

Socio-demographics, Causes of Injuries, and Rehabilitation Injury Categories in a Commercial Motorcycle Road-Related Orthopedics and Neurological Surgery Cohort in Eldoret, Kenya

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ABSTRACT

Commercial motorcycle road related orthopedics and neurological injuries are one of the major causes of short- and long-term consequences requiring timely interdisciplinary referrals and in-patient physiotherapy rehabilitation together with out-patient follow-ups, to maintain and improve physical and functional level of patients. Spinal cord injuries and fractures of the vertebra and lower extremities remain one of the causes of mortality, impairments and disability to the riders, passengers and pedestrians. The objective of the study was to explore socio-demographic characteristics, causes of injuries, rehabilitation injury categories following commercial motorcycle road-related orthopedics and neurological surgery, Eldoret, Kenya. In this prospective cohort study, purposive sampling was adopted to select a sample size of 79 participants for a 6 months period of March 2021-July 2022 in 5 level hospitals, Eldoret, Kenya. The data was entered and analyzed with SPSS 20. The findings show that, from the patients' bio-data during the study period, 79 out 150 were admitted with commercial motorcycle road-related orthopedics and neurological injuries for surgery with a prevalence rate 53%. All (100%) participants from socioeconomic backgrounds used commercial motorcycles as means of public transport. Male participants constituted to 62% and 38% females with a ratio of male to female of 4.9:3. Majority (94%) of participants were aged between 18 to 44 years with 62% aged between 18-34 years. Sixty-six per cent (66%) were admitted to orthopedics while 34% in neurological wards. All (100%) of the participants reported physical impairments and functional limitations with reduced independence level following commercial motorcycle road-related orthopedics and neurological injuries. All (100%) were referred for post-operative physiotherapy by orthopedics and neurological surgeons. More than half (62%) participants did not intend to continue with outpatient and follow-up physiotherapy rehabilitation. Majority (78%) paid their hospital health bills out of pocket with 51% coming from needy socio-economic class. However, 75% of the participants had requested for a waiver from a social worker. Based on the findings, the study concludes that interdisciplinary referral for post-operative physiotherapy by orthopedics and neurological surgeons were excellent. As a result, there is need for out-patient post-operative physiotherapy follow-ups and sensitization of NHIF registration and uptake by workers in informal sectors.

Keywords: Commercial Motorcycle, Follow-Ups, Injuries, In-Patients, Interventions, Neurological, Orthopedics, Post-Operative Physiotherapy, Surgeon

I. INTRODUCTION

Worldwide, motor vehicle and commercial motorcycle road related accidents contribute to sub-section of 1.3 million fatal road traffic damages and 20-50 million non-fatal damages annually with mortality of 1.24 million people on global roads each year (World Health Organisation [WHO], 2013). In United States of America, 81% of motorcycle road related injuries contribute to the five top categories of impairments namely; traumatic brain injury (TBI), other multiple trauma, TBI with fracture and amputation, other orthopedic, and hip/knee joint replacement (Hoseinian et al., 2019), that require injury diagnosis, medical and in- and outpatient rehabilitation cost (Baptistella et al., 2020). In low- and middle-income countries more than 1.35 million people die with more than 50 million reported to have suffered from long life disability due to road traffic accidents including motorcycle traffic injuries annually (Ahmed et al., 2023; Cholo et al., 2023; Khalaf et al., 2023).

Motorcycle road related accidents contribute more than half of neuro-musculoskeletal injuries of patients hospitalized in trauma, intensive care unit, surgical and neurological wards (Hoseinian et al., 2019). These injuries have been linked to life and limbs threatening conditions with other body system being disrupted, requiring high quality care through orthopaedic, surgical and neurological rehabilitation to minimise physical and functional impairments according to best practices guidelines on orthopaedics trauma. Commercial motorcycles road related orthopaedics and



neurological injuries have been linked with considerable high health care cost, prolonged hospital stay, functional impairments, disruption of social status, long-term disability, loss of employment and reduced workplace productivity (O'Hara, et al., 2020). According to WHO (2023) on Global status on road traffic injuries, some of these accidents lead to cases of death, impairments and disability have been related to long health consequences with socioeconomic burden to the family, society and the government (Cholo et al., 2023; Roshanfekar et al., 2019).

In Kenya like in other Africa countries, the increase in motorcycle road related injuries has been linked to the increased use of commercial motorcycles for public transportation of commuters, goods, and services (Cholo et al., 2023; Konlan & Hayford, 2022) and high cost of trauma injuries (Rahmati et al., 2016). In addition, commercial motorcycle road related orthopedics and neurological injuries remains one of the prevalent causes of short- and long-term consequences requiring direct and timely physiotherapy rehabilitation communication for inpatient, outpatient and follow-up following hospital discharge. Fractures of the lower extremities remain most prevalent with high mortality and morbidity rates to the riders, passengers and pedestrians (Wanjema et al., 2020). However, there a few studies on interdisciplinary referrals for post-operative physiotherapy following commercial motorcycle road-related orthopedics and neurological injuries in the County to improve patients' quality of life.

Physiotherapists remains part of the healthcare rehabilitation team that plays an essential role in reducing the hospital stay, quick recovery and in rehabilitation for a better-quality life (Koranteng et al., 2023). Physiotherapists provided information on rehabilitation to patients during their initial day of admission and after hospital discharge, to improve their knowledge, attitude and practice. The right team at the right time of the interdisciplinary and multidisciplinary team to multi-trauma patient with orthopedics injuries remains core for provision of optimal care and hospitalization (Bach et al., 2017). Worldwide, communication between rehabilitation team and compliance with interdisciplinary referrals in healthcare remains core for patients' safe management and high-quality care (Scaiola et al., 2020). Timely evaluation, diagnosis and assessment for hemodynamics stabilization for operative procedures for surgical, orthopedics and neurological injuries remains core for interdisciplinary referrals to physiotherapists to facilitate the development of proactive rehabilitation programs to reduce functional decline during patients' hospitalization (Irving et al., 2023). Secondly, effective communication on direct timely referrals remains core for efficient functioning of rehabilitation team to optimize patients' functional outcomes of injured body parts (Paxino et al., 2022). Although each patient presents with different needs, inpatient rehabilitation process is initiated pre-operatively and post-operatively by physiotherapists once a referral has been requested.

Research indicates that an interdisciplinary teamwork in healthcare has been linked with increased patient safety, decreases length of hospital stay, lower costs rates, complications and medical care errors (Bendowska & Baum, 2023; Rosen et al., 2018). In addition, it fosters healthcare professionalism coordination on patients' care and access to healthcare services (Bendowska & Baum, 2023). Studies have shown each member of the interdisciplinary team collaborates, directly communicates and timely refers patients to each other to optimize their health and wellbeing by addressing patients' medical, surgical, functional and psychological needs concurrently (Rosen et al., 2018). Interdisciplinary teamwork approach to patients in the healthcare systems has been linked to better quality care and improved outcomes, multiple practitioners reduces medical errors, effective and efficient communication within an interdisciplinary team that reduces waiting time for interventions, faster treatment, reduced stalls of management within the team and patients frustrations; and prompt referrals, investigations and test results and reduced opportunity for condition worsening (Rosen et al., 2018). In addition interdisciplinary patients approach has been linked to reduced hospital stay due to timely surgical start times to prevent orthopedics and neurological surgery delays, improved quality care, quicker recovery and reduced average length of patients hospital stay (Salamanna et al., 2022). More so, collaboration and effective and efficient communication for patients care has been associated with patients better quality of life and healthcare workers high rate of job satisfaction (O'Daniel & Rosenstein, 2008).

In Kenya like in developed countries the interdisciplinary teams comprises of trauma, surgical, orthopedic, neurosurgeons, medical consultants, nurses, physiotherapists, occupational therapists, speech and language therapists, and social workers who act as discharge planners for patients. Interdisciplinary patients' referral for post-operative physiotherapy remains core. Early bed mobilization, progressive self and active stretching, strengthening, proprioceptive and kinetic exercises are recommended (Mason, 2008; Kumar et al., 2005). However, some surgical interventions and physiotherapy rehabilitation for patients with lower extremity fracture/s were pointed to be complex. Basic tenets of fracture (vector muscle pull and bone alignment) and soft tissue reconstruction healing process usually guide on weight bearing and range of motion protocols (Botchey et al., 2017). In addition, physiological complications, extent of injury, pain, patient compliance, depression and negative effects of prolonged bed immobility may interfere with set goals of post-surgery rehabilitation process (Hoyt et al., 2015).



The optimal evaluation, assessment and management of orthopaedics and neurological motorcycle road related injuries and timely interdisciplinary referrals remains key to patients return to Activities of Daily Living (ADLs). Post-operatively, physiotherapist rehabilitation process usually focuses on effects of prolonged bed immobility and extent of injuries to body structure in the following body systems (Cardoso et al., 2022). Therefore, understanding the rehabilitation injury categorizes, timely interdisciplinary referrals for post-operative physiotherapy and follow-ups following commercial neurological and orthopaedic of a single or multisystem trauma is core to optimize functional outcomes.

In developed countries, inpatient rehabilitation costs for motorcycle injuries were estimated at \$13,200 per patient with 4% of inpatient care cost (Miller et al., 2006). Nineteen point five per cent of public funds were paid for motorcycles crash injuries that were approximated to \$422 million (Cholo et al., 2023; Baptistella et al., 2023). Motorcycle injuries contribute to other costs linked to loss of functional capacity that negatively impact on social, physical and role functions (Bittar et al., 2020). Others were prolonged hospital stay, healthcare cost and lost livelihood linked to loss of employment or source of income and living standards to the patient, family and the state (Miller et al., 2006).

Rehabilitation of orthopaedic and neurological injuries following motorcycle road accidents in developed countries, use of Functional Independence Measure (FIMs) for motor score, Cognitive score and Craig Handicap Assessment and Reporting Technique (CHART) to Quantify Individual Extent of Handicap like in other conditions were reported useful during, before and after patients discharge and follow-up (Furuta et al., 2022; Beninato & Portney, 2011). A CHART that consists of six dimensions of one's life each with maximum score of 100 with a total of 600 namely occupation, cognitive independence, physical independence, mobility, social integration, and economic self-sufficiency (Walker et al., 2003). Use of pre- and post-outcome measures before and after surgery was core across all motorcycle road related injury categories to determine patients' level of motor and cognitive function, handicap and quality of life (Cholo et al., 2023). A study found that across all motorcycle injury categories 51.1 % of the patient were not working and 10.6% disabled at the time of discharge (Cholo et al., 2023). However, a few studies have highlighted on interdisciplinary referrals for post-operative physiotherapy rehabilitation and follow-ups that remain core part of universal healthcare coverage target in the achieving 3rd (3.8) Sustainable Development Goal (SDG) in ensuring healthy living and wellbeing for all in all ages (WHO, 2023; Government of Kenya [GoK], 2008).

II. METHODS & MATERIALS

2.1 Study design

A prospective descriptive cohort study design was conducted in 6-month at Moi Teaching and Referral hospital in orthopedics wards; Longonot and Kilimanjaro (male), Sergoit (female) and Neurological wards from March 2021-July 2022.

2.2 Study area

The study was carried out at Moi Teaching and Referral Hospital (MTRH). The hospital serves Kenya, Eastern Uganda, Northern Tanzania, Southern Sudan and the Democratic Republic of Kenya with a catchment population of over 25 million. The hospital is located in Eldoret town, Uasin Gishu County in the North Rift region of Kenya. It is situated along Nandi Road, and is about 310 km northwest of Nairobi, the capital city of Kenya. It is a level six (6) hospital accredited to National Insurance Hospital Fund (NHIF) that provides medical services for in-patient and out-patient services for approximately to 1,500 in- and 1,500 out-patients daily visiting from different parts of other Counties. It has a bed capacity of 1020 for in patients. It has four coordinated departments for victims of motorcycle accidents as accident and emergency, diagnostic, prosthetics, theater, inpatients and outpatients' services.

Study Population

The study population was all motor cycle accident injury patients who were admitted to Orthopedics and Neurological wards in Moi Teaching and Referral Hospital (MTRH), patients aged 18 years old and had undergone surgical interventions and were referred for physiotherapy rehabilitation interventions for the management of their impairments, their care givers, and social workers. Medical records were reviewed to obtain patients case presentation of their socio-demographic characteristics, extent of injury, rehabilitation injury categories and types of post-physiotherapy interventions. The study population was 150 patients admitted in neurological and orthopedics wards.

2.3 Inclusion and Exclusion Criteria

Those patients with motorcycle related injuries that had undergone surgery and were receiving in-patient physiotherapy services in Orthopedics and Neurological wards were included. Patients with incomplete bio data files, traumatic head injuries and those with Glass Coma Scale of less than 12/15 without care givers were excluded.

2.4 Sampling Procedure and Sample Size Determination

Non-probability purposive sampling was used to select patients post-operatively following motorcycle related road traffic accidents in orthopedics and neurological wards in MTRH. The formula by Taro Yamane was used to determine sample size from study population of 150 patients who were admitted during the study period (Yamane, 1967) with 95% confidence level as illustrated: $\pi = N / (1 + N(e)^2)$ where; π = sample size, N = population size, e = accepted 5% margin of error/degree of precision: $150 / (1 + 150(0.05)^2) = 85.714$ which was rounded off to 86. A sample size of 86 were selected but only 79 participants qualified for inclusion criteria.

2.5 Data Collection Instruments and Techniques

Data was collected by using self-developed structured questionnaires which was guided by literature reviews of similar studies. Face-to face self-administered questionnaires during the period of study. The collected data was coded, entered, cleaned and analyzed using SPSS version 20. Descriptive data was presented using percentages, frequencies, histograms and bar graphs. Permission to conduct the research study was sought from Institute of Research and Ethics Committees (IREC/2019/279 from MTRH, Eldoret). Participants were informed of their voluntary participation and withdrawal from the study, the aim and objectives of the study, and their confidentiality. All personal information and data gathered during the study was protected according to guidelines set out by Protection of Personal Information Act and the Kenya data protection Act No. 24 of 2019.

3.1 Data Analysis

A prospective cohort study was conducted. A total 150 patients were admitted to orthopedics (Longonot and Kilimanjaro (male), Sergoit (female) and neurological wards in MTRH during the 6-month period of March 2021-July 2022. Only 79 patients qualified for inclusion criteria. All patients were referred for post-operative physiotherapy after surgery. Out of 150 bio-data of patients' medical records which were prospectively reviewed, only 79 participants qualified for inclusion for the study. Descriptive statistics was used to analysis data. Findings were presented in frequencies in Tables and Figures.

III. RESULTS

3.1 Socio-Demographic Characteristics

The prevalence of motor cycle road related orthopedics and neurological injuries was 53%. Among them 62% were males and 38% females with a ratio of male to female of 4.9:3. The minority (29%) of males victims were aged between 18-34 years while females 18-34 years (39%). All (100%) participants from different background used commercial motorcycle as a means of transport to and from rural and urban settings. Sixty-six per cent of the participants were admitted in orthopedics while 34% in neurological wards. Thirty-four per cent of participants were admitted in neurology ward (19 males and 8 females). Thirty-eight per cent (38%) males were admitted in Longonot and Kilimanjaro (a male orthopedics) wards. Majority (94%) of participants (56% males, 39% females) aged between 18 to 44 years old. Three per cent were minors and 4% were above 55years old. There were 28% (females) in Sergoit, a female orthopedic ward. Majority (63%) resided in Uasin Gishu County while 27% were from other places. Forty-four per cent were dependent on caregivers for their activities of daily living and self-care as shown in Table 1;

Table 1
Socio-Demographic Characteristics of Motorcycle Related Accidents in Orthopedics and Neurology Wards (N=79)

Characteristics	Patients	Number	Percentage of males to females
Age	Males:		
	Under 18 years	2	62
	18-24 years	8	
	25-34 years	18	
	34-35 years	10	
	35-44 years	8	
	Above 55 years	3	
	Females:		
	18-24 years	15	38
	25-34 years	8	
34-35 years	4		
35-44 years	3		
Gender	Male	49	62
	Females	30	38
Socio-economic status	Upper class	9	11
	Middle class	30	38
	Needy	40	51
Orthopedics'	Males:	30	39
	Females:	22	27
Neurology	Males	19	24
	Females	8	10
Place of residence	Uasin Gishu County(32 males:18 females)	50	63
	Outside County(18 males:11 females)	29	37
Caregivers/caretakers	Orthopedics	25	31
	Neurological wards	10	13

3.2 Causes of Commercial Motorcycle Road Traffic Accident-Related Injuries

The major causes of the 79 participants of motorcycle road related orthopedics and neurological injuries were due to over speeding at 38% (18 males riders, 12 females pedestrians), 38% due to collision where 16 males car drivers collided with 13 females motorcycle riders, 25% of the participants fell off from commercial motorcycle passengers seat (16 males motorcycle riders and 4 females passengers as shown in Figure 1 below;

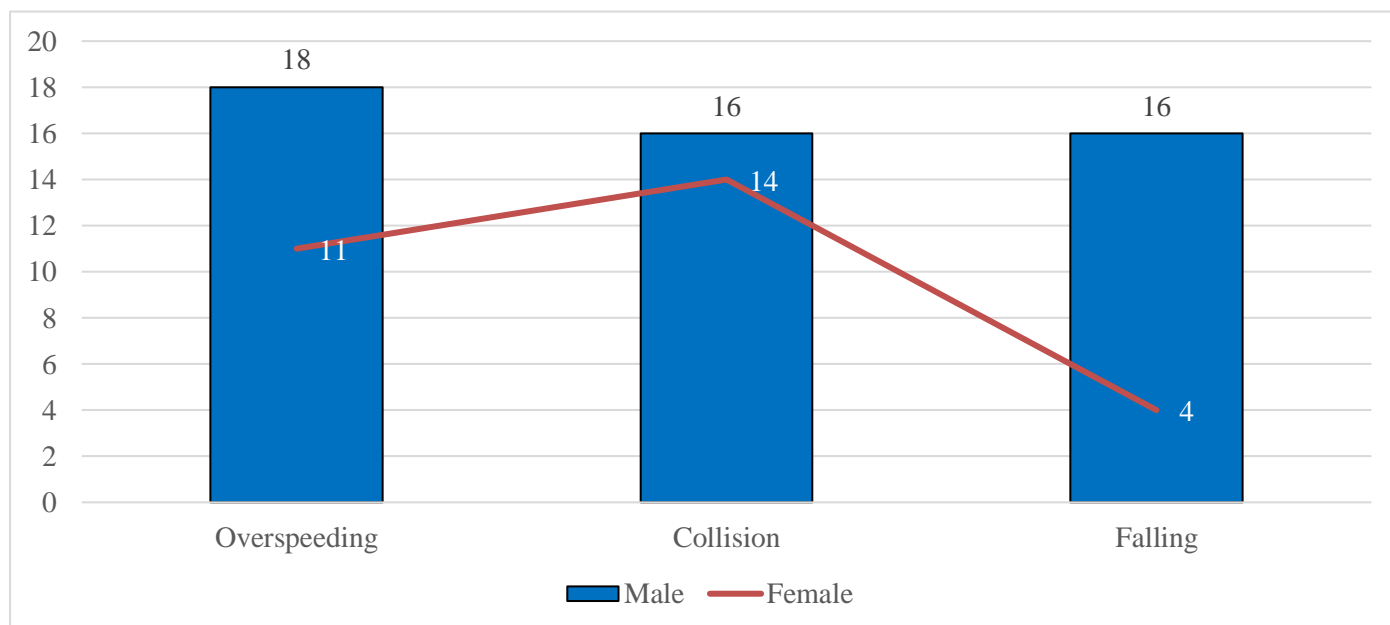


Figure 1
Causes of Commercial Motorcycle Road Related Neurological and Orthopedics Injuries



3.3 Distribution of Rehabilitation Injury Categories Caused by Commercial RTA Motorcycle Injuries

Fifty one per cent (51%) of the participants (26 males, 15 females) sustained fractures and other injuries to the lower extremities (L.E). Forty three per cent (43%) (19 males, 15 females) had fractures to the upper extremity (U.E) and 24% (19) had spinal cord injuries. Eleven per cent (11%) (8 males, 1 female) had burst fractures to the thoracic spine (T. Spine); 9% (5 males, 2 females) had impacted fractures to the cervical spine (C.Spine); while 4% (2 males, 1 female) fracture of the lumbar region. Majority 51% of the participants (24 males, 16 females (19%) sustained severe multiple injuries involving spinal cord injury (SCI) of the cervical, thoracic and lumbar region, upper and lower extremities multiple fractures, 44% (23 males, 12 females) has moderate injuries and 5% had minor injuries (3 males, 1 female). Some of the participants had fractures of the upper and lower extremities in addition to SCI. Seven (9%) participants had SCI complete quadriplegia, 8 (10%) had SCI complete paraplegia and 3 (4%) had incomplete paraparesis as shown in Figure 2.

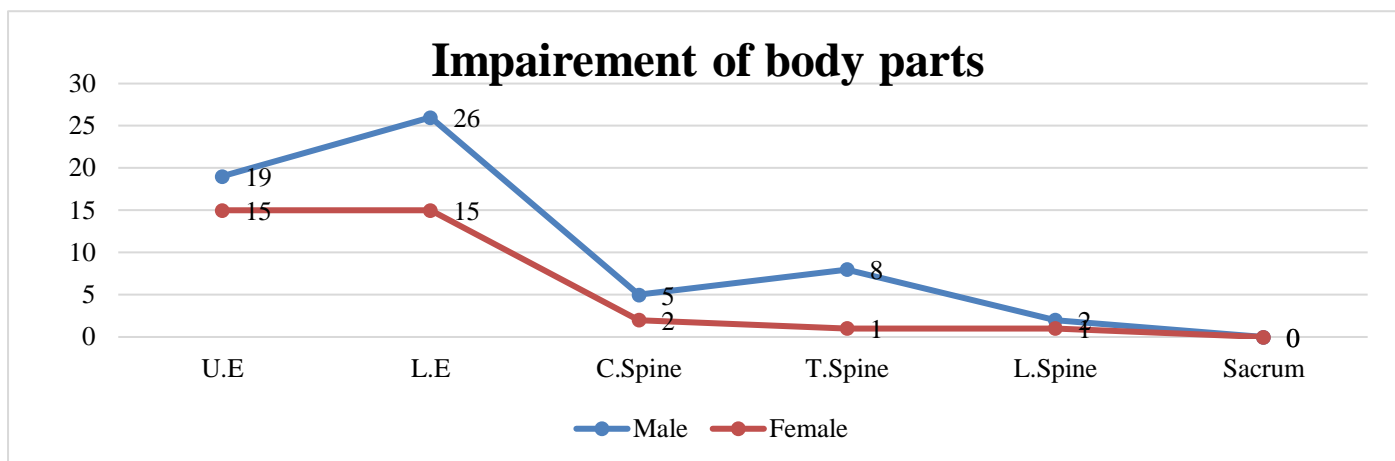


Figure 2
Characteristics of Body Part Injured Following Commercial Motorcycle Accidents

3.4 Patient-Reported Outcome Following Post-Operative Physiotherapy

Hundred per cent (100%) of the participants reported they had lost their physical and functional capacity of the affected limb/s and had undergone some form of surgical repair. All (100%) participants were referred for interdisciplinary team for post-operative physiotherapy rehabilitation following surgical interventions. Out of 100% participants referred for interdisciplinary post-operative physiotherapy, 65% reported improved physical and functional levels of independence of their impairments in spite use of assistive devices with 35% reporting of number improved quality of life as shown in Figure 3.

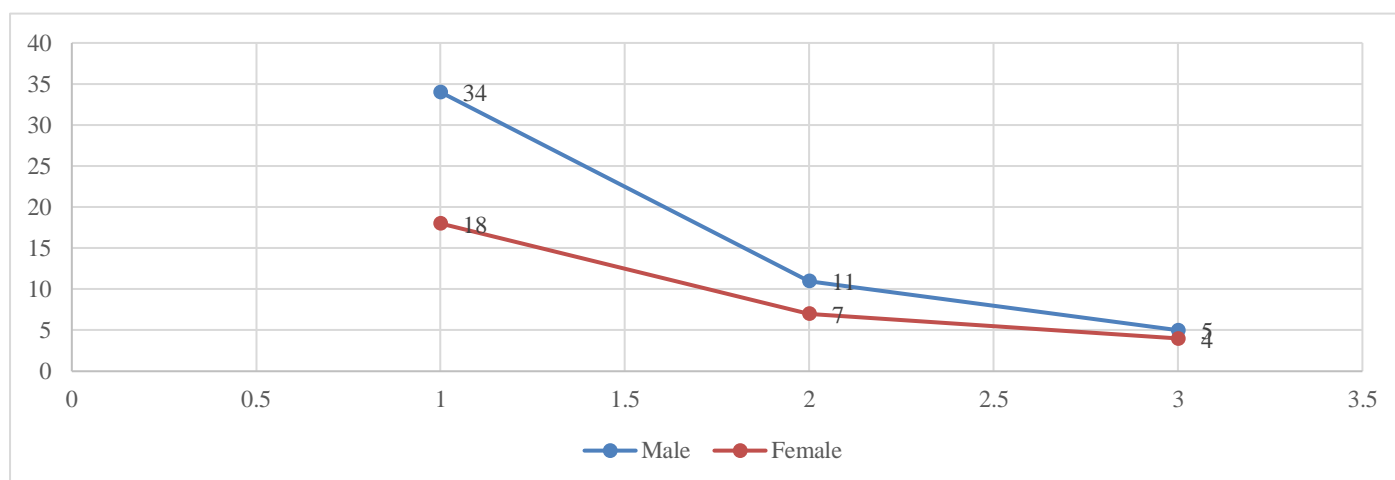


Figure 3
Patient-Reported Outcome Following Post-Operative Physiotherapy

Majority (40%, 19% female, 21% male) of the participants were from needy socio-economic class, 30% were from middle class, and 9% were from upper class. This revealed 100% of the participants used of commercial motorcycles as a means of public transport across all social classes in both urban and rural settings as shown in Figure 4 below

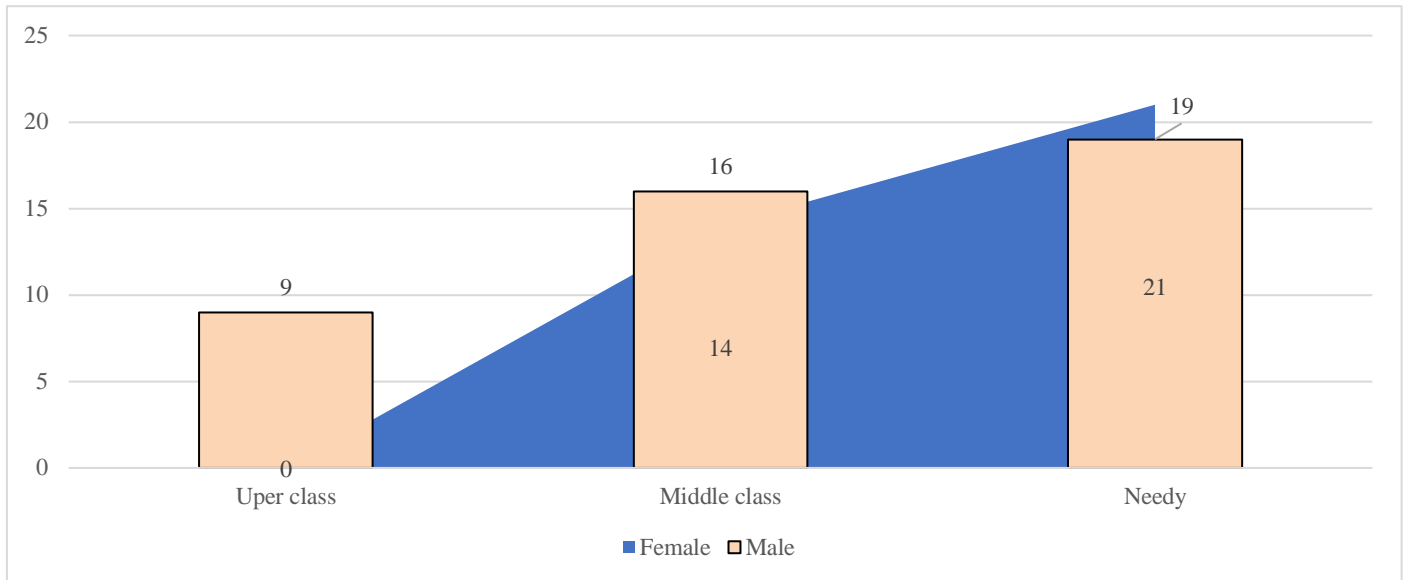


Figure 4
Socioeconomic status of the patient involved motorcycle RTA

The members of an interdisciplinary team had been determined by the patients’ needs of their orthopedics and neurological conditions. The team comprised of orthopedic surgeons, neurologist surgeons, general surgeons, medical students, other physician specialists of Firm 1 and 2, nurse practitioners, nutritionists, physiotherapist, orthopedics technologists, medical psychologists, occupational therapists, care givers, psychiatrists, and social workers. Majority (92.4%) of the participants (48 males, 25 females) pointed out physiotherapists were available for their post-operative in-patients rehabilitation. Six point three per cent (6.3%) indicated physiotherapists did not attend to their conditions with 1.3% not aware of their availability. This was a clear indication of prompt interdisciplinary teamwork with orthopedics and neurological surgeon timely referring patients for post-operative physiotherapy rehabilitation. This is shown in Figure 5 below.

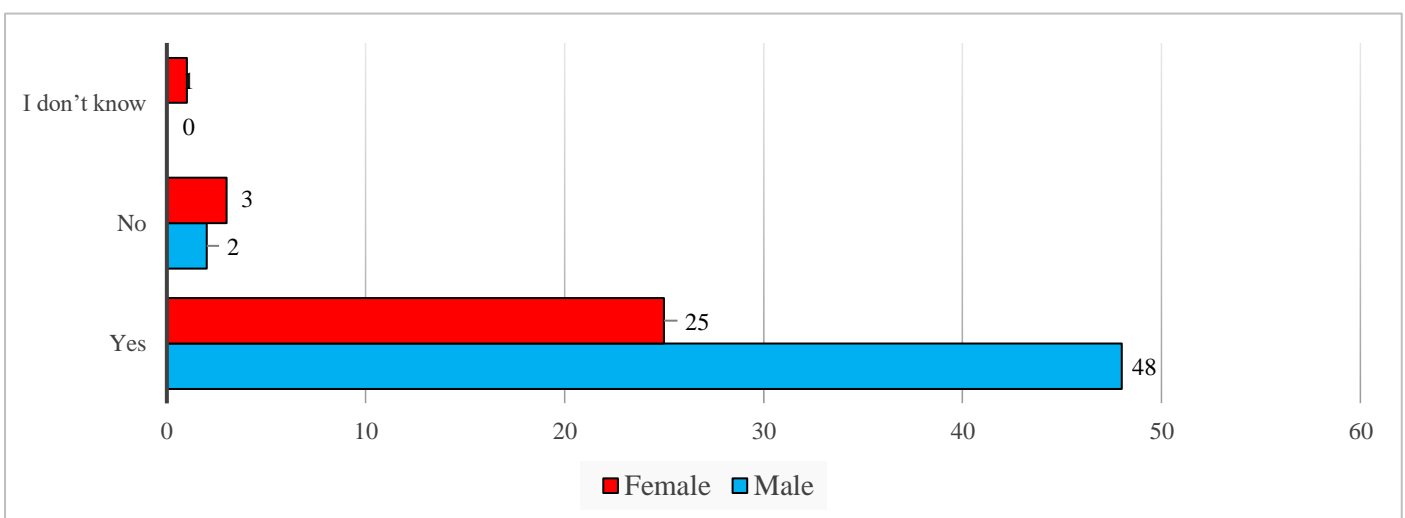


Figure 5
Availability of Physiotherapists for In-Patient Rehabilitation



A few (51%) participants had planned to continue without-patients and follow-ups after discharge while 20% planned to discontinue with 29% did not know. This was an indication of lack of knowledge on benefits achieved by therapeutic interventions on their impairments and limitations could decline if continuity was ceased. As a result leading musculoskeletal pain, joint range limitations, muscle weakness, poor use and delayed weaning from assistive device/s, delayed reintegration to school/work/sports and poor posture, gait, balance and falls. There is a need for health education on significance of out-patients physiotherapy follow-ups following hospital discharge to maintain and improve achieved physical mobility and function levels for improved quality of life. This is shown in Figure 6 below.

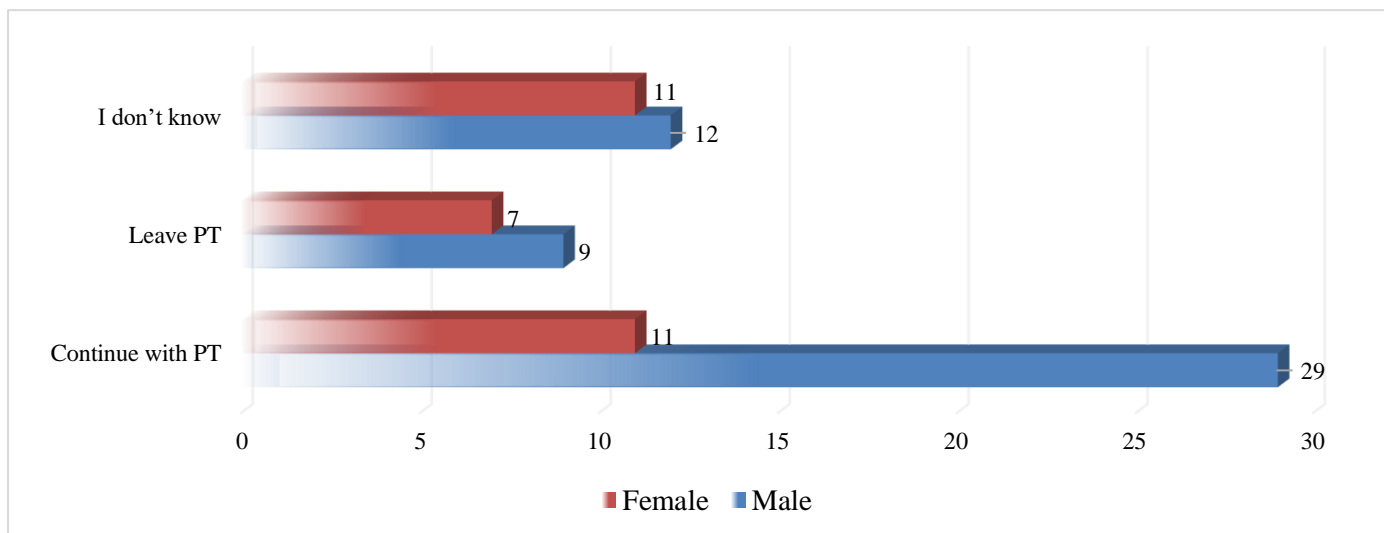


Figure 6
Out-Patients Physiotherapy Rehabilitation Plan and Follow-Ups After Hospital Discharge

Majority (78%) of the participants paid cash for their medical and theatre expenses for orthopedics, neurological and post-operative physiotherapy rehabilitation services. A few (23%) of the participants paid their healthcare costs through National Health Insurance Fund. This revealed motorcycles related injuries contributed to medical expenses and rehabilitative physiotherapy services that was an economic burden to the participants. The participants' mode of payments for healthcare cost is shown in Figure 7 below;

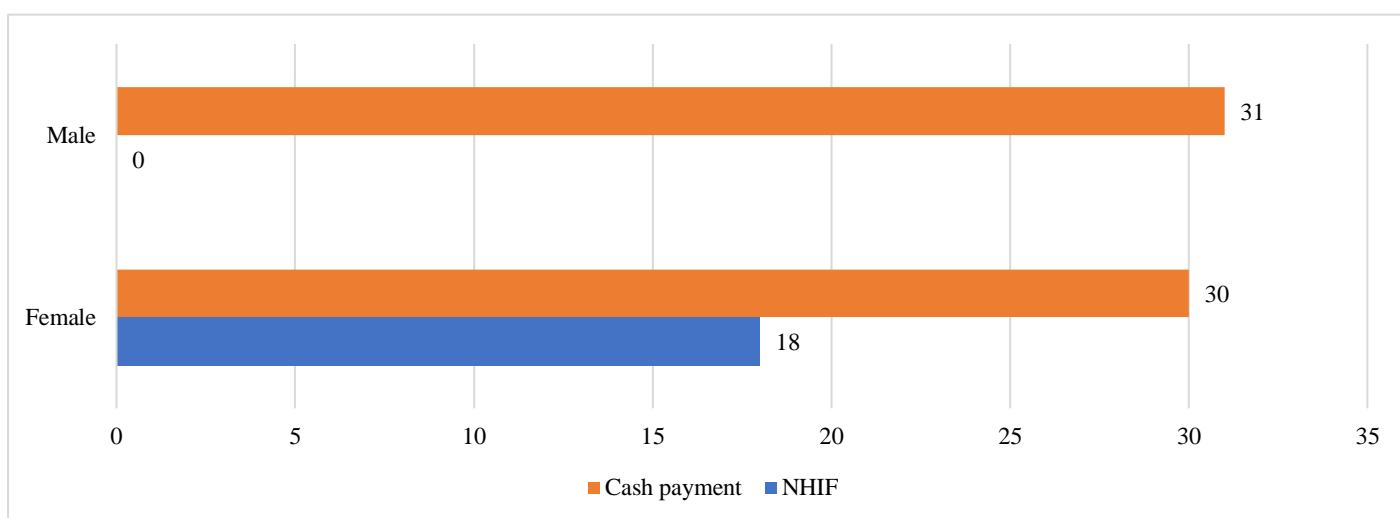


Figure 7
Mode of payment of the patient

Seventy-five per cent (75%) of the participants had requested for a waiver from the social workers for their surgical interventions of the orthopedics and neurological injuries and post-operative physiotherapy services. Of those

43% and 38%, male and female participants respectively, who sustained orthopedics and neurological injuries due to over speeding and collision had requested for a waiver from the social worker as in Figure 8 below.

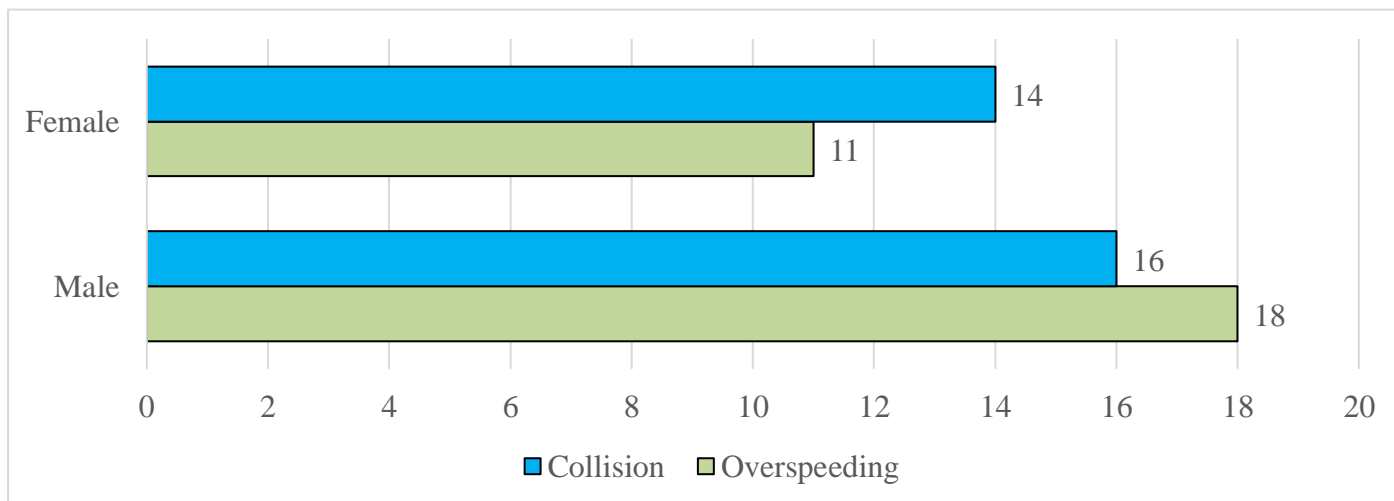


Figure 8
Patients’ Request for A Waiver from A Social Workers and Cause of Orthopedics and Neurological Injury

IV. DISCUSSIONS

The study determined prevalence of commercial motorcycle road-related orthopedics and neurological surgery, interdisciplinary referrals and follow-ups in Eldoret, Kenya. This study confirms the prevalence of commercial motorcycle road related orthopedics and neurological injuries was 53% lower than 55% of a similar study in Kisumu County by Cholo et al. (2020) and (Oltaye et al., 2021) study in Nigeria that reported prevalence of 54%. In the current study 63% males accounted for orthopedics and neurological injuries. In the current study, sixty two per cent (62%) were males and 38% were females. This is similar but lower to Ezeme et al. (2023) and Cholo et al. (2023) study where men accounted for 74.4%. This study confirmed there was increased (100%) use of commercial motorcycle as means of public transport in the rural and urban settings (Munene 2022; Karema, 2015). These study findings confirm motorcycle riders, car drivers, passengers and pedestrians were vulnerable group of road accidents, from varied socioeconomic backgrounds, with a few (51%) from needy class (Hoseinian et al., 2019).

Collisions (38%), over speeding (38%) and falls (24%) were the major cause of orthopedics and neurological trauma related to motorcycle road related injuries. These findings confirms with Carrasco et al. (2021) study that indicated collisions at 63% much higher but falls at 14% much less as main causes of motorcycle injuries. The current study concurs with other studies in the developed countries and in Africa that reports alcohol use, loss of control, poor riding skills, over speeding, overloading of passengers, use of motorcycles with faulty braking systems and striking highway structures and non-compliance with road safety among commercial motorcyclists, as main cause of motorcycle road accidents (WHO, 2023; Konlan et al., 2022; Awosusi et al., 2021; Kipnetich, 2017).

In this study, 94% of the orthopedics and neurological injuries were observed in age group of 18-44 years with males more predisposed than females (6%) with a ratio of 4.9:3. The youth (94%) were more vulnerable to commercial motorcycle road related orthopedics and neurological injuries similar to other studies (Mutai, 2021; Hoseinian et al., 2019; Matheka et al., 2015). This was in line with World Bank (2008) reports that approximate one in every five Kenyan youth of working age brackets were in informal sectors for source of employment and income. The current study findings were contrary to the National Road and Safety Action Plan (NTSA) 2023-2027 in Kenya and adoption of the United Nations Decade of Action for Global Road Safety 2021-2030 in prevention of motorcycle accidents globally (Passmore, 2021).

This current study findings confirmed all participants of rehabilitation injury categories were of upper and lower limb fractures with or without spinal cord and others injuries. These findings concur with Khanbhai and Lutomia (2012) study that revealed rehabilitation injury categories were tibia-fibular fractures (29.3%), femur fractures (19.8%), chest and other injuries (10.3%), soft tissue injuries (20.7%), TBI with high mortality (12.1%), foot injuries (3.4%), ankle injuries, hip dislocations and forearm fractures (1.7%). In the current study 100% participants

reported impaired and lost body structure/s function that resulted to poor health status and quality of life that required orthopaedics and neurological surgical repair and post-operative physiotherapy referral for restoration of impaired or lost physical and functional level. Orthopaedics surgeries were in line with the Best Practices in the Management of Orthopaedics Trauma (2015) to optimize care for musculoskeletal injuries. These study findings concur with Gheslaghi et al. (2021) study that revealed motorcycle road related injuries were linked to poor health and quality of life due to impaired/reduced physical and functional mobility levels, increased dependence on activities of daily living, pain or discomfort, dependence on others for self-care, anxiety and depression.

The study findings indicated 100% suffered orthopedics and neurological injuries was the main cause of operation, hospital stay and interdisciplinary referral for post-operative physiotherapy rehabilitation services. Sixty three per cent indicated surgery significantly repaired and managed their orthopedics and neurological injuries. Ninety eight per cent (98%) of the participants were operated on their impairments with 52% of surgeries done within 1st to 15th day of admission. While 29% were operated within one day after admission which may have been an indication on the severity of commercial motorcycles road related orthopedics and neurological injuries to save on life and restore physical and functional independence. These study findings concur with National Road and Safety Action Plan (NTSA) 2023-2027 in Kenya (GoK, 2023). and adoption of the United Nations Decade of Action for Global Road Safety 2021-2030 (Passmore, 2021), which reports victims who survive motorcycle accidents suffer traumatic fractures, spinal cord and traumatic brain injuries, among others with quality-adjusted life years (QALYs) and disability-adjusted life years (DALYs) that require surgical interventions and post-operative physiotherapy interventions for short and long term care for optimal recovery. The current study findings revealed 36% patients suffered traumatic spinal cord injuries in addition with other fractures of the body parts with increased rate of physical disability or impairments with functional limitation/s. Findings that concur with others studies and Golestani et al. (2022) study that indicated traumatic brain and spinal cord injuries were most prevalent of neurological dysfunction that increased socioeconomic burden and dependence on others (Blincoe et al., 2023; Merritt et al., 2019), reduced quality-adjusted of life years (Gheslaghi et al., 2021; Lee et al., 2010; Collie et al., 2010) as well as increased disability-adjusted life years (Hall et al., 2019).

The study findings confirm interdisciplinary teamwork was 100% on patients' referrals for post-operative physiotherapy. This is similar to Rosen et al. (2016) and Van Dijk et al. (2016) studies which indicated that teamwork rehabilitation and compliance with interdisciplinary patients referrals by the medical doctors in healthcare systems remains core for timely management of patients. More male participants in orthopedics wards (49%) were aware of existence of physiotherapy interventions than females. However, 62% of the participants had no plans to continue with outpatient physiotherapy rehabilitation which remains significant in this study in spite of physiotherapy services availability in most of the County and Sub-County hospitals in Kenya.

In the current study findings, 78% of the participants planned to pay cash for their medical, theatre expenses, orthopedics and neurological surgery and post-operative physiotherapy rehabilitation health costs. A few (51%) were from needy socio-economic class with 75% requesting for a waiver from social workers. This concurs with Mutai (2021) study findings that reported socio-economic factors remained key determinants for registration and uptake of NHIF in spite accessibility of NHIF offices within the hospital settings to facilitate financing of their health care costs similar to Mutai (2021). In this study, 78% paid their hospital health bills out of pocket. This was contrary to NHIF targets of informal sector in Nairobi to increase retention for the realization of universal health coverage (UHC) (WHO, 2023). This also supported by a case report that called for sensitization of informal workers in the participation of Kenya National Health Insurance Scheme (NHIF, 2021) reports on countrywide NHIF sensitization, extension of voluntary registration of the informal sector and willingness of motorcycle riders to pay for their NHIF.

The findings were contrary to WHO Rehabilitation 2030 initiative on the strategic priority of achieving universal healthcare coverage that calls for full continuum of essential health services that covers physiotherapy rehabilitation interventions where all people receive quality health care services to cater for one's health care cost needs without being exposed to financial hardships (WHO, 2023; GoK, 2008). This is geared towards making physiotherapy follow-ups possible. WHO Rehabilitation 2030 Call for Action is in the process of developing a Package for Rehabilitation Interventions to support ministries of health in integrating rehabilitation services in health care systems (Rauch et al., 2019).

Interdisciplinary referrals to social workers were due to poor financial status of 94% participants to cater for healthcare cost in spite their varied socio-economic status. The social workers had a devised strategy to use public funds to cater for the payments of health cost in spite economic burden to health systems to reduce prolonged length of hospital stay after discharge similar to Miller et al. (2006) study. This study findings that confirm to Cholo et al. (2023) and Rahmati et al., (2019) studies that revealed the trends of motorcycle road related injuries were linked to



increased socio-economic burden to the families, communities and public healthcare system in East Africa. Despite National Health Insurance Fund sensitization, majority of motorcycle and passengers victims were not NHIF beneficiaries but paid cash for their healthcare costs (Mutai, 2021).

Patient-reported outcome in the current study was good (62%) following interdisciplinary referrals for post-operative physiotherapy interventions that improved their physical and functional level of independence of their impairments similar to multidisciplinary approach as outlined in the Best Practices in the orthopedics Trauma (2015) and Gohy et al. (2016) study findings that reported physiotherapy interventions shortened hospital length of stay (LOS) and increased physical mobility and functional levels in traumatic injuries. These findings also concur with Tedesco et al. (2018) who points out that delayed post-operative physiotherapy increased in-patient hospital mortality and readmissions after hip fracture in elderly patients. But contrary to 8% of participants, who reported post-operative physiotherapy increased their joint stiffness of the fractured limbs, pitting edema, reduced physical and functional mobility, increased length of hospital stays and even depression.

Ninety-two per cent (92%) of the participants indicated physiotherapists were available in orthopedics and neurological wards with 80% being aware of their role in the management of their lost physical and functional abilities. Approximately 62% of respondents agreed that post-operative physiotherapy management was important, while 38% cited that the management increased pain during and after interventions. Despite availability of physiotherapists in orthopedics and neurological wards, 51% of the participants did not intend to continue with out-patient physiotherapy follow-ups after hospital discharge. Similar to Smith et al. (2016) study findings that indicated need for pre and post-operative physiotherapy clinical practice guidelines for quality assurance standards on diagnosis, examination and intervention strategies for the lower limb extremity amputation. More males (49%) were aware of existence of post-operative physiotherapy interventions than females. This was contrary to Muia and Mlenzana (2022) study that indicated participants' lacked knowledge and awareness on the significance of post-operative physiotherapy interventions which continues to be of great challenge in accessing post-operative physiotherapy service after hospital discharge. One year out patient follow-ups was not feasible in the current study findings contrary to recommended one year follow-ups on post-operative physiotherapy on different condition have been reported to prevent decline of the achieved functional ability during inpatient treatment with increased possibility of further functional improvement (Paolucci et al., 2020).

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

Majority (100%) of the participants was admitted due to commercial road related orthopedics and neurological injuries with a prevalence rate of 53%. Sixty two per cent (62%) were males aged between 18 to 34 years with a male to female ratio of 4.9:3 coming from needy background (51%). Majority (100%) of orthopedics and neurological surgeons referred patients for post-operative physiotherapy. Majority (94%) of the participants were aware of post-operative physiotherapy services for their impairments management. A few 51% of the participants did not intend to continue with out-patient physiotherapy follow-ups after hospital discharge. That may result to decline of the achieved functional outcomes with prolonged rehabilitation programs, who were likely to present later with joints stiffness, edema, reduced physical and functional mobility, hospital re-admission, depression, high mortality rates and high country's dependence ratio. Seventy seven per cent had requested for a waiver from a social worker.

5.2 Recommendations

There is a need for health education on the benefits of post-operative physiotherapy and follow-ups. This will maximize surgical recovery outcomes, maintain achieved or improved, and restore physical and functional impairments following commercial motorcycles road related orthopedics and neurological injuries. This could prevent long term consequences traumatic orthopedics and neurological related residual impairments, disability and lowering socioeconomic impact to healthcare systems, individual, family, community and societal levels. Ministry of health and other stakeholders need to continue sensitizing members of the community on the health status and socioeconomic impact at individual, family, community and state levels in terms of healthcare costs and increased level of dependence linked to orthopedics and neurological dysfunctions following commercial motorcycle-road related injuries.

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