealed that health-related quality of life improved from 2.5 to 24 months although it remained low compared to quality of life in general populations. The more proximal upper extremities injuries had a lower health related quality of life and a slower recovery of health related quality of life than distal injuries (37).

Hand injury impacts on all four domains of life. Hand injuries can result in pain, weakness, stiffness, and limited range of motion, which can impact a person's ability to perform daily tasks, work, and engage in leisure activities. This can lead to feelings of frustration, isolation, and dependence on others. In addition, hand injuries can impact a person's body image and self-esteem, particularly if the injury results in scarring or disfigurement (25). Further, The trauma of the injury, along with the physical pain and limitations, can lead to anxiety and depression (51). These emotional and psychological issues can further exacerbate the physical disability and limit a person's ability to cope with the injury and engage in meaningful activities. Individual social relations are also affected which negatively impact on their general lives.

5.3 Factors influencing quality of life among hand injury patients.

The findings from the current study revealed that women patients were more likely to have poor quality of life. These findings are comparable to a study in Norway which established

that gender was a significant factor associated with mild functional impairment among hand injury patients (29). Similarly in another study conducted by Reitan in Sweden, it was observed that gender was associated with quality of life where male patients recorded fewer functional impairment cases than female with hand injuries (11). The poor quality of life among women with hand injuries could be due to the consideration that women generally have smaller and weaker hands compared to men, which may make them more vulnerable to certain types of hand injuries, such as fractures and soft tissue injuries. This can lead to more severe and long-lasting disabilities that impact their ability to perform daily activities. Further, the impact of the injury on a woman's body image and self-esteem may be more significant, as women are often socialized to prioritize physical appearance and attractiveness. This may lead to greater feelings of depression, anxiety, and social isolation.

Level of education was also found to have a significant association with quality of life with having secondary level of education associated with six times higher risk of poor quality of life. Majority of machine operators within Kenyan market have secondary level education and learn skills to operate these machines on the job. The poor quality of life could be attributed to the fact that they are sole breadwinners in their families which negatively impacts on their lives (59).

Fracture hand injury patients were 6.9 times more likely to have poor quality of life. Fractures provide severe form of injury which limits an individual ability to perform basic activities. This has negative implications to their lives. These findings are comparable with those from xx who found that majority of patients with fractures had poor quality of life (40). Similarly, Putter *et al.* (41) also affirmed that fractures limit ability of individual to perform their duties which lead to physical, psychological and social challenges.

Severity of hand injury was also found to be significantly associated with poor quality of life. Those who had severe or major injury were 8.22 times more likely to have poor quality of life. These findings align with those from Kovacs *et al.* (12) who found that patients with pain and pressure sensations were significantly less satisfied in life, showed lower levels of health satisfaction, had higher levels of anxiety and depression and showed higher body dysmorphic disorder levels. Another study conducted by Grob (55) established that there was negative relationship between severity of injury and quality of life among hand injury patients. However, findings from another study established that there was positive relationship between severity of injury and the quality of life. The findings showed that severe hand injuries are related to high efforts for surgical and functional reconstructions, which result in high quality of life measured (17).

6. CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

- Female patients, having secondary level of education, having fracture injury were significantly associated with poor quality of life.
- Males <36 years with severe injuries were associated with poor quality of life.
- There was significant association between hand severity and quality of life. Those who had severe or major injuries were more likely to have poor quality of life.

6.2. Recommendations

- Provide counselling sessions to hand injury patients by focusing on their physical, psychological, social and environmental wellbeing.
- A multidisciplinary team approach in treating hand injury patients.
- Hand injury patients should be followed up for a long time, since recovery usually takes long.

REFERENCES

1. Kringstad O, Dahlin LB, Rosberg HE. Hand injuries in an older population - A retrospective cohort study from a single hand surgery centre. *BMC Musculoskeletal Disord.* 2019 Dec;20(1):1-2.
2. Van de Kar AL, Eijffinger EM, Lapid O, van der Horst CMAM, de Haart M. An exploratory study of the impact of firecracker-induced hand injuries on adolescents and their parents. *Eur J Plast Surg.* 2022; 1-0.
3. Agarwal R, Agarwal D, Agarwal M. Approach to mutilating hand injuries. *Journal of Clinical Orthopaedics and Trauma.* 2019 Sep 1;10(5):849-52.
4. Crowe CS, Massenbun BB, Morrison SD, Chang J, Friedrich JB, Abady GG, et al. Global trends of hand and wrist trauma: A systematic analysis of fracture and digit amputation using the Global Burden of Disease 2017 Study. *Inj Prev.* 2020 Oct 1;26(Suppl 2):i115-24.
5. Gyer G, Michael J, Inklebarger J. Occupational hand injuries: a current review of the prevalence and proposed prevention strategies for physical therapists and similar healthcare professionals. *Journal of Integrative Medicine.* 2018Mar 1;16(2):84-9.
6. Dębski T, Noszczyk BH. Epidemiology of complex hand injuries treated in the Plastic Surgery Department of a tertiary referral hospital in Warsaw. *Eur J Trauma Emerg Surg.* 2021 Oct;47:1607-12.
7. Makobore P, Galukande M, Kalanzi E, Kijjambu SC. The Burden of Hand Injuries at a Tertiary Hospital in Sub-Saharan Africa. *Emerg Med Int.* 2015 Jun 1;2015.
8. Awe OO OO, JK O, EE E. Epidemiology of Hand Injuries Seen at Two Teaching Hospitals in Southern Nigeria. *East Cent Afr J surg.* 2015;20(2):44–8.
9. Chang JH, Shieh SJ, Kuo LC, Lee YL. The initial anatomical severity in patients with hand injuries predicts future health-related quality of life. *J Trauma - Inj Infect Crit Care.* 2011 Nov 1;71(5):1352-8.

10. Marinkovic M, Janjic Z, Nikolic J. Estimating disability and quality of life after different degrees of hand and forearm trauma. *Vojnosanit Pregl.* 2015;72(2):155-9.
11. Reitan I, Dahlin LB, Rosberg HE. Patient-reported quality of life and hand disability in elderly patients after a traumatic hand injury - A retrospective study. *Health Qual Life Outcomes.* 2019 Dec;17(1):1-0.
12. Kovacs L, Grob M, Zimmermann A, Eder M, Herschbach P, Henrich G, et al. Quality of life after severe hand injury. *J Plast Reconstr Aesthetic Surg [Internet].* 2011;64(11):1495–502. Available from: <http://dx.doi.org/10.1016/j.bjps.2011.05.022>
13. Kaisha WO, Khainga S. Causes and pattern of unilateral hand injuries. *East Afr Med J.* 2008; 85(3):123-8.
14. Wairegi A, Sitati F, Mutiso V. Pattern of Acute Foot Injuries in Patients Seen at Kenyatta National Hospital. 2020. Retrieved from: <http://erepository.uonbi.ac.ke/handle/11295/154161>
15. Ootes D, Lambers KT, Ring DC. The epidemiology of upper extremity injuries presenting to the emergency department in the United States. *Hand.* 2012;7(1):18–22.
16. Lin DCY, Chang JH, Shieh SJ, Tsai FHJ, Lee YL. Prediction of hand strength by hand injury severity scoring system in hand injured patients. *Disabil Rehabil.* 2012 Mar 1;34(5):423-8.
17. Alawi SA, Werner D, Könniker S, Vogt PM, Jokuszies A. Quality of life and reconstructive surgery efforts in severe hand injuries. *Innov Surg Sci.* 2018 Apr 20;3(2):147-56.
18. Çapkın S, Cavit A, Yılmaz K, Erdoğan E, Kaleli T. Associations between initial injury severity in acute hand, wrist or forearm injuries and disability ratings and time to return to work. *Ulus Travma ve Acil Cerrahi Derg.* 2020 May 1;26(3).
19. Özgen M, Aydogan AM, Uygur A, Armagan O, Berkan F, Mutlu F. Rehabilitation cost share and cost analysis of traumatic hand injuries: Our single-center results. *Turkish J Phys Med Rehabil.* 2021 Sep;67(3):308.

20. Ramel E, Rosberg HE, Dahlin LB, Cederlund RI. Return to work after a serious hand injury. *Work*. 2013 Jan 1;44(4):459-69.
21. Uys ME, Buchanan H, van Niekerk L. Return to Work for People with Hand Injuries in South Africa: Occupational Therapy Strategies. *South African J Occup Ther*. 2020 Aug;50(2):52-61.
22. Zeelenberg ML, Den Hartog D, Halvachizadeh S, Pape HC, Verhofstad MHJ, Van Lieshout EMM. The impact of upper-extremity injuries on polytrauma patients at a level 1 trauma center. *J Shoulder Elb Surg*. 2022 May 1;31(5):914-22.
23. Dinesh D, Eltag Karadawi N. Traumatic Hand Injuries presenting to Orthopedic Unit of a Regional Referral Hospital, Oman. *Int J Orthop*. 2020 Feb 28;7(1):1232-5.
24. Abebe MW. Common causes and types of hand injuries and their pattern of occurrence in Yekatit 12 Hospital, Addis Ababa, Ethiopia. *Pan Afr Med J*. 2019;
25. Al-Husuny A, Rampal L, Manohar A, Adon MY, Ahmad AA. Work-related hand injuries: Type, location, cause, mechanism and severity in a tertiary hospital. *Malaysian J Med Heal Sci*. 2012;
26. Sorock GS, Lombardi DA, Hauser RB, Eisen EA, Herrick RF, Mittleman MA. Acute traumatic occupational hand injuries: Type, location, and severity. *J Occup Environ Med*. 2002;
27. Altan L, Akin S, Bingöl U, Ozbek S, Yurtkuran M. The prognostic value of the Hand Injury Severity Score in industrial hand injuries. *Ulus Travma Acil Cerrahi Derg*. 2004;
28. Echchaoui A, Belaroussi L, Ahmad A, Mazouz S, Gharib N, Abbassi A. Occupational hand injury patterns at Avicenna University Hospital. *Hand Microsurg*. 2017;
29. Saxena P, Cutler L, Feldberg L. Assessment of the severity of hand injuries using “hand injury severity score”, and its correlation with the functional outcome. *Injury*. 2004;

30. Keller MM, Jordaan PW. Traumatic hand injury management and outcomes: A case report. *South African Fam Pract.* 2022 Feb 28;7(1):1232-5.
31. Sim WP, Ng HJH, Liang BZ, Rajaratnam V. Can Open Hand Injuries Wait for Their Surgery in a Tertiary Hospital? *J Hand Microsurg.* 2021 Mar 4;13(03):157-63.
32. Alexander A. Using the modified Hand Injury Severity Score (mHISS) as an objective measure to evaluate a mechanism of triage in a hand therapy department. *Hand Therapy.* 2016 Jun;21(2):54-7.
33. Urso-Baiarda F, Lyons RA, Laing JH, Brophy S, Wareham K, Camp D. A prospective evaluation of the Modified Hand Injury Severity Score in predicting return to work. *Int J Surg.* 2008 Feb 1;6(1):45-50.
34. Tezel N, Can A. The association between injury severity and psychological morbidity, hand function, and return to work in traumatic hand injury with major nerve involvement: A one-year follow-up study. *Ulus Travma ve Acil Cerrahi Derg.* 2020;
35. Wong JYP. Time Off Work in Hand Injury Patients. *J Hand Surg Am.* 2008;33(5):718–25.
36. Grob M, Papadopoulos NA, Zimmermann A, Biemer E, Kovacs L. The psychological impact of severe hand injury. *Journal of Hand Surgery: European Volume.* 2008 Jun;33(3):358-62.
37. De Putter CE, Selles RW, Haagsma JA, Polinder S, Panneman MJM, Hovius SER, et al. Health-related quality of life after upper extremity injuries and predictors for suboptimal outcome. *Injury.* 2014 Nov 1;45(11):1752-8
38. Turkington C, Dempster M, Maguire J. Adjustment to hand injury: Cross-sectional survey exploring adjustment in relation to illness perceptions and coping strategies. *J Hand Ther.* 2018 Feb 28;7(1):1232-5.
39. O’Baire-Kark M, Klevay A. Another Perspective on Finger Replantation Surgery: Nursing Support for the Psychological Levels of Recovery. *J Trauma Nurs.* 2011 Nov 1;45(11):1752-8

40. Meyer TM. Psychological aspects of mutilating hand injuries. *Hand Clinics*. 2003. Feb;549(2):106-111
41. Putter CE De, Selles RW, Polinder S, Beeck EF Van. Economic Impact of Hand and Wrist Injuries : *J Bone Jt Surg*. 2012; Jan 1:29 : 96-102
42. Kalfoss MH, Reidunsdatter RJ, Klöckner CA, Nilsen M. Validation of the WHOQOL-Bref: psychometric properties and normative data for the Norwegian general population. *Health Qual Life Outcomes*. 2021Dec;19(1):1-2.
43. Harper A, Power M, Orley J, Herrman H, Schofield H, Murphy B, et al. Development of the World Health Organization WHOQOL-BREF Quality of Life Assessment. *Psychol Med*. 1998 May;28(3):551-8.
44. Gholami A, Araghi MT, Shamsabadi F, Bayat M, Dabirkhani F, Moradpour F, et al. Application of the world health organization quality of life instrument, short form (WHOQOL-BREF) to patients with cataract. *Epidemiol Health*. 2021 Jul 1;71(7):2767-72.
45. Suárez L, Tay B, Abdullah F. Psychometric properties of the World Health Organization WHOQOL-BREF Quality of Life assessment in Singapore. *Qual Life Res*. 2018 Nov;27:2945-52.
46. Lima-Castro S, Arias-Medina P, Bueno-Pacheco A, Peña-Contreras E, Aguilar-Sizer M, Cabrera-Vélez M. Factor structure, measurement invariance and psychometric properties of the Quality of Life Scale WHOQOL-BREF in the Ecuadorian context. *Psicol Reflex e Crit*. 2021; 12(1):45-9.
47. Purba FD, Hunfeld JAM, Iskandarsyah A, Fitriana TS, Sadarjoen SS, Passchier J, et al. Quality of life of the Indonesian general population: Test-retest reliability and population norms of the EQ-5D-5L and WHOQOL-BREF. *PLoS One*. 2018 ec;19:1-9.

48. Uddin MN, Islam FMA. Psychometric evaluation of an interview-administered version of the WHOQOL-BREF questionnaire for use in a cross-sectional study of a rural district in Bangladesh: an application of Rasch analysis. *BMC Health Serv Res.* 2019 Dec;19:1-9.
49. Bonomi AE, Patrick DL, Bushnell DM, Martin M. Validation of the United States' version of the World Health Organization Quality of Life (WHOQOL) instrument. *Journal of Clinical Epidemiology.* 2000 Jan 1;53(1):1-2.
50. Bhat AK, Acharya AM, Mishra D. Correlation of HISS and Strickland Score with the Michigan Hand Outcome Questionnaire in hand injuries. *J Clin Orthop Trauma* [Internet]. 2020;11(4):620–5. Available from: <https://doi.org/10.1016/j.jcot.2020.05.026>
51. Tsinaslanidis P, Smith TO, Brown OS, Tsinaslanidis G, Umarji S, Hing CB. The association of hand and wrist injuries with other injuries in multiple trauma patients. A retrospective study in a UK Major Trauma Centre. *Injury.* 2021 1;52(7):1778-82.
52. Goes M, Lopes MJ, Marôco J, Oliveira H, Fonseca C, Mónico L, et al. The quality of life of older individuals following the world health organization assessment criteria. *Geriatr.* 2020 Dec 5;5(4):102.
53. Young CA, Mills R, Al-Chalabi A, Burke G, Chandran S, Dick DJ, et al. Measuring quality of life in ALS/MND: validation of the WHOQOL-BREF. *Amyotroph Lateral Scler Front Degener.* 2020 Jul 2;21(5-6):364-72.
54. Campbell DA, Kay SPJ. The hand injury severity scoring system. *J Hand Surg (British Eur Vol.* 1996;21(3):295–8.
55. Grob M. Quality of Life Assessment after Severe Hand Injury. 2006;1–166.
56. Museve G, Kinyua N, Wangai P. Industrial hand injuries as seen at Avenue Hospital, Nairobi. *East African Orthop J.* 2015;8(2):49–51.
57. Farzad M, MacDermid J, Rassafiani M. Factor structure of Participation Behavioural Questionnaire (PBQ) in patients with hand injuries. *PLoS One.* 2023 Jan

20;18(1):e0267872.

58. Chow CY, Lee H, Lau J, Yu ITS. Transient risk factors for acute traumatic hand injuries: A case-crossover study in Hong Kong. *Occup Environ Med.* 2007 Jan 1;64(1):47-52.
59. Wanjara S, Oduor P. Hand injuries in Kenya: a chaff cutter menace. *F1000Research.* 2022 Nov 4;11:1255.

APPENDICES

Appendix A: Questionnaire/data tool

SECTION A: Patient characteristics

1. Form Number:
2. Age _____ years
3. Sex: Male / Female
4. Level of education

Primary level [] Secondary [] Tertiary [] No education []

5. Average monthly income (Ksh).....
6. Mechanism of injury
 - a. Moving vehicle accident
 - b. Motor cycle accident
 - c. Machine injury
 - d. Fall from height
 - e. Violence
 - f. Human /animal bite
 - g. Others (Please explain)
7. Site of injury
 - a. Right
 - b. Left
8. Type of injury
 - a. Fracture
 - b. Dislocation
 - c. Soft tissue injury
9. Site of limb fracture

- a. Wrist
- b. Hand
- c. Phalanges
- d. Knuckles

SECTION B: SEVERITY OF HAND INJURY

STRUCTURES INJURED SCORE

1. INTEGUMENT INJURIES

| | |
|-------------------------|-------|
| Skin loss to the hand | ..... |
| Skin loss to the digits | ..... |
| Skin lacerations | ..... |
| Nail bed damage | ..... |

2. SKELETAL INJURIES

| | |
|----------------------|-------|
| Fractures | ..... |
| Dislocations | ..... |
| Ligamentous injuries | ..... |

3. MOTOR INJURIES **SCORE**

| | |
|---------------------------------------|-------|
| Extensor tendon injuries | |
| Flexor profundus tendons injuries | ..... |
| Flexor superficialis tendons injuries | ..... |
| Intrinsic muscles injuries | ..... |

4.NEUROVASCULAR INJURIES

| | |
|-------------------------------------|-------|
| Main median nerve injury | ..... |
| Main ulnar nerve injury | ..... |
| Motor branch of median nerve injury | ..... |
| Motor branch of ulnar nerve injury | ..... |
| Ulnar artery injury | ..... |
| Radial artery injury | ..... |
| TOTAL MHISS | ..... |

SECTION B:

SEVERITY (Tick appropriately).

Reference

| | | |
|---------|-----|--------|
| MILD | { } | < 20 |
| MODERAT | { } | 21-50 |
| SEVERE | { } | 51-100 |
| MAJOR | { } | >100 |

INTEGUMENT

ABSOLUTE

| | | | |
|------------------------------|--------|-------------------|----|
| Skin loss to hand or forearm | Dorsum | <1cm ² | 5 |
| | | >1cm ² | 10 |
| | | >5cm ² | 20 |
| | Volar | <1cm ² | 10 |
| | | >1cm ² | 20 |
| | | >5cm ² | 40 |

WEIGHTED (See "Weighting Factors")

| | | | |
|--|--------|-------------------|---|
| Skin loss to digit | Dorsum | <1cm ² | 2 |
| | | >1cm ² | 3 |
| | Volar | <1cm ² | 2 |
| | | >1cm ² | 6 |
| | Pulp | <25% | 3 |
| | | >25% | 5 |
| Skin laceration | | | |
| <i>If extends across more than one ray, include in both ray scores</i> | | <1cm ² | 1 |
| | | >1cm ² | 2 |
| Nail bed damage | | | 1 |

If wound crushed, dirty or contaminated: DOUBLE the score

SKELETAL

ABSOLUTE

| | | |
|----------------------|--|----|
| Any forearm fracture | | 20 |
|----------------------|--|----|

WEIGHTED (See "Weighting Factors")

| | | |
|------------------|--------------------------------|---|
| Digital fracture | Simple shaft | 1 |
| | Comminuted shaft | 2 |
| | Intra-articular DIPJ | 3 |
| | Intra-articular MCPJ | 4 |
| | Intra-articular PIPJ/IPJ/thumb | 5 |
| Dislocation | Closed | 2 |
| | Open | 4 |
| Ligament injury | Sprain | 2 |
| | Rupture/avulsion | 3 |

If fracture is open: DOUBLE the score

MOTOR

ABSOLUTE

| | | |
|---------------------------------|--|----|
| Wrist flexor or extensor (each) | | 10 |
|---------------------------------|--|----|

WEIGHTED (See "Weighting Factors")

| | | |
|-----------------|------------------|---|
| Extensor tendon | Proximal to PIPJ | 1 |
| | Distal to PIPJ | 3 |

| | | |
|---------------------------------|------------------|---|
| Flexor profundus (incl. FPL) | Zone 1 | 6 |
| | Zone 2 | 6 |
| | Zone 3 | 5 |
| | Zone 4, 5, belly | 3 |

| | | |
|----------------------|-------------------|---|
| Flexor superficialis | Distal to wrist | 5 |
| | Proximal to wrist | 2 |

| | | |
|-------------------|--|---|
| Intrinsic muscles | | 2 |
|-------------------|--|---|

Crush or avulsion of above: DOUBLE the score

NEUROVASCULAR

ABSOLUTE

| | | |
|-------|---------------------------|----|
| Nerve | Main median n. | 60 |
| | Main ulnar n. | 60 |
| | Motor branch of median n. | 30 |
| | Deep branch of ulnar n. | 30 |

| | | |
|--------|---------------|----|
| Artery | Radial artery | 10 |
| | Ulnar artery | 10 |

WEIGHTED (See "Weighting Factors")

| | | |
|---------------|------|---|
| Digital nerve | One | 3 |
| | Both | 4 |

| | | |
|----------------|------|---|
| Digital artery | One | 3 |
| | Both | 6 |

Crush or avulsion of neurovascular bundle: DOUBLE the score

WEIGHTING FACTORS

The following apply to weighted scores:

| | | | |
|--------|-----|---------|-----|
| Thumb | x 6 | Little | x 2 |
| Index | x 2 | Hand & | x 1 |
| Middle | x 3 | forearm | |
| Ring | x 3 | | |

SECTION C: WORLD HEALTH ORGANISATION QUALITY OF LIFE WHOQOL-BREF

Instructions:

This assessment asks how you feel about your quality of life, health, and other areas of your life. Please answer all the questions. If you are unsure about which response to give to a question, please choose the one that appears most appropriate. This can often be your first response.

Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life in the **last two weeks**.

Do you get the kind of support from others that you need?

| | | | | |
|------------|----------|------------|------|------------|
| Not at all | Slightly | Moderately | Very | Completely |
| 1 | 2 | 3 | 4 | 5 |

You would circle the number 4 if in the last two weeks you got a great deal of support from others.

If you did not get any of the support from others that you needed in the last two weeks you would circle 1.

Thank you for your help.

Please read the question, assess your feelings, for the last two weeks, and circle the number on the scale for each question that gives the best answer for you.

| | | Very poor | Poor | Neither poor nor good | Good | Very good |
|---|--|-----------|------|-----------------------|------|-----------|
| 1 | How would you rate your quality of life? | 1 | 2 | 3 | 4 | 5 |

| | | Very dissatisfied | Fairly Dissatisfied | Neither satisfied nor dissatisfied | Satisfied | Very satisfied |
|---|---|-------------------|---------------------|------------------------------------|-----------|----------------|
| 2 | How satisfied are you with your health? | 1 | 2 | 3 | 4 | 5 |

The following questions ask about how much you have experienced certain things in the **last two weeks**.

| | | Not at all | A Small amount | A Moderate amount | A great deal | An Extreme amount |
|---|--|------------|----------------|-------------------|--------------|-------------------|
| 3 | To what extent do you feel that physical pain prevents you from doing what you need to do? | 1 | 2 | 3 | 4 | 5 |
| 4 | How much do you need any medical treatment to function in your daily life? | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|--|---|---|---|---|---|
| 5 | How much do you enjoy life? | 1 | 2 | 3 | 4 | 5 |
| 6 | To what extent do you feel your life to be meaningful? | 1 | 2 | 3 | 4 | 5 |

| | | Not at all | Slightly | Moderately | Very | Extremely |
|---|--|------------|----------|------------|------|-----------|
| 7 | How well are you able to concentrate? | 1 | 2 | 3 | 4 | 5 |
| 8 | How safe do you feel in your daily life? | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 9 | How healthy is your physical environment? | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|

| | | Not at all | Slightly | Somewhat | To a great extent | Completely |
|----|--|------------|----------|----------|-------------------|------------|
| 10 | Do you have enough energy for everyday life? | 1 | 2 | 3 | 4 | 5 |
| 11 | Are you able to accept your bodily appearance? | 1 | 2 | 3 | 4 | 5 |
| 12 | Have you enough money to meet your needs? | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|----|--|---|---|---|---|---|
| 13 | How available to you is the information you need in your daily life? | 1 | 2 | 3 | 4 | 5 |
| 14 | To what extent do you have the opportunity for leisure activities? | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|----|---|------------|----------|------------|------|-----------|
| | | Not at all | Slightly | Moderately | Very | Extremely |
| 15 | How well are you able to get around physically? | 1 | 2 | 3 | 4 | 5 |

The following questions ask you to say how good or satisfied you have felt about various aspects of your life over the over the **last two weeks**.

| | | | | | | |
|----|--|-------------------|---------------------|----------|-----------|----------------|
| | | Very Dissatisfied | Fairly Dissatisfied | Not Sure | Satisfied | Very satisfied |
| 16 | How satisfied are you with your sleep? | 1 | 2 | 3 | 4 | 5 |
| 17 | How satisfied are you with your ability to perform your daily living activities? | 1 | 2 | 3 | 4 | 5 |
| 18 | How satisfied are you with your capacity for work | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|----|---|---|---|---|---|---|
| 19 | How satisfied are you with yourself? | 1 | 2 | 3 | 4 | 5 |
| 20 | How satisfied are you with your personal relationships? | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|----|---|---|---|---|---|---|
| 21 | How satisfied are you with your sex life? | 1 | 2 | 3 | 4 | 5 |
| 22 | How satisfied are you with the support you get from your friends? | 1 | 2 | 3 | 4 | 5 |
| 23 | How satisfied are you with the conditions of your living place? | 1 | 2 | 3 | 4 | 5 |
| 24 | How satisfied are you with your access to health services? | 1 | 2 | 3 | 4 | 5 |
| 25 | How satisfied are you with your transport? | 1 | 2 | 3 | 4 | 5 |

The following question refers to **how often** you have felt or experienced certain things in the last two weeks.

| | | Never | Infrequently | Sometimes | Frequently | Always |
|----|--|-------|--------------|-----------|------------|--------|
| 26 | How often do you have negative feelings such as blue mood, despair, anxiety or depression? | 1 | 2 | 3 | 4 | 5 |

Appendix B: Informed consent

Participant information and consent form for enrolment in the study

This consent form will be administered to all eligible persons. We are requesting you to take part in this research whose title is:

SEVERITY AND QUALITY OF LIFE AMONG HAND INJURY PATIENTS SEE ATKENYATTA NATIONAL HOSPITAL

Principal Investigator:

Dr. Bat-heif Omar Awadh

Registrar at the Orthopaedic Surgery Unit,

Department of Surgery, School of Medicine,

University of Nairobi.

This Informed Consent Form has 3 parts:

- I. Information Sheet (informs you in a brief overview about the research with you).
- II. Certificate of Consent (for you to sign if you agree to take part).
- III. Statement by the researcher/person taking consent.

I. INFORMATION SHEET

Introduction

This study is titled:

SEVERITY AND QUALITY OF LIFE AMONG HAND INJURY PATIENTS SEE ATKENYATTA NATIONAL HOSPITAL

The study involves data collection from eligible participants. We seek to find out the association between level of severity and quality of life of patients with hand injuries.

The information obtained from this study will help in development of better treatment protocol of hand injuries and look at a multidisciplinary approach to these patients so as to get better outcomes both functionally, socially and psychologically.

Voluntary participation/right to refuse or withdraw

It is your decision to participate or not. Whether you choose to participate or not does not in any way affect you. You shall not be victimized or denied any services whatsoever.

Confidentiality

The information obtained in this study will be treated with confidentiality and only be available to the principal investigator and the study team. Your name will not be used. Any personal information will have a number on it instead of your name. We will not be sharing the identity of those participating in this research.

Study procedure

After agreeing and consenting to participate in the study, severity of the injury will be checked from the file and a quality of health questionnaire administered to you. You will be asked 26 questions from the WHOQOL-BREF questionnaire.

Sharing the results

The knowledge obtained from this study will be shared with Department of Orthopaedic surgery university of Nairobi and Kenyatta National hospital and doctors through publications and conferences. Confidential information will not be shared.

Benefits

The benefits of joining the study include:

- I. Contribution in advancing a multidisciplinary approach to hand injury.
- II. The information may be used to formulate treatment protocols for hand injuries.
- III. There will be no risk involved by enlisting for this study.

Cost and compensation

There will be no extra cost incurred for participating in this study nor is there compensation offered.

Ethical Consideration

This research proposal has been reviewed and approved by the UoN/KNH Ethics and Research Committee, which is a committee whose task is to make sure that research participants are protected from harm.

Who to contact

If you wish to ask any questions later, you may contact:

Principal Researcher:

DR. Bat-heif Omar Awadh

Phone: 0721625683

Email: omarawadh1989@gmail.com

Department of Surgery, School of Medicine, University of Nairobi

University of Nairobi /Kenyatta National Hospital Supervisors:

DR. VINCENT MUOKI MUTISO

Senior Lecturer, Consultant Orthopaedic, Trauma Surgeon and Sports Medicine

Head Orthopaedic Surgery Unit, Department of Surgery

University of Nairobi

P.O. Box 19681-00202 Nairobi, Kenya.

Email: mutiso@uonbi.ac.ke

Or

DR. FRED CHUMA SITATI

MBChB, MMed (Ortho), FCS (ECSA), Dip SICOT, PhD

Consultant Orthopaedic Surgeon (Arthroplasty, Arthroscopy and Trauma)

Senior Lecturer Orthopaedic Surgery Unit, Department of Surgery

University of Nairobi

P.O. Box 895-00200 Nairobi, Kenya.

Email address: fchuma@uonbi.ac.ke

Or

Secretary/Chairperson, Kenyatta National Hospital-University of Nairobi Ethics

and Research Committee

Telephone No. 2726300

Ext. 44102

Email: uonknh_erc@uonbi.ac.ke.

II. Certificate of Consent

I have read and understood the above information/the above information has been read out to me. I have had the opportunity to ask questions and the questions that I have asked have been answered satisfactorily. I voluntarily agree and consent to participate in this research.

Print Name of Participant _____

Signature of Participant _____

Date _____

If Non -literate:

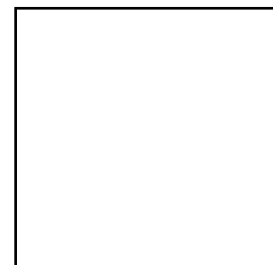
I have witnessed the reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I can confirm that the individual has given consent voluntarily.

Print Name of witness _____

Thumb print of participant

Signature of witness _____

Date _____



III. Statement by the researcher

I have read out the information sheet to the participant and made sure that the participant understands the whole information on the consent form.

A decision to refuse to participate or withdrawal from the study will not in any way affect the subjects.

All information given will be handled with confidentiality.

The results of this study might be published to facilitate research and improved clinical guidelines. I can confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the approval has been given voluntarily.

Name of researcher/person taking consent _____

Signature of researcher/person taking consent _____

Date _____

Kiambatisho C: Hojaji ya masomo

Maelezo ya mshiriki na fomu ya idhini ya uandikishaji katika utafiti

Fomu hii ya idhini itasimamiwa kwa watu wote wanaostahili. Tunakuomba ushiriki katika utafiti huu ambao kichwa chake ni:

KIWANGO CHA MAJERUHI NA UBORA WA MAISHA MIONGONI MWA WAGONJWA WA MAJERAHA YA MIKONO WANAOPATA MATIBABU KATIKA HOSPITALI YA KITAIFA YA KENYATTA

Mpelelezi Mkuu: Dr. Bat-heif Omar Awadh

Fomu hii ya Ridhaa ya Habari ina sehemu 3:

Karatasi ya Habari (inakujulisha kwa muhtasari mfupi kuhusu utafiti na wewe).

Cheti cha Idhini (kwa wewe kusaini ikiwa unakubali kushiriki).

Kauli ya mtafiti/mtu kuchukua ridhaa.

Utangulizi

Utafiti huu umepewa jina: KIWANGO CHA MAJERUHI NA UBORA WA MAISHA MIONGONI MWA WAGONJWA WA MAJERAHA YA MIKONO WANAOPATA MATIBABU KATIKA HOSPITALI YA KITAIFA YA KENYATTA

Utafiti huo unahusisha ukusanyaji wa data kutoka kwa washiriki wanaostahiki. Tunatafuta kujua ushirika kati ya kiwango cha majeruhi na ubora wa maisha ya wagonjwa wenye majeraha ya mikono. Taarifa zilizopatikana kutokana na utafiti huu zitasaidia katika kuandaa itifaki bora ya matibabu ya majeraha ya mikono na kuangalia mbinu mbalimbali kwa wagonjwa hawa ili kupata matokeo bora kiutendaji, kijamii na kisaikolojia.

Ushiriki wa hiari/ haki ya kukataa au kujiondoa

Ni uamuzi wako kushiriki au la. Iwapo utaamua kushiriki au kutokuathiri kwa namna yoyote ile. Hutaathirika au kunyimwa huduma yoyote.

Usiri

Maelezo yaliyopatikana katika utafiti huu yatatibiwa kwa usiri na yatapatikana tu kwa mpelelezi mkuu na timu ya utafiti. Jina lako halitatumika. Maelezo yoyote ya kibinafsi

yatakuwa na nambari juu yake badala ya jina lako. Hatutapeana utambulisho wa wale wanaoshiriki katika utafiti huu.

Utaratibu

Baada ya kukubali kushiriki katika utafiti, kiwango cha jeraha kitaangaliwa kutoka kwa faili na ubora wa dodoso la afya linalosimamiwa kwako. Utaulizwa maswali 26 kutoka kwa dodoso la WHOQOL-BREF. Kushiriki matokeo Maarifa yaliyopatikana kutokana na utafiti huu yatashirikiwa na Idara ya Upasuaji wa Mifupa chuo kikuu cha Nairobi na Hospitali ya Kitaifa ya Kenyatta na madaktari kupitia machapisho na mikutano. Taarifa za siri hazitasambazwa.

Faida

Faida za kujiunga na utafiti huo ni pamoja na: Mchango katika kuendeleza mbinu mbalimbali za kuwasaidia wote walio umia mikono. Taarifa hizo zinaweza kutumika kuunda itifaki za matibabu ya majeraha ya mikono. Hakutakuwa na hatari yoyote inayohusika kwa kujiandikisha kwa utafiti huu.

Gharama na fidia

Hakutakuwa na gharama ya ziada iliyopatikana kwa kushiriki katika utafiti huu wala hakuna fidia inayotolewa.

Uzingatiaji wa Maadili

Pendekezo hili la utafiti limepitiwa na kuidhinishwa na Kamati ya Maadili na Utafiti ya UoN / KNH, ambayo ni kamati ambayo kazi yake ni kuhakikisha kuwa washiriki wa utafiti wanalindwa dhidi ya madhara.

Nani wa kuwasiliana naye

Ikiwa unataka kuuliza maswali yoyote baadaye, unaweza kuwasiliana na:

Mtafiti Mkuu:

DR. Bat-heif Omar Awadh

Simu: 0721625683 Barua pepe: omarawadh1989@gmail.com

DKT. VINCENT MUOKI MUTISO

Mhadhiri Mwandamizi, Mshauri wa Mifupa, Daktari wa Upasuaji

Mwenyekiti Kitengo cha Upasuaji wa Mifupa, Idara ya Upasuaji Chuo Kikuu cha Nairobi

P.O. Box 19681-00202 Nairobi, Kenya.

Barua pepe: mutiso@uonbi.ac.ke

DKT. FRED CHUMA SITATI

MBCChB, MMed (Ortho), FCS (ECSA), Dip SICOT, PhD (Ortho, UoN)

Daktari wa Upasuaji wa Mifupa (Arthroplasty, Arthroscopy na Trauma)

Mhadhiri Mwandamizi Kitengo cha Upasuaji wa Mifupa,

Idara ya Upasuaji Chuo Kikuu cha Nairobi

P.O. Box 895-00200 Nairobi, Kenya.

Anwani ya barua pepe: fchuma@uonbi.ac.ke

Au

Katibu / Mwenyekiti, Hospitali ya Taifa ya Kenyatta-Chuo Kikuu cha Nairobi Kamati ya

Maadili na Utafiti

Simu Nambari. 2726300

Ext. 44102

Barua pepe: uonknh_erc@uonbi.ac.ke.

Cheti cha ridhaa

Nimesoma na kuelewa maelezo hapo juu/maelezo hapo juu yamesomwa kwangu. Nimepata fursa ya kuuliza maswali na maswali ambayo nimeuliza yamejibiwa kwa kuridhisha. Ninakubali kwa hiari na kukubali kushiriki katika utafiti huu.

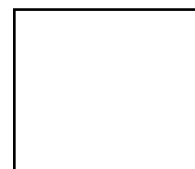
Chapisha Jina la Mshiriki _____ Saini ya Mshiriki _____

Ikiwa sio -kusoma:

Nimeshuhudia usomaji wa fomu ya ridhaa kwa mshiriki mtarajiwa, na mtu binafsi amepata fursa ya kuuliza maswali.

Naweza kuthibitisha kuwa mtu huyo ametoa ridhaa kwa hiari. Chapisha Jina la chapisho la

witness _____ Kidole cha mshiriki



Saini ya shahidi _____

Tarehe _____

Kauli ya mtafiti

Nimesoma karatasi ya habari kwa mshiriki na kuhakikisha kuwa mshiriki anaelewa taarifa nzima kwenye fomu ya ridhaa. Uamuzi wa kukataa kushiriki au kujiondoa katika utafiti hautaathiri masomo kwa njia yoyote.

Taarifa zote zitakazotolewa zitashughulikiwa kwa usiri. Matokeo ya utafiti huu yanaweza kuchapishwa ili kuwezesha utafiti na miongozo bora ya kliniki.

Naweza kuthibitisha kuwa mshiriki alipewa nafasi ya kuuliza maswali kuhusu utafiti, na maswali yote yaliyoulizwa na mshiriki yamejibiwa kwa usahihi na kwa kadri ya uwezo wangu.

Nathibitisha kuwa mtu huyo hajalazimishwa kutoa ridhaa, na idhini imetolewa kwa hiari.

Jina la mtafiti/mtu kuchukua ridhaa _____

Saini ya mtafiti _____

Tarehe _____

Appendix D: UON/KNH ERC Approval



UNIVERSITY OF NAIROBI
FACULTY OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

KNH-UoN ERC
Email: uonknh_erc@uonbi.ac.ke
Website: <http://www.erc.uonbi.ac.ke>
Facebook: <https://www.facebook.com/uonknh.erc>
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC



KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/136

28th March, 2023

Dr. Omar Awadh Bat-Heif
Reg.No.H58/10978/2018
Dept. of Orthopaedic Surgery
Faculty of Health Sciences
University of Nairobi



Dear Dr. Bat-Heif,

RESEARCH PROPOSAL: SEVERITY AND QUALITY OF LIFE AMONG ADULT HAND INJURY PATIENTS SEEN AT KENYATTA NATIONAL HOSPITAL (P927/12/2022)

This is to inform you that KNH-UoN ERC has reviewed and approved your above research proposal. Your application approval number is **P927/12/2022**. The approval period is 28th March 2023 – 27th March 2024.

This approval is subject to compliance with the following requirements;

- i. Only approved documents including (informed consents, study instruments, MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by KNH-UoN ERC.
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KNH-UoN ERC 72 hours of notification.
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH-UoN ERC within 72 hours.
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to KNH-UoN ERC.

Protect to discover

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://research-portal.nacosti.go.ke> and also obtain other clearances needed.

Yours sincerely,








DR. BEATRICE K.M. AMUGUNE
SECRETARY, KNH-UoN ERC

c.c. The Dean, Faculty of Health Sciences, UoN
The Senior Director, CS, KNH
The Assistant Director, Health Information Dept., KNH
The Chairperson, KNH- UoN ERC
The Chair, Dept. of Orthopaedic Surgery, UoN
Supervisors: Dr. Fred Sitati Dept. of Orthopaedic Surgery, UoN
Dr. Tom Mogire , Dept. of Orthopaedic Surgery, UoN

Protect to discover

Appendix E: Nacosti research License

| | |
|---|--|
|  REPUBLIC OF KENYA |  NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION |
| Ref No: 440279 | Date of Issue: 01/May/2023 |
| RESEARCH LICENSE | |
|  | |
| This is to Certify that Dr.. OMAR Awadh BAT-HEIF of University of Nairobi, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: SEVERITY AND QUALITY OF LIFE AMONG ADULT HAND INJURY PATIENTS SEEN AT KENYATTA NATIONAL HOSPITAL. for the period ending : 01/May/2024. | |
| License No: NACOSTI/P/23/25693 | |
| 440279 |  |
| Applicant Identification Number | Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION |
| | Verification QR Code |
| |  |
| NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application. | |
| See overleaf for conditions | |

Appendix F: Similarity Report.

SEVERITY AND QUALITY OF LIFE AMONG ADULT HAND INJURY PATIENTS SEEN AT KENYATTA NATIONAL HOSPITAL

ORIGINALITY REPORT

| | | | |
|--------------------------------|-------------------------------|---------------------------|-----------------------------|
| 12% SIMILARITY INDEX | 8% INTERNET SOURCES | 6% PUBLICATIONS | 2% STUDENT PAPERS |
|--------------------------------|-------------------------------|---------------------------|-----------------------------|

PRIMARY SOURCES

| | | |
|----------|--|---------------|
| 1 | www.researchgate.net Internet Source | 2% |
| 2 | erepository.uonbi.ac.ke Internet Source | 1% |
| 3 | ir.mu.ac.ke:8080 Internet Source | 1% |
| 4 | Onoja Matthew Akpa, Elijah Afolabi Bamboye. "Correlates of the quality of life of adolescents in families affected by HIV/AIDS in Benue state, Nigeria", Vulnerable Children and Youth Studies, 2015 Publication | 1% |
| 5 | ir.ikuat.ac.ke Internet Source | <1% |
| 6 | www.jpalliativecare.com Internet Source | <1% |
| 7 | dspace.muhas.ac.tz:8080 Internet Source | <1% |

DEPARTMENT OF SURGERY
FACULTY OF HEALTH SCIENCES
P O Box 19876 - 00202. KNI
NAIROBI
Tel: 020 4915043

[Signature]
15/8/2023

[Signature]
10/8/23