EPIDEMIOLOGY, FUNCTIONING AND REINTEGRATION INTO THE COMMUNITY OF PATIENTS WITH SPINAL CORD INJURIES IN KENYA

STUDENT:
George Mutuku Muli
Student Number: 2301438

Supervisors:

Prof. Veronica Ntsiea
(Wits University)

Dr. Natalie Benjamin-Damon
(Wits University)

Dr. Nassib Tawa
(Jomo Kenyatta University of Agriculture & Technology)

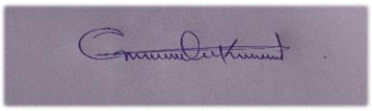
A thesis submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the Doctor of Philosophy

17th OCTOBER 2025

DECLARATION

I declare that *"**Epidemiology, Functioning and Reintegration into the Community of Patients with Spinal Cord Injuries in Kenya"*** is my own work, that it has not been submitted for any degree or examination in any other university and that all sources I have used or quoted have been indicated and acknowledged by means of complete references.

George Mutuku Muli

Signature  17TH OCTOBER 2025

DEDICATION

I dedicate this thesis to my Wife, Melody for her kind support, prayers and encouragement through the good and challenging times of my study, and to my children Paul, Daniel and Susan for the great sacrifices they were prepared to make to allow me to complete my thesis. I am eternally grateful that you continue to be my strength and inspiration always. Thank you for your patience during this challenging journey. May God Bless you abundantly.

PUBLICATION IN THIS THESIS

Muli, G.M., Ntsiea, V., Benjamin-Damons, N. & Tawa, N., 2025, 'Epidemiology of spinal cord injuries in three selected counties in Kenya', *South African Journal of Physiotherapy* 81(1), a2097. https://doi.org/10.4102/sajp. v81i1.2097

ACKNOWLEDGEMENTS

I extend my deepest gratitude to the Almighty God for granting me the strength and perseverance to pursue my academic dreams despite all challenges. I am profoundly grateful to Prof. Veronica Ntsiea for her unwavering support, motivation, and invaluable guidance throughout this journey. Her leadership and encouragement have been instrumental in my success. I sincerely appreciate Dr. Natalie Benjamin-Damon for her tremendous insights and guidance, which have greatly enriched this work. My heartfelt thanks go to Dr. Nassib Tawa for his invaluable contributions and support in obtaining research clearance at Kenyatta National Hospital - I deeply appreciate his assistance. I am also grateful to Dr. Peter Juma for his expertise in statistical analysis, as well as for his continuous support and encouragement.

I extend my sincere appreciation to my parents, family, and friends for their prayers, unwavering support, and belief in me. I am thankful to JKUAT for granting me the time and opportunity to conduct this research. My gratitude also goes to all the authorities who permitted me to collect data in their institutions, as well as my clinical research assistants for their dedication and hard work. Lastly, I express my deepest appreciation to all the patients who participated in this study—your contributions have been invaluable, and this research would not have been possible without you.

ACRONYMS

AIS	ASIA Impairment scale
ASIA	American spinal injury association
CHART	Craig handicap assessment reporting technique
CHIEF	Craig hospital inventory of environmental factors
CRPD	Convention on the rights of persons with disabilities
ICF	International classification of functioning, disability and health
KNH	Kenyatta National Hospital
LOS	Length of stay
LSQ	Life satisfaction questionnaire
MVA	Motor vehicle accident
NLL	Neurological level of lesion
NSIH	National spinal injuries hospital
NTSCI	Non-traumatic spinal cord injury
SCI	Spinal cord injury
SCIM III	Spinal cord independence measure version three
SD	Standard deviation
TSCI	Traumatic spinal cord injury
WHO	World health organization
SPSS	Statistical Package for the Social Sciences

OPERATIONAL DEFINITIONS

Spinal cord injury	Is the injury of the spinal cord from the foramen magnum to the cauda equina which occurs as a result of pressure, incision or contusion (McDonald & Sadowsky, 2002)
Tetraplegia	It is as a result of an injury above the first thoracic vertebra and is characterized by paralysis of the trunk, lower limbs, and the upper limbs (Kirshblum *et al.,* 2014).
Paraplegia	The injury occurs below the first thoracic spinal nerve, resulting in loss of sensation or motor function in the lower limbs and lower part of the thorax or trunk (Kirshblum *et al*., 2014).
Participation	Actions and involvement in life situations such as taking part, being engaged in an area of life, being accepted, or having access to needed resources (WHO,2004).
Integration	It's the process of becoming part of the mainstream of the family and community life, participating in normal roles and responsibilities and being an active and contributing member of one's social group and society as a whole (Capenter *et al.,* 2007).
Functioning	Umbrella term encompassing all body functions (physiological function), body structures (anatomical structures) activities (execution of tasks) and participation, (WHO, 2013).
Activity	"The execution of a task or action by an individual" (WHO, 2001)
Activity limitations	"Difficulties an individual might have in executing activities" (WHO,2001)
Impairments	Problems in body functions or structure as a significant deviation or loss" (WHO,2001)
Outcomes	A patient characteristic that occurs after a SCI that is expected to change after an intervention
Participation restrictions	Problems an individual may experience in life situations" (WHO,2001)
Rehabilitation	All measures aimed at reducing the impact of disability for an individual enabling him or her to achieve independence, social integration, a better quality of life and self-actualization" (Helander, 1999)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

ABSTRACT

Background

Spinal cord injury (SCI) occurs when damage to the spinal cord affects its structure and function, leading to neurological impairments in motor, sensory, and autonomic functions, depending on the severity and location of the injury. Globally, the primary objectives of SCI care remain consistent, highlighting the need for epidemiological data to guide medical and governmental organizations in allocating resources effectively. Functional outcomes are influenced by factors such as injury severity, rehabilitation quality, staff-to-patient ratio, and community support. Successful reintegration into the community is essential for individuals with SCI to regain competence and achieve life satisfaction. This study aimed to examine the epidemiology, functional outcomes, and community reintegration of SCI patients in Kenya.

Methodology

The study was conducted in three counties in Kenya: Machakos, Nairobi, and Mombasa. A mixed-methods design was employed in three phases. **Phase I:** Focused on the epidemiology of SCI through a retrospective cross-sectional design that involved reviewing medical records from a four-year period. The sample size included 159 participants from Nairobi, 61 from Machakos, and 70 from Mombasa. **Phase II:** Utilized an explanatory sequential mixed-methods design. The quantitative component involved a prospective longitudinal study using the SCIM III tool for activity-level functional outcomes and the CHART tool for participation-level functional outcomes. The qualitative component employed a grounded theory design to explore factors affecting reintegration, using CHIEF and LSQ outcome measures. Quantitative data were analyzed using SPSS version 15, while qualitative data were processed with ATLAS Ti software. **Phase III:** Focused on developing guidelines to improve community reintegration using the Delphi procedure study design. In round one, demographic data were analyzed through frequency distribution and percentages, while qualitative data underwent thematic content analysis. In round two, a Likert scale was used to rate participants' statements in terms of importance, and SPSS was used to analyze measures of central tendency and variations. In round three, participants re-rated statements from round two using a Likert scale, and SPSS was employed again to assess the level of agreement among participants.

Results

The results reveals that spinal cord injuries (SCI) primarily affect young, working-age males with limited education, with motor traffic accidents and falls being the leading causes. Incomplete injuries were more common in road accidents, while falls resulted in more severe injuries. Preventive measures, such as road safety campaigns and workplace safety programs, are crucial in reducing SCI cases. The study also highlights the high prevalence of neuropathic pain among male patients, emphasizing the need for specialized pain management. Functional outcome assessments showed significant recovery, especially in individuals with incomplete injuries, though challenges in respiration and sphincter management persist, necessitating long-term, multidisciplinary rehabilitation. Social participation

improved notably, with functional ability and injury severity being strong predictors of recovery, alongside psychosocial factors like social support and depression. Environmental and societal barriers, particularly affecting younger, lower-income, and less-educated individuals, remain significant obstacles to healthcare access and community reintegration. Racial disparities were evident, with Black participants facing greater accessibility and social acceptance challenges. The Delphi study further identified key factors for successful reintegration, such as removing physical barriers, strengthening community support, and improving access to assistive technology and healthcare policies. Major barriers included stigma, financial struggles, inadequate infrastructure, and insufficient specialist training. The study underscores the need for a holistic, multidisciplinary approach that integrates physical, social, and economic interventions to foster independence, social participation, and long-term well-being for individuals with SCI.

Conclusion

The study provided comprehensive insights into the epidemiology of SCI in Kenya, revealing that most cases occurred among males aged 26–35 years with primary education. This study highlights the significant challenges faced by individuals with spinal cord injuries (SCI), particularly young, working-age males with limited education. Motor traffic accidents and falls were the leading causes, with incomplete injuries more common in road accidents and severe injuries resulting from falls. While functional outcomes showed significant improvements, persistent challenges in respiration, sphincter management, and neuropathic pain emphasize the need for long-term, multidisciplinary rehabilitation. Social and environmental barriers, especially for lower-income and less-educated individuals, further hinder recovery and reintegration. Racial disparities in accessibility and social acceptance were also evident. The Delphi study identified key factors for successful reintegration, including removing physical barriers, strengthening community support, and improving healthcare policies. Addressing systemic gaps such as stigma, financial struggles, and inadequate specialist training is crucial. Ultimately, a holistic, multidisciplinary approach is essential to enhance independence, social participation, and long-term well-being for individuals with SCI.

CHAPTER 1
INTRODUCTION

1.0 Background

Spinal cord injury (SCI) is among the most severe and life-altering conditions, leading to both permanent physical and psychological disabilities that significantly impact a person's quality of life (Kriz et al., 2017). SCI occurs when the spinal cord's structure and function are compromised due to trauma, inflammation, tumors, or other causes, resulting in impaired movement, sensation, sphincter control, and autonomic nerve function below the affected area (Yang et al., 2014). Based on its cause, SCI is classified into two categories: traumatic spinal cord injury (TSCI) and non-traumatic spinal cord injury (NTSCI). TSCI is triggered by external forces such as motor vehicle accidents, falls, or acts of violence (Moshi et al., 2017).

In contrast, NTSCI stems from underlying medical conditions such as spinal tumors, infections (e.g., tuberculosis of the spine), degenerative disorders like osteoarthritis, vascular diseases, and congenital anomalies. In the African context, spinal tuberculosis (Pott's disease) is frequently reported, often in association with HIV infection (accounting for ~33–41 % of NTSCI cases in countries like Malawi, Kenya, Uganda, Ethiopia, and South Africa) (New, 2014; Joseph & Ibrahim, 2021).

The neurological impact of SCI varies depending on the location and severity of the injury. The degree of motor, sensory, and autonomic dysfunction is influenced not only by the level of spinal cord damage but also by whether the injury is classified as "complete" or "incomplete" (WHO, 2013). According to the American Spinal Injury Association (ASIA) Impairment Scale (AIS), an SCI is deemed complete when no motor or sensory function is present at the S4-S5 spinal segments. In contrast, an incomplete SCI retains some sensory or motor function below the injury level, including the lowest sacral segments (S4-S5). Although incomplete spinal cord injuries (SCIs) may allow for some level of recovery, they can still cause significant disabilities such as impaired motor function, chronic pain, muscle weakness, loss of bladder or bowel control, and reduced sensory perception.

Neurological recovery largely depends on the severity of the impairment, with most improvement occurring within the first three months post-injury. Complete SCIs rarely result in full recovery, defined here as the restoration of both motor and sensory functions to pre-injury levels, whereas incomplete SCIs offer a greater potential for neurological improvement (Scivoletti et al., 2015).

Despite variations in healthcare systems across different countries, the primary objective of SCI care remains consistent worldwide. The main goals are to help patients regain optimal motor function, posture control, and mobility while promoting independence in daily activities. Achieving these objectives requires accurate epidemiological data to guide medical and governmental institutions in allocating appropriate resources for SCI treatment and rehabilitation (Kriz et al., 2017). Spinal cord injury (SCI) imposes a substantial global health burden, with annual incidence estimates ranging from 40–80 cases per million people worldwide (WHO, 2013), and broader reported ranges between 10.4

and 83 per million (Wyndaele & Wyndaele, 2006). Incidence varies by region and income level, from 13.1 per million in Ireland to 163.4 in Canada, with middle-income countries often showing higher traumatic SCI rates, such as 12.7–29.7 per million (Chiu et al., 2010) and wide national variation from 2.1 per million in Saudi Arabia to 130.7 in Bulgaria (Rahimi-Movaghar, 2013). In Africa, limited data suggest a significant burden, with Botswana at 13.0 per million (WHO, 2025) and Tanzania at 26 per million (Moshi et al., 2017). In Kenya, comprehensive national data are lacking, but existing evidence indicates increasing SCI prevalence, driven largely by motor vehicle accidents and falls. Limited trauma care access, delayed admissions, and inadequate rehabilitation contribute to potentially high mortality, similar to trends in other low-income countries. Globally, 250,000–500,000 people sustain an SCI annually (WHO, 2013), and Kenya likely contributes to this burden. Strengthening surveillance, healthcare infrastructure, and rehabilitation services is essential to improve outcomes and reduce premature mortality.

1.10 Epidemiology

In the context of spinal cord injury (SCI), epidemiology refers to the study of the distribution, patterns, causes, and effects of SCI within populations. It involves examining how often SCI occurs (incidence and prevalence), who is most affected (such as by age, gender, or geographic location), the common causes or risk factors leading to SCI (like trauma, accidents, or disease), and the outcomes or consequences for individuals and communities. Globally, spinal cord injury (SCI) represents a significant public health challenge, with an estimated annual incidence ranging broadly from 40 to 80 cases per million people worldwide (WHO, 2013). This wide range is supported by various studies, such as Wyndaele and Wyndaele (2006), who reported incidences between 10.4 and 83 per million annually. Incidence rates demonstrate considerable variation across different regions and income levels. For instance, high-income countries show a broad spectrum, from as low as 13.1 per million in Ireland to as high as 163.4 per million in Canada, while upper-middle income countries like Botswana report lower incidences near 13 per million (WHO, 2025). Middle-income countries tend to experience relatively higher rates of traumatic SCI, with figures ranging between 12.7 and 29.7 per million (Chiu et al., 2010), and some countries exhibiting extremes from 2.1 per million in Saudi Arabia to 130.7 per million in Bulgaria (Rahimi-Movaghar, 2013). Globally, SCI affects approximately 250,000 to 500,000 individuals each year, with prevalence influenced by survival rates that are typically higher in countries with advanced healthcare systems and lower in low-income regions due to higher mortality (WHO, 2013). Leading causes worldwide include motor vehicle accidents, falls, violence, and sports injuries, with mortality rates two to five times higher than the general population, particularly within the first year after injury (Kang et al., 2018; Devivo, 2012).

In the African context, epidemiological data on SCI remain limited and fragmented, yet existing studies point to a considerable burden. For example, Tanzania, a low-income country, has reported an SCI incidence of 26 per million annually (Moshi et al., 2017), underscoring the regional need for improved data collection and research efforts. The continent faces distinct challenges, including delayed hospital

admissions, limited access to specialized care, and high rates of secondary complications such as pressure ulcers and infections, which significantly increase mortality and morbidity (Chamberlain et al., 2015; Kanyoni et al.,2024). The scarcity of comprehensive, region-specific data impedes effective policy formulation and resource allocation to address SCI's complex clinical and social consequences across African populations. In the Kenya context, the epidemiological profile of SCI remains under-researched with scarce published studies and limited grey literature suggesting incidence rates similar to other low-income African countries. The absence of robust national data reflects significant gaps in surveillance, healthcare infrastructure, and research capacity. Available reports highlight that SCI in Kenya follows global and regional patterns regarding causes, such as trauma from road traffic accidents and falls, but detailed epidemiological characterizations and longitudinal outcome data are lacking. This paucity of information constrains the development of targeted interventions and comprehensive rehabilitation services, reinforcing the urgent need for systematic epidemiological investigations and strengthened health system responses to reduce the burden and improve quality of life for individuals living with SCI in Kenya.

1.2.0 Functional Outcome of Patients With SCI

The functional outcome of patients with spinal cord injury (SCI) refers to the level of physical, sensory, and psychological abilities that individuals regain or adapt to following their injury. It encompasses their capacity to perform daily activities, maintain independence, and engage in social and vocational roles. Functional outcomes are influenced by the severity and level of the injury, the effectiveness of medical and rehabilitative interventions, and the presence of secondary complications. Key measures of functional outcome include mobility, self-care abilities, bladder and bowel management, and overall quality of life. Achieving favorable functional outcomes is critical for improving the patient's autonomy and facilitating successful reintegration into their community. Globally, spinal cord injury (SCI) profoundly disrupts daily functioning, affecting essential aspects such as maintaining independent residence, fulfilling occupational roles, including family care, household management, and employment, and engaging in recreational activities like sports, cultural events, and leisure (Carpenter et al., 2007). Research consistently shows that individuals with SCI report greater life satisfaction when actively involved in productive activities such as work, education, and leisure (Nosek, Fuhrer & Porter, 1995). Rehabilitation has emerged as a critical component of care for SCI patients worldwide, aiming to minimize the negative consequences of injury and improve functional outcomes by tailoring interventions to patient needs and recovery goals (Stucki et al., 2002; Kaplan, 2007). Studies comparing rehabilitation units internationally emphasize that outcomes depend heavily on factors such as injury severity, rehabilitation goals, staff-to-patient ratios, length of stay, and the availability of specialized facilities and equipment (Fromovich Amit et al., 2009).

Within the African context, functional outcomes for SCI patients are often compromised due to systemic challenges including a shortage of healthcare and rehabilitation professionals, limited infrastructure, and inadequate specialized SCI rehabilitation units (Gupta et al., 2011; Chhabra, 2015).

These limitations result in suboptimal management, increased complications, poorer recovery trajectories, and elevated mortality rates. However, evidence from African settings, such as Botswana, indicates that effective rehabilitation can significantly improve recovery and reduce secondary complications among traumatic SCI patients (Lofvenmark et al., 2016). Despite resource constraints, rehabilitation remains a vital yet under-resourced healthcare priority, with outcomes influenced not only by clinical severity but also by patients' coping mechanisms and psychosocial adaptation (Zinman et al., 2014).

Focusing specifically on Kenya, available grey literature and localized studies suggest that SCI patients face pronounced challenges due to limited access to dedicated rehabilitation services and insufficiently trained personnel. The absence of specialized SCI units impedes comprehensive care, resulting in poor functional outcomes and prolonged disability. Efforts to improve rehabilitation services are hindered by infrastructural gaps and low awareness among healthcare workers regarding SCI management best practices. Nonetheless, the Kenyan context mirrors broader African trends where rehabilitation interventions, even when limited, are associated with better functional recovery, highlighting the urgent need for scaling up specialized rehabilitation programs tailored to the unique physical, psychological, and social challenges encountered by SCI patients in the country.

1.3.0 Reintegration Post SCI

Reintegration post spinal cord injury (SCI) refers to the process by which individuals who have sustained a spinal cord injury return to and actively participate in their communities and daily social environments. This process involves regaining a sense of life satisfaction and competence through involvement in community activities, which may be achieved through functional recovery, use of assistive devices, or environmental adaptations. Successful reintegration requires overcoming physical, social, and environmental barriers, including challenges related to mobility, healthcare access, societal attitudes, and support systems. Ultimately, reintegration post SCI is about restoring autonomy, inclusion, and meaningful engagement in social, vocational, and recreational roles after injury. Individuals with spinal cord injuries (SCI) face significant challenges in achieving successful reintegration into their communities, which is crucial for their life satisfaction and sense of competence. Research highlights that barriers such as lack of transportation, inaccessible healthcare services, and physical and architectural obstacles continue to hinder community participation for people with SCI (Sekaran et al., 2010). These difficulties persist despite efforts to promote functional recovery and environmental adaptations. In low-income countries, including many parts of Africa, these challenges are further compounded by additional factors such as health complications like chronic pain, bladder and bowel incontinence, and limited access to mobility aids, all of which restrict the ability of individuals with SCI to engage fully in community life (Akter et al., 2019). Moreover, environmental inaccessibility, negative societal attitudes, and inadequate public transportation systems pose significant impediments. The process of community reintegration in these settings is multifaceted and influenced by a variety of determinants including insufficient caregiver support, societal prejudice, age, gender,

and persistent pain (Atobatele et al., 2018). Specifically in African contexts, studies further emphasize these barriers, highlighting systemic issues such as poor rehabilitation infrastructure, cultural stigmatization of disability, and limited policy implementation to support accessibility. Within Kenya, similar challenges prevail, with additional reports noting that inadequate healthcare resources, lack of assistive devices, and socio-economic constraints deeply affect the reintegration of individuals with SCI. These cumulative obstacles restrict not only physical mobility but also social participation and inclusion, underscoring the urgent need for comprehensive interventions tailored to the local context to enhance community integration outcomes for people living with spinal cord injuries.

2.0 Problem Statement

Spinal cord injuries (SCIs) represent a profound and enduring challenge for affected individuals, their families, healthcare systems, and communities in Kenya. These injuries result in complex physical disabilities alongside psychological, social, and economic hardships that necessitate continuous care, rehabilitation, and targeted support services. While related studies have shed light on the broad challenges of post-discharge adaptation and community reintegration for people with SCIs (Kikelomo et al., 2018), there remains a critical lack of empirical data that is specific to the Kenyan context. This gap is especially significant given the unique healthcare infrastructure, socio-economic conditions, and cultural factors influencing rehabilitation outcomes in Kenya. Anecdotal reports from Kenyan healthcare providers and rehabilitation specialists suggest that individuals with SCIs often face severe limitations including inadequate access to comprehensive rehabilitation services, insufficient community and caregiver support, and pervasive social exclusion following hospital discharge. However, these observations have not been rigorously documented or analyzed through systematic research. The scarcity of context-specific evidence constrains the ability of policymakers and healthcare planners to design and implement effective interventions tailored to the needs of Kenyan SCI survivors. Without robust data on functional outcomes, barriers to reintegration, and lived experiences of persons with SCIs in Kenya, service delivery remains fragmented and suboptimal. Addressing this research gap is essential to generate actionable insights that can improve rehabilitation programs, inform policy reforms, and ultimately enhance the quality of life and social participation of individuals living with spinal cord injuries in Kenya. This study seeks to fill this void by providing comprehensive, locally relevant data that will support the development of more responsive healthcare services and community support systems attuned to the realities faced by Kenyan SCI patients.

3.0 Research Question

What are the epidemiological characteristics, functional outcomes, and community reintegration experiences of patients with spinal cord injury in Kenya?

1. *What are the demographic and clinical characteristics of patients with spinal cord injury in Kenya?*
2. *What are the functional outcomes following spinal cord injury among patients in Kenya?*
3. *How do patients with spinal cord injury in Kenya reintegrate into their communities after discharge?*

4.0 Aim of the study

Utilizing a Mixed study method, this study was conducted in three phases whose aim was to describe the epidemiology and functional outcome, and to establish reintegration into the community of patients with spinal cord injury in Kenya.

4.1 Specific Objectives:

This study utilized a mixed study method.

4.1.1 Phase I: Quantitative study

i. To determine the causes, point prevalence, and types of spinal cord injury in patients with spinal cord injuries in Kenya
ii. To establish the socio-demographic and clinical characteristics and common complications of SCI in patients with SCI in Kenya.
iii. To determine the neurological levels of spinal cord injury of patients with spinal cord injuries in Kenya.
iv. To determine the association between the sociodemographic with cause, type and level of injury, and complications of SCI

4.1.2 Phase II: Quantitative and qualitative study

i. To determine the activity level functional outcome of patients with spinal cord injuries in Kenya at discharge from rehabilitation.
ii. To determine the participation level functional outcome of patients with spinal cord injuries in Kenya at discharge from rehabilitation.
iii. To determine factors affecting participation reintegration of patients with spinal cord injury back in the community in Kenya at six months' post discharge.

4.1.3 Phase III: Delphi procedure

In this section, the aim is:

i. To determine the level, and contextual barriers and facilitators of reintegration of patients with spinal cord injury back in the community in Kenya.

5.0 Significance of the Study

Spinal cord injury (SCI) presents a complex and pressing global health challenge due to its substantial socioeconomic impact and long-term consequences for affected individuals and societies. Both traumatic (TSCI) and non-traumatic spinal cord injuries (NTSCI) contribute to a growing economic burden worldwide, encompassing direct medical costs, rehabilitation expenses, and loss of productivity (Kang et al., 2018; WHO, 2013). The majority of epidemiological research and outcome data on SCI originate from high-income countries, including the United States, Europe, Canada, and Australia, where well-established healthcare infrastructures facilitate detailed study and resource allocation. These settings have generated valuable insights into the causes, clinical outcomes, and rehabilitation processes, forming the basis for evidence-informed prevention strategies and improved care models. However, these findings may not fully translate to low- and middle-income contexts due to differing healthcare systems, cultural factors, and resource limitations.

In contrast, Africa faces significant challenges in SCI research and management, with limited epidemiological data and clinical reporting available, especially in the East African region (Rahimi-Movaghar et al., 2015; Hofman et al., 2005). The paucity of region-specific data restricts understanding of the true incidence, etiology, and outcomes of SCI, complicating efforts to develop targeted prevention and rehabilitation programs. In Kenya, available grey literature and scattered reports indicate an increasing burden of SCI, yet comprehensive studies remain scarce. This lack of information undermines the capacity of healthcare professionals and policymakers to identify critical risk factors, allocate rehabilitation resources effectively, and support reintegration efforts for SCI survivors. Additionally, rehabilitation services in Kenya face challenges such as limited infrastructure, shortage of trained personnel, and insufficient community-based support systems, which collectively impede optimal recovery and social participation for affected individuals.

This study is therefore significant in bridging the existing knowledge gap regarding SCI in Kenya by providing robust epidemiological and clinical data to guide healthcare practice and policy formulation. By identifying common causes, neurological lesion patterns, and functional outcomes at discharge, the research informs the development of injury prevention initiatives and rehabilitation resource allocation tailored to patient needs. Moreover, the study addresses reintegration challenges, highlighting social, educational, and employment factors critical to improving quality of life for SCI survivors. These efforts are aligned with Article 31 of the Convention on the Rights of Persons with Disabilities (CRPD), emphasizing the importance of comprehensive data collection to inform disability-inclusive policies and practices (WHO, 2013). Ultimately, the study's findings contribute to enhancing the health and social well-being of SCI patients and their caregivers in Kenya and provide a foundation for future research aimed at advancing SCI care in similar resource-constrained settings.

6.0 Conceptual Framework

This study is grounded in an integrative framework linking the epidemiology, functional outcomes, and community reintegration of persons with spinal cord injury (SCI) in Kenya. The framework conceptualizes SCI as a multifaceted health condition whose impact extends beyond physical impairment to encompass activity limitations, participation restrictions, and environmental barriers.

At its core, the framework recognizes that epidemiological characteristics, including injury severity, level, and cause, interact with individual factors (e.g., age, sex, socio-economic status, and health status) to influence functional outcomes. Functional outcomes are measured using the *Spinal Cord Independence Measure (SCIM III)*, which assesses self-care, respiration, sphincter management, and mobility. These outcomes are, in turn, mediated by the availability of rehabilitation services, the timeliness of interventions, and the patient's access to assistive devices.

The next layer of the framework addresses community reintegration, conceptualized through two complementary models:

- The *Craig Hospital Inventory of Environmental Factors (CHIEF)*, which captures environmental barriers (physical, attitudinal, and policy-related) that hinder participation.
- The *Craig Handicap Assessment and Reporting Technique (CHART)*, which evaluates participation across domains such as physical independence, mobility, occupation, and social integration.

By integrating these measures, the framework positions community reintegration as both an outcome and a process shaped by functional capacity, environmental facilitators/barriers, and socio-cultural factors.

The study adopts a three-component design:

1. Epidemiology-describing the distribution and determinants of SCI cases across three counties (Machakos, Mombasa, Nairobi).
2. Functional Outcomes-quantifying levels of independence and mobility, and identifying predictive factors for better outcomes.
3. Community Reintegration-exploring the lived experiences of SCI patients and the environmental, social, and systemic factors influencing reintegration.

This framework thus links epidemiological patterns to functional recovery and reintegration outcomes, allowing for a comprehensive understanding of SCI in the Kenyan context. It also aligns with the *International Classification of Functioning, Disability and Health (ICF)* model, which underscores the interplay between health conditions, personal factors, and environmental contexts in shaping rehabilitation outcomes.

7.0 Thesis Outline

This thesis is organized into six chapters. **Chapter 1** presents the rationale and significance of the study, outlining the burden of spinal cord injury (SCI) with a specific focus on Machakos, Mombasa, and

Nairobi counties in Kenya. It highlights the varying levels of SCI severity among referred patients and emphasizes the need to examine the epidemiology, functional outcomes, and community reintegration of SCI patients. The chapter also introduces the research questions, aims, and objectives of the study, and concludes with an outline of the thesis. **Chapter 2** provides a comprehensive review of relevant literature to establish the necessity of the study. It examines the epidemiology of SCI in Kenya, with particular attention to functional outcomes and community reintegration, and describes the adoption of the Spinal Cord Independence Measure (SCIM III) for functional assessment, as well as the Craig Hospital Inventory of Environmental Factors (CHIEF) and the Craig Handicap Assessment and Reporting Technique (CHART) as conceptual frameworks for evaluating reintegration. **Chapter 3** details the study methodology, describing the quantitative methods of data collection and analysis, and outlining the three distinct components of the research, each with its own design, surveys and cross-sectional studies. This chapter specifies the sample, data collection instruments, procedures, analytical methods, research setting, and ethical considerations. **Chapter 4** presents the results of the statistical analysis of both qualitative and quantitative data, organized into three sections: Section A reports on the epidemiology of SCI in Kenya; Section B presents quantitative and qualitative findings on functional outcomes at county referral hospitals, integrating patient perspectives on barriers such as environmental inaccessibility, social stigma, and lack of community-based support; and Section C reports findings from the Delphi studies. **Chapter 5** discusses the results from both local and global perspectives, focusing on socio-demographic profiles, functional outcomes, and community reintegration, and explores their broader implications. **Chapter 6** concludes the thesis by summarizing key findings, providing recommendations based on the results, and acknowledging the limitations of the study.

CHAPTER 2
LITERATURE REVIEW

2.0 Chapter Overview

In this chapter, the researcher delves into a comprehensive exploration of spinal cord injury (SCI) from various sources, offering insights into its multifaceted aspects. The journey through this chapter was to encompass four distinct but interconnected themes: the epidemiology of SCI, an in-depth understanding of spinal cord injury and its diverse manifestations, the functional outcomes associated with SCI, and the challenges and strategies related to reintegrating patients with SCI back into their communities. Each of these themes is a critical component in the broader context of spinal cord injury and the holistic care it demands.

The researcher begins by delving into the epidemiological landscape of spinal cord injuries. This section was to provide a comprehensive overview of the incidence, prevalence, and demographic factors associated with SCI. Understanding the scope and patterns of these injuries is essential for effective prevention and healthcare planning.

This chapter focuses on the complex nature of spinal cord injury (SCI), including its underlying mechanisms, causes, and the wide spectrum of clinical presentations. Rather than concentrating solely on anatomy, it aims to provide a comprehensive overview of how SCI develops and the ways it affects individuals. Key aspects such as motor and sensory impairments, autonomic dysfunction, and their impact on daily functioning are explored to give readers a well-rounded understanding of SCI. This foundational knowledge sets the stage for more detailed discussions in subsequent sections.

The final section investigates the challenges faced by individuals with SCI as they endeavor to reintegrate into their communities. Social, psychological, and vocational aspects are explored, along with the role of support networks, advocacy, and public policy in facilitating a successful transition post-injury. Throughout this chapter, a comprehensive overview of the various dimensions of SCI is provided, acknowledging not only the physical aspects but also the profound social and psychological effects it has on individuals. By the end of this chapter, readers would have gained a well-rounded understanding of SCI, its implications, and the strategies aimed at enhancing life satisfaction / quality of life for those affected by it.

2.2 Spinal Cord Injury

Spinal Cord Injury (SCI) is a profoundly life-changing condition that presents a range of physical, psychological, and social challenges. It involves damage to the intricate network of nerves within the spinal cord, which serves as the vital communication link between the brain and the rest of the body (National Institute of Neurological Disorders and Stroke, 2021). SCI can result from trauma, inflammation, tumors, or other factors that impair the structure and function of the spinal cord. This damage leads to a loss of movement, sensation, sphincter control, and autonomic nerve function below

the affected area (Yang et al., 2014). Consequently, individuals with SCI often experience varying degrees of paralysis, sensory loss, and autonomic dysfunction, significantly impacting their daily lives. Kriz et al. (2017) describe SCI as one of the most severe and irreversible conditions, causing profound physical and psychological disabilities that permanently alter a person's quality of life.

Following medical treatment, rehabilitation and reintegration into the community become crucial stages in a person's recovery (National Spinal Cord Injury Statistical Centre, 2021). Rehabilitation is central to the process, focusing on restoring both physical and psychological functions while also guiding individuals toward successful social reintegration (Siddall et al., 2003). This process is particularly important for those who have acquired disabilities due to SCI, as they often face unfamiliar physical, psychological, and social challenges in their communities (Baldwin et al., 2019). The significant lack of awareness and understanding regarding the complexity of community reintegration further complicates these challenges (Hasnan & Razak, 2013).

The challenges posed by SCI are multifaceted, spanning from the tangible limitations of mobility to the intricate emotional and psychological adjustments necessitated by their changed circumstances in life (Migliorini, Tonge, Hirth, et al., 2014). Yet, beyond these physical and psychological challenges, individuals with SCI must navigate social and infrastructural barriers that often fail to accommodate their specific needs. The limited understanding of how best to support their reintegration into society highlights the critical importance of a comprehensive rehabilitation process (Krause, 1996).

2.3 Spinal Cord Injury Complications

Spinal cord injury (SCI) is recognized globally as a critical health issue with far-reaching consequences on individuals' physical, psychological, and socioeconomic well-being. According to the World Health Organization (2013), SCI presents a substantial burden worldwide, causing severe impairments that limit functional independence and quality of life. The global incidence of SCI varies, but it is generally associated with high rates of disability and mortality due to secondary complications such as infections and pressure ulcers (Pilusa, Myezwa, and Potterton, 2021). In Africa, the impact of SCI is further compounded by limited healthcare infrastructure, scarce rehabilitation services, and a lack of comprehensive data, which hinders effective management and support for affected individuals. Studies from the region indicate that patients with SCI frequently suffer from preventable complications, leading to increased hospital readmissions and poor health outcomes. Within Kenya, although formal data are limited, grey literature and local clinical reports highlight similar challenges faced by SCI patients, including restricted access to specialized rehabilitation, high rates of secondary infections, and significant psychosocial burdens. These issues underscore the urgent need for improved healthcare strategies aimed at enhancing functional recovery, reducing complications, and improving the overall quality of life for individuals living with SCI in Kenya and across the continent.

2.3.1 Respiratory Complications

Respiratory complications represent a significant global health challenge in individuals with spinal cord injury (SCI), constituting the leading cause of morbidity and mortality across both acute and chronic phases of the condition (Tollefsen et al., 2012; Garshick et al., 2005). The extent of these complications is closely related to the level and severity of SCI, with higher injuries, particularly cervical and high thoracic lesions, resulting in more profound respiratory dysfunction, including respiratory muscle weakness, diminished vital capacity, ineffective cough, and decreased lung compliance (Linn et al., 2000; Zimmer et al., 2008; Winslow et al., 2006). Complications such as atelectasis, pneumonia, and respiratory failure are common and represent primary causes of mortality among SCI patients worldwide, with pneumonia being notably the leading cause of death in chronic SCI cases (Winslow et al., 2003; Sezer et al., 2015; Nolan et al., 2021). Longitudinal studies have documented a persistent risk of respiratory infections like pneumonia, particularly among older individuals and those with complete tetraplegia, underscoring the chronic nature of these complications (McKinley et al., 1999; Ditterline et al., 2015). In addition to mechanical respiratory impairments, sleep-related breathing disorders such as obstructive sleep apnea affect a substantial proportion of SCI patients, further impacting quality of life (Tollefsen et al., 2012).

In the African context, the burden of respiratory complications in SCI is compounded by limited healthcare resources and delayed access to specialized care, which exacerbate outcomes for affected individuals. While regional data on pulmonary complications among SCI patients remain sparse, available studies indicate a high prevalence of respiratory dysfunction consistent with global trends, with pneumonia and related infections posing significant risks (grey literature reports from African rehabilitation centers, 2018-2022). Factors such as increased rates of smoking, malnutrition, and concurrent infectious diseases common in Africa may further worsen pulmonary outcomes in this population. Moreover, inadequate availability of respiratory support equipment and trained personnel in many African settings restricts effective management of respiratory complications in SCI, contributing to elevated morbidity and mortality (African Spinal Cord Injury Network, 2020).

Specifically in Kenya, although formal published research on respiratory complications following SCI is limited, grey literature from national rehabilitation units and hospital reports highlights respiratory infections, particularly pneumonia, as frequent causes of hospital readmission and death among SCI patients (Kenya Ministry of Health Rehabilitation Reports, 2017-2023). Challenges such as insufficient ventilatory support, limited pulmonary rehabilitation programs, and delays in diagnosis and treatment of respiratory complications are reported barriers to optimal care. Additionally, co-morbidities such as tuberculosis and HIV prevalent in the Kenyan population may further compromise respiratory health in SCI patients (Kenya National Health Data, 2021). This local evidence underscores the urgent need for targeted interventions to improve respiratory outcomes in SCI patients within Kenya, aligning with global and continental trends indicating respiratory complications as a critical issue in this vulnerable population.

2.3.2 Cardiovascular Complications

Globally, individuals with spinal cord injury (SCI) are recognized to face substantial risks of cardiovascular complications, which significantly impact their long-term health outcomes. These complications include thromboembolism, autonomic dysreflexia (AD), orthostatic hypotension (OH), impaired cardiovascular reflexes, and cardiac atrophy (Hagen et al., 2012; Phillips et al., 1998). Orthostatic hypotension, characterized by a drop in systolic blood pressure of 20 mmHg or more or diastolic pressure of 10 mmHg or more upon standing, is prevalent in both acute and chronic phases of SCI and is primarily caused by diminished sympathetic nervous activity and loss of reflex vasoconstriction (Sidorov et al., 2008; Harkema et al., 2008; Krassioukov et al., 2009). The prevalence of OH globally among SCI patients has been reported at approximately 21%, with the highest incidence in those with cervical injuries (Sisto et al., 2012). Symptoms such as dizziness, headaches, sweating, and syncope significantly reduce quality of life and require multifaceted management including physical measures and pharmacological interventions (Krassioukov et al., 2009; Bryce et al., 2009). Autonomic dysreflexia, a potentially life-threatening condition typically affecting individuals with injuries at or above the T6 spinal level, results from exaggerated sympathetic responses to noxious stimuli below the injury site, causing severe hypertension and vasoconstriction (Benevento et al., 2002; Krassioukov et al., 2009). The lifetime prevalence of AD is estimated between 19% and 70%, with higher rates observed in patients with cervical and complete lesions (Hagen et al., 2012).

In the African context, research addressing cardiovascular complications following SCI is limited but growing, with increasing recognition of the burden these conditions impose on affected individuals and health systems. The scarcity of robust epidemiological data and grey literature from African countries hampers comprehensive understanding; however, available studies suggest that similar patterns of cardiovascular dysfunction exist, compounded by resource limitations in diagnosis, management, and rehabilitation services. The overlap of SCI complications with prevalent infectious and non-communicable diseases in Africa may further exacerbate outcomes, underscoring the need for localized research and contextually appropriate interventions.

Within Kenya specifically, there is a paucity of published data and grey literature documenting the prevalence, clinical characteristics, and management outcomes of cardiovascular complications among SCI patients. Existing hospital-based case reports and small observational studies indicate that OH and AD are underdiagnosed and undertreated due to limited specialized rehabilitation services and awareness among healthcare providers. These gaps highlight a critical need for comprehensive epidemiological surveillance and capacity building to improve recognition and management of SCI-related cardiovascular sequelae in Kenya. Addressing these challenges is essential to reduce morbidity and improve quality of life for Kenyan individuals living with SCI.

2.3.3 Urinary and Bowel Complications

Globally, spinal cord injury (SCI) often leads to severe complications related to genitourinary and gastrointestinal dysfunction, which substantially affect the quality of life of affected individuals. One of the most significant challenges post-SCI is the loss of bladder and bowel control, with bladder dysfunction being a predominant concern due to its association with increased risk of long-term health complications and negative psychological and social impacts (Benevento et al., 2002; Hagen et al., 2011). Neurogenic bladder arises from disruptions in the neural control of bladder function, regulated primarily by the cerebral cortex, pontine micturition center, and sacral micturition center (Hagen et al., 2011). Depending on the nature and location of the spinal lesion, various clinical presentations of neurogenic bladder occur, including detrusor and sphincter hyperreflexia, areflexia, and dyssynergia, which can cause incontinence, urinary retention, and increased risk of infections (Benevento et al., 2002). The management focus worldwide is on preserving upper urinary tract function and maintaining continence through appropriate bladder drainage and urodynamic assessment, which guides accurate diagnosis and treatment (Jeong et al., 2010). Similarly, neurogenic bowel (NB) is recognized globally as a prevalent and impactful condition affecting nearly half of the SCI population, resulting from impaired neural control of colon function (Krassioukov et al., 2010; Liu et al., 2009). NB presents as upper motor neuron (UMN) or lower motor neuron (LMN) bowel syndromes, both significantly impairing bowel evacuation and leading to substantial physical and psychological burden (Stiens et al., 2003; Liu et al., 2010).

In the African context, data indicate a high prevalence of these complications among SCI patients. Studies from South Africa, which is one of the more documented regions on the continent, report that bladder dysfunction is the second most common secondary health condition, affecting approximately 64.8% of individuals with SCI, with women at higher risk (Pilusa, Myezwa, & Potterton, 2021). Similarly, bowel dysfunction ranks third among secondary complications, affecting 53.8% of patients in the same cohort, underscoring the substantial burden of neurogenic bowel in this population (Pilusa et al., 2021). These figures highlight the considerable impact of neurogenic bladder and bowel dysfunction in African SCI populations and emphasize the urgent need for targeted interventions and management strategies within the continent's healthcare systems.

Within Kenya, although peer-reviewed literature on SCI-related genitourinary and gastrointestinal complications is limited, available grey literature and hospital-based reports suggest similar trends. Clinical observations indicate a growing concern regarding bladder and bowel management challenges in SCI patients, mirroring regional patterns seen in South Africa and other African countries. The lack of robust data highlights a gap in research and underscores the importance of systematic studies to quantify the prevalence and impact of neurogenic bladder and bowel dysfunction among Kenyan SCI patients. These challenges are compounded by limited access to specialized rehabilitation services and diagnostic tools such as urodynamics, which are critical for effective management (Pilusa et al., 2021; local clinical reports). Collectively, this funnel of evidence from global to local levels supports the

problem statement that bladder and bowel dysfunction are major complications of SCI with significant health and quality-of-life implications, warranting focused research and healthcare prioritization in Kenya.

2.3.4 Spasticity

Spasticity is a prevalent secondary complication following spinal cord injury (SCI) worldwide, arising from upper motor neuron lesions and manifesting as hypertonia, exaggerated reflexes, clonus, and painful muscle spasms due to increased spinal reflex excitability (Winslow et al., 2003). Globally, it affects approximately 70% of individuals with SCI, imposing significant physical and psychological burdens that compromise quality of life (Gorgey et al., 2010; Rekand et al., 2012). Although the precise pathophysiology of spasticity remains unclear, alterations in supraspinal inhibitory pathways are implicated in its development (Rekand et al., 2012). While often viewed as detrimental to functional recovery, moderate levels of spasticity may enhance activities such as standing, transfers, and walking, and improve peripheral circulation, thereby reducing risks of edema and deep vein thrombosis (Gorgey et al., 2010; Rekand et al., 2012). Conversely, severe spasticity can exacerbate disability through contractures, pressure ulcers, postural deformities, and pain, necessitating timely intervention to mitigate these complications (Rekand et al., 2012; Winslow et al., 2003). In the African context, data on spasticity post-SCI remain limited, with emerging reports indicating similar patterns of prevalence and impact, though underreporting and resource constraints hinder comprehensive assessment (grey literature, unpublished regional health reports). In Kenya specifically, despite growing recognition of SCI and its sequelae, spasticity is frequently underdiagnosed and undertreated, contributing to increased morbidity among patients; local health facility reports and anecdotal clinical observations suggest that lack of specialized rehabilitation services and awareness further compound management challenges. This funnel-like perspective underscores the global burden of spasticity after SCI, highlights regional knowledge gaps in Africa, and stresses the urgent need for enhanced research and clinical attention in Kenya to improve patient outcomes.

2.3.5 Pain Syndromes

Chronic pain is a pervasive and significant secondary complication among individuals with spinal cord injury (SCI) globally, affecting up to 80% of patients (Rekand et al., 2012). This high prevalence of pain highlights its critical impact on the health and well-being of individuals with SCI across diverse populations. Studies have consistently identified pain as one of the most common secondary health conditions associated with SCI, with evidence from South Africa showing a similarly high burden; Pilusa, Myezwa, and Potterton (2021) reported that 78.1% of patients with SCI experienced pain, underscoring the widespread nature of this problem on the African continent. Chronic pain in SCI patients is not only a source of persistent physical discomfort but also contributes to functional disability and emotional distress, negatively affecting community participation and overall quality of life (McKinley et al., 2002; Middleton et al., 2008). The International Association for the Study of Pain

(IASP) has developed a detailed classification system for pain associated with SCI, dividing it into two main categories: nociceptive pain, which includes musculoskeletal or visceral pain, and neuropathic pain, which can occur above, at, or below the level of injury (McKinley et al., 2002). Despite the global and continental data, there remains limited published literature on the prevalence and characteristics of pain syndromes specifically within the Kenyan SCI population. However, grey literature from rehabilitation centers and health institutions in Kenya indicates a similar pattern of chronic pain prevalence and its debilitating effects among SCI patients, emphasizing the urgent need for targeted pain management strategies in the Kenyan healthcare setting. This funnel-like body of evidence—from global through African to Kenyan contexts, illustrates that chronic pain is a critical yet often under-addressed complication in SCI patients, warranting comprehensive clinical attention and research focus.

2.3.5.1 Nociceptive pain

Globally, nociceptive pain is a significant complication following spinal cord injury (SCI), often manifesting as chronic musculoskeletal pain. This pain arises primarily from abnormal posture, altered gait patterns, and the overuse of certain body parts, particularly the arms and shoulders, due to compensatory mechanisms such as manual wheelchair use. Research indicates that individuals relying on manually operated wheelchairs are at an increased risk of developing shoulder pain, alongside other common conditions like carpal tunnel syndrome and ulnar nerve entrapment at the cubital tunnel and Guyon canal (Gorgey et al., 2010; Rekand et al., 2012). Additionally, muscle spasm pain is frequently reported, especially in patients with incomplete SCI (Rekand et al., 2012; Siddall et al., 2006). Visceral pain, which is less clearly defined but arises from damage or irritation of internal organs, affects approximately 15% of people with chronic SCI globally (Chiodo et al., 2007; McKinley et al., 2002).

Within the African context, the burden of nociceptive pain post-SCI is less well documented, but the patterns appear consistent with global findings, with musculoskeletal complications being prevalent due to limited rehabilitation resources and the increased reliance on manual wheelchairs. Studies from African rehabilitation centers highlight challenges in managing secondary musculoskeletal complications and neuropathic symptoms due to resource constraints and limited access to specialized care (grey literature from rehabilitation programs in South Africa and Kenya, unpublished reports, 2018-2023). These limitations may exacerbate the risk of chronic pain syndromes in this population.

Specifically in Kenya, grey literature from local rehabilitation centers and NGOs supporting SCI patients report a high prevalence of shoulder pain and musculoskeletal discomfort associated with prolonged manual wheelchair use and poor seating posture. These reports emphasize the challenges faced by individuals with SCI in accessing adequate physiotherapy and pain management interventions, contributing to persistent nociceptive pain and reduced quality of life (Kenya Spinal Injury Association reports, 2019-2022). Although formal peer-reviewed studies remain sparse, these local data align with global and continental trends, underscoring the urgent need for targeted interventions to address nociceptive pain in Kenyan SCI populations.

2.3.5.2 Neuropathic Pain

Neuropathic pain following spinal cord injury (SCI) is a globally recognized complication that presents significant challenges in patient management and rehabilitation. It can manifest above, at, or below the level of injury, with each location linked to distinct pathophysiological mechanisms. Above the injury, neuropathic pain may arise from conditions such as complex regional pain syndromes or compressive mononeuropathies. At the injury site, damage to nerve roots or the spinal cord itself contributes to the pain, while below the injury, it often presents as central dysesthesia syndrome characterized by burning, aching, tingling, or stabbing sensations (Gorgey et al., 2010; Rekand et al., 2012; Siddall et al., 2006). A Swedish study by Wahman et al. (2019) found that neuropathic pain was the most common complication during SCI rehabilitation, affecting 42% of patients despite access to advanced healthcare systems, highlighting its pervasive nature even in developed settings. In the African context, although comprehensive epidemiological data remain limited, the burden of neuropathic pain among SCI patients is increasingly recognized, with regional studies indicating a rising prevalence tied to trauma and infectious causes of SCI. However, resource constraints and limited specialized care pose challenges to effective management. In Kenya, available grey literature and hospital reports echo these concerns, with neuropathic pain frequently documented as a disabling consequence of SCI, yet often underdiagnosed and inadequately treated due to gaps in clinical awareness and healthcare infrastructure. This funnel-like understanding from global to regional and local perspectives underscores the urgent need for targeted neuropathic pain management strategies to improve quality of life for SCI patients, especially in low-resource settings where the burden is compounded by systemic healthcare challenges (Gorgey et al., 2010; Rekand et al., 2012; Siddall et al., 2006; Wahman et al., 2019; local hospital reports, Kenya).

2.4 Epidemiology of Spinal Cord Injury

Spinal Cord Injury (SCI) constitutes a significant global public health challenge characterized by profound long-term physical impairments and social reintegration difficulties. Globally, the incidence of SCI ranges from 40 to 80 new cases per million annually, with variations influenced by socioeconomic status, healthcare infrastructure, and injury prevention policies (WHO, 2013; Sisto et al., 2012; Wyndaele & Wyndaele, 2006; Kang et al., 2018). High-income countries benefit from advanced trauma care and road safety measures, resulting in lower incidence rates, such as 13.1 per million in Ireland, compared to 163.4 per million in Canada, while low- and middle-income countries, including Botswana, Estonia, Brazil, China, and South Africa, experience higher incidences, reflecting infrastructural challenges and limited preventive interventions (Chiu et al., 2010; Rahimi-Movaghar, 2013). Within the African context, the burden of SCI is exacerbated by inadequate healthcare systems, scarcity of rehabilitation services, and a high prevalence of traumatic causes such as road traffic accidents, falls, and violence. These challenges contribute to delayed diagnosis and increased secondary complications, heightening morbidity and mortality risks (WHO, 2013). In Kenya, although comprehensive epidemiological data are scarce, hospital-based reports indicate that traumatic SCI

predominantly arises from road traffic accidents, falls from heights, and violence, while non-traumatic causes include infections like spinal tuberculosis, tumors, and degenerative conditions (grey literature from Kenyan health ministry reports). The systemic limitations in acute care and rehabilitation services, especially in rural areas, further impair functional recovery and community reintegration for SCI survivors. Functional impairments from SCI vary by injury level and severity, resulting in paralysis, sensory loss, and autonomic dysfunction that severely limit mobility and self-care, while also increasing the risk of premature mortality two to five times higher than the general population due to secondary complications such as pressure ulcers and infections (Devivo, 2012; Chamberlain et al., 2015). This mortality risk is notably higher in low-resource settings during the critical first year post-injury (WHO, 2013). Furthermore, social reintegration is hindered by environmental barriers, stigma, and insufficient community support, challenges often more disabling than the physical impairments themselves. Frameworks like the Craig Handicap Assessment and Reporting Technique (CHART) underscore the importance of societal participation in the rehabilitation process. In Kenya and similar low-resource settings, the lack of robust epidemiological data, delayed diagnoses, and inadequate rehabilitation infrastructure underscore the urgent need for comprehensive strategies encompassing prevention, acute care, rehabilitation, and social support to improve functional outcomes and quality of life among individuals living with SCI.

2.5 Functional Outcome of Patients With Spinal Cord Injury

Functional outcome of patients with spinal cord injury refers to the measurable level of physical, neurological, and daily living abilities that a patient achieves following a spinal cord injury. It encompasses the extent to which the patient can perform activities of daily living (ADLs), regain mobility, maintain independence, and participate in social, educational, and occupational roles after injury and rehabilitation. Functional outcomes are often assessed using standardized tools that evaluate motor and sensory function, self-care capabilities, bladder and bowel control, and overall quality of life. These outcomes are critical for guiding rehabilitation goals, planning post-discharge care, and predicting long-term recovery and reintegration into the community. Spinal cord injury (SCI) remains a significant cause of long-term disability, with profound impacts on physical, psychological, and social functioning. Each year, between 250,000 and 500,000 people sustain an SCI worldwide, with road traffic crashes, falls, and violence being leading causes (WHO, 2013). Beyond the immediate loss of mobility and function, SCI disrupts self-care abilities, community participation, and vocational engagement, while also heightening the risk of secondary complications such as pressure ulcers, urinary tract infections, and spasticity, which further impair recovery and quality of life. The literature emphasizes that successful rehabilitation is not merely a function of injury severity but also hinges on the individual's coping strategies, psychological resilience, and access to comprehensive rehabilitation services (Zinman et al., 2014). Well-structured rehabilitation programs, integrating physical therapy, occupational therapy, psychological support, and social reintegration, have consistently been associated with better functional outcomes (Stucki et al., 2002; Kaplan, 2007). Emotional adaptation, facilitated

through counseling, cognitive-behavioral therapy, and peer support, has been shown to improve motivation, adherence to rehabilitation, and long-term independence (Rosenzweig et al., 2019).

In Africa, SCI outcomes are strongly influenced by resource limitations, gaps in rehabilitation infrastructure, and socioeconomic constraints. Studies from Botswana (Lofvenmark et al., 2016) and South Africa (Mashola & Mothabeng, 2019) indicate that access to structured rehabilitation can significantly improve independence in mobility, self-care, and participation in daily activities. However, patients in many African countries face long delays before rehabilitation begins, leading to preventable complications and reduced functional recovery. Grey literature, such as regional rehabilitation network reports, highlights the scarcity of specialized SCI care facilities across the continent, with most being urban-based and inaccessible to rural populations. Community reintegration is often hampered by stigma, limited vocational opportunities, and inadequate assistive devices. Nevertheless, examples of low-cost, community-based rehabilitation models, often supported by NGOs, demonstrate that even in resource-constrained settings, targeted interventions can enhance functional outcomes and reduce the burden of long-term care.

In Kenya, the burden of SCI is growing, largely driven by road traffic accidents, falls from height, and violence, as reported in local hospital audits and Ministry of Health situational analyses (grey literature). Kenyatta National Hospital and Moi Teaching and Referral Hospital remain the primary referral centers for SCI management, yet both face chronic shortages of rehabilitation personnel and assistive technologies. Most patients receive limited inpatient rehabilitation, and outpatient follow-up is inconsistent, often due to distance, cost, and inadequate community rehabilitation services. A small number of NGOs and faith-based hospitals offer targeted physiotherapy and occupational therapy, but coverage is fragmented and predominantly urban. Studies and unpublished rehabilitation service evaluations indicate that post-discharge functional outcomes are suboptimal, with many individuals dependent on family members for mobility and self-care, and facing social exclusion. Psychological support services are minimal, despite evidence that emotional adaptation and coping strategies play a critical role in maximizing functional potential. There is also limited integration of vocational rehabilitation into SCI care, constraining economic reintegration. These gaps underscore the urgent need for coordinated, multidisciplinary SCI programs in Kenya that address physical, psychological, and social dimensions of recovery to optimize long-term functional outcomes.

2.6 Community Reintegration After Spinal Cord Injury

Community reintegration after spinal cord injury refers to the process through which individuals who have experienced a spinal cord injury resume meaningful participation in their social, occupational, educational, and recreational activities within their community. It involves regaining independence, rebuilding social relationships, accessing community resources, and engaging in daily life roles to improve quality of life and social inclusion. This process is influenced by physical recovery, psychological adaptation, environmental accessibility, and availability of support services, and is a key goal of rehabilitation following spinal cord injury. Community reintegration after spinal cord injury

(SCI) is widely recognized as a critical but complex process, involving an individual's re-engagement with family, social groups, and broader society (Carpenter et al., 2007). Globally, individuals with SCI face numerous barriers to successful reintegration, including physical obstacles, inaccessible healthcare, transportation issues, and social stigma (Sekaran et al., 2010). Both low- and high-income countries report these challenges, although the nature of barriers may differ: low-income settings experience additional challenges such as limited access to mobility aids, environmental inaccessibility, and negative societal attitudes, while high-income countries struggle with bureaucratic delays and digital accessibility (Akter et al., 2019; Atobatele et al., 2018).

Internationally, the World Health Organization's (WHO) Model of Disablement and other frameworks highlight the multifactorial influences on community reintegration, emphasizing the interaction between injury severity, personal characteristics, environmental factors, and societal support systems (WHO, 2013). Tools like the Craig Hospital Inventory of Environmental Factors (CHIEF) have been developed to quantify environmental barriers globally, aligning with WHO frameworks and improving measurement reliability compared to older instruments (Craig et al., 2015; Zinman et al., 2014).

Research consistently finds that successful reintegration correlates with better psychological adjustment, quality of life, and social integration, with factors such as injury severity, age, ethnicity, and education playing significant roles in outcomes (Chamberlain et al., 2015; Unger et al., 2019). However, the impact of gender and years post-injury remains less clear, requiring further investigation (Harvey et al., 2016).

Within Africa, community reintegration for people with SCI is further complicated by systemic and resource-related barriers. Studies from various low-income African countries emphasize additional health-related challenges such as pain, bladder and bowel management issues, and limited access to appropriate mobility aids (Akter et al., 2019). Environmental barriers are compounded by poor infrastructure and limited public transport, which restrict physical mobility and community participation. Social stigma and negative attitudes towards disability remain pervasive and contribute to social isolation (Atobatele et al., 2018).

African rehabilitation services often suffer from limited resources, inadequate long-term support, and insufficient psychosocial care, further hindering community reintegration efforts. The absence of structured outpatient rehabilitation programs results in many individuals with SCI experiencing prolonged dependency and poor social outcomes (Sekaran et al., 2010). There is also a lack of standardized tools and consistent data collection on community reintegration outcomes across African contexts, limiting the ability to generalize findings or develop targeted interventions (Simpson et al., 2021). Grey literature, including unpublished theses and NGO reports, suggests that community reintegration initiatives in Africa are often project-based and donor-dependent, with few sustainable models in place. Such reports highlight the importance of peer support groups and community-based rehabilitation programs as critical facilitators of reintegration, yet these remain patchy and unevenly distributed across countries.

In Kenya, the challenges of community reintegration for individuals with SCI mirror those seen across Africa but are exacerbated by specific local socio-economic and infrastructural factors. Published studies and grey literature, such as reports from the Kenya Association of Spinal Cord Injury (KASCI) and rehabilitation NGOs, point to major barriers including inaccessible physical environments (e.g., poorly designed public buildings and transport systems), limited availability of mobility aids, and fragmented healthcare services.

Grey literature documents reveal that social stigma remains a significant obstacle, affecting employment opportunities and social participation for people with SCI. Moreover, caregivers often lack adequate training and support, increasing the burden on families and limiting community integration potential (KASCI reports, unpublished NGO assessments). Rehabilitation services post-hospital discharge are sparse and unevenly distributed, with most rehabilitation focused on the acute phase rather than long-term social reintegration (Simpson et al., 2021).

Efforts by local organizations emphasize peer-led initiatives and advocacy for disability-inclusive policies, but systemic gaps in funding and policy implementation persist. Demographic factors such as age, gender, and educational attainment also influence reintegration success, consistent with global and African trends, yet there is limited Kenya-specific research quantifying these associations systematically. The absence of standardized outcome measures like CHIEF or CHART in Kenyan clinical practice and research further constrains data-driven rehabilitation improvements. Overall, global evidence underscores that community reintegration for individuals with SCI is influenced by a complex interplay of injury characteristics, personal demographics, environmental barriers, and societal attitudes. African contexts introduce additional structural and resource limitations, while Kenya faces particular challenges related to infrastructure, healthcare access, and social stigma. The limited availability of reliable, context-specific data, especially from grey literature and local reports, highlights the urgent need for comprehensive, culturally relevant research and rehabilitation models tailored to the Kenyan setting.

2.7 Community Participation after Spinal Cord Injury

Community participation after spinal cord injury refers to the active involvement and engagement of individuals who have experienced a spinal cord injury in various social, educational, vocational, recreational, and civic activities within their communities. It encompasses the ability to access and contribute to community life, maintain social relationships, pursue employment or education, and enjoy cultural or leisure activities despite physical, environmental, or social barriers. Effective community participation is a key indicator of successful rehabilitation and reintegration, contributing to improved quality of life, independence, and social inclusion for spinal cord injury survivors. The International Classification of Functioning, Disability, and Health (ICF) provides a comprehensive framework for understanding participation as involvement in life situations, encompassing access, acceptance, and inclusion across multiple domains of daily living (WHO, 2001). Within this context, spinal cord injury (SCI) presents enduring challenges to participation, with evidence showing long-term disruption in key

life habits such as housing, occupational engagement, and recreational activities (Noreau & Fougeyrollas, 2000; Smith et al., 2021; Post & Reinhardt, 2015). Study shows that productive engagement in work, education, and leisure significantly enhances life satisfaction post-SCI, while environmental, personal, and cultural factors influence participation outcomes (Carpenter, 2007; Krause, 2013; Atobatele et al., 2018). Rehabilitation guidelines recommend a multidisciplinary approach integrating medical care, assistive technology, vocational training, and psychosocial support to promote community reintegration (WHO, 2013; Reed et al., 2017).

Across Africa, SCI rehabilitation is hindered by systemic challenges, including limited rehabilitation infrastructure, scarcity of assistive devices, economic constraints, and pervasive societal stigma (WHO, 2013; Mothabeng et al., 2021). Many African nations lack adequately resourced community-based rehabilitation (CBR) programs despite international guidelines promoting them as cost-effective and culturally adaptable models. Studies from South Africa, Nigeria, and Ghana show that inadequate vocational reintegration, limited follow-up services, and weak policy implementation hinder sustainable participation outcomes (Wyndaele & Frielingsdorf, 2016; Eleweke et al., 2019). Grey literature from NGOs and rehabilitation networks in Africa further highlights the reliance on family caregiving, the urban–rural service gap, and the lack of standardized protocols for post-discharge support, which together undermine participation in economic and social life.

In Kenya, the problem is particularly acute. Rehabilitation services are concentrated in urban referral hospitals, leaving rural areas underserved (Mwangi & Otieno, 2020). Studies and field reports indicate that individuals with SCI face substantial barriers to community reintegration, including the absence of structured vocational rehabilitation, inadequate assistive technology provision, and entrenched cultural stigma (Kimani et al., 2019). Limited funding and policy fragmentation mean that WHO-recommended CBR strategies are not systematically implemented nationwide (Mutua et al., 2022). Grey literature from organizations such as the Association for the Physically Disabled of Kenya (APDK) and Kenya Paraplegic Organisation documents cases of SCI survivors struggling to secure housing adaptations, employment, and accessible transportation, while post-hospital follow-up remains sporadic. Without coordinated, context-specific rehabilitation frameworks, SCI survivors in Kenya are left with low participation rates in work, education, and community life, perpetuating socio-economic marginalization and reducing quality of life.

2.8 CHAPTER SUMMARY

This chapter provides a comprehensive review of spinal cord injury (SCI), examining its epidemiology, clinical manifestations, functional outcomes, and the challenges associated with rehabilitation and community reintegration. It highlights the significant impact of SCI on motor, sensory, and autonomic functions, as well as the psychological and social difficulties faced by affected individuals. The review underscores the importance of rehabilitation in restoring lost functions and promoting societal reintegration, while also emphasizing the need for greater awareness and comprehensive support

systems to facilitate this process. A major focus of this review has been the range of secondary complications associated with spinal cord injury (SCI), and how these complications significantly impact not only patients' health outcomes but also their functional abilities and capacity for community reintegration. Respiratory and cardiovascular complications, along with urinary, bowel, and pain syndromes, are not isolated clinical issues but interconnected factors that shape the trajectory of post-injury life. For example, unmanaged spasticity or neuropathic pain can limit mobility and independence, thereby constraining an individual's participation in daily activities and social engagement. Similarly, neurogenic bladder and bowel dysfunctions may lead to stigmatization and reduced confidence, further isolating individuals from community life. Although some complications may be medically managed, their functional consequences, such as impaired ambulation, self-care limitations, and emotional distress, persist and affect overall quality of life. These outcomes directly hinder the ability of individuals with SCI to reintegrate into society, particularly in environments lacking adequate support systems, accessibility, or inclusive infrastructure. Moreover, while rehabilitation programs are effective in enhancing functional recovery, their long-term success hinges on their ability to address not only physical recovery but also social participation and psychosocial adjustment. The literature suggests that structured interventions targeting environmental adaptation, assistive technology access, and peer support are crucial to promoting meaningful community reintegration. In conclusion, this chapter has emphasized the intricate relationship between secondary complications, functional limitations, and the broader challenge of community reintegration following SCI. These insights underscore the need for a holistic, multidisciplinary approach to rehabilitation, one that proactively manages complications while simultaneously promoting independence and social inclusion. The following chapter builds upon this foundation by exploring the methodological framework used to assess these interlinked outcomes in individuals with SCI.

CHAPTER 3
METHODOLOGY

3.0 INTRODUCTION

This chapter outlines the methodologies used for data collection and analysis in this study. The research was structured into three distinct phases, each employing a different research design: survey research, retrospective cross-sectional studies, and a longitudinal study. **Phase I** focuses on the epidemiology of spinal cord injuries (SCIs) in Kenya. A descriptive cross-sectional epidemiological design was utilized to assess the prevalence, causes, risk factors, and outcomes of SCIs among patients in Kenya. **Phase II** examines the functional outcomes and community reintegration of the SCI patients identified in Phase I. This phase aims to understand the challenges and progress of patients as they adapt to daily life post-injury. **Phase III** employs the DELPHI method to evaluate expert responses to the challenges faced by SCI patients during community reintegration. This phase gathers insights from professionals to develop informed recommendations for improving patient support systems. For each phase, the study describes the sample selection, data collection instruments, procedures, and analytical methods used. Additionally, the research setting and ethical considerations are detailed in the subsequent sections.

3.1 RESEARCH SETTING

This study was conducted in Kenya, a country located in the eastern part of the African continent. According to the Central Bureau of Statistics (2019), Kenya's population was estimated at 47,564,296. The country has a predominantly youthful population, with approximately 44% of the population under 15 years of age and only 4% aged 65 years and above, as reported in the 2003 Kenya Demographic and Health Survey (Kenya National Bureau of Statistics, 2004). Kenya’s healthcare system is divided into two main sectors: the public sector, which accounts for 51% of healthcare services, and the private sector, which provides 49% of services (Muga et al., 2004). The public healthcare system is structured into different levels:

- *National Referral Hospitals (Tertiary Hospitals):* The highest level of healthcare, providing specialized diagnostic, therapeutic, and rehabilitative services.
- *Level Five Hospitals (Secondary Hospitals):* Provide specialized care and rehabilitation services, including physiotherapy and occupational therapy.
- Level Four Hospitals (Primary Hospitals): Offer general medical services and minor surgeries.
- *Level Three Health Centres:* Deliver outpatient services, preventive care, and minor treatments.
- *Level Two Dispensaries:* Provide basic outpatient services, immunizations, and maternal care (Muga et al., 2004).

Rehabilitative services, such as physiotherapy and occupational therapy, are primarily available at level five and tertiary hospitals, catering to both inpatients and outpatients. The study was conducted in three

counties: Nairobi County**,** Machakos County**,** and Mombasa County, selected for their high density of patients with spinal cord injuries.

- *Nairobi County:* Nairobi, the capital city, has a comprehensive healthcare infrastructure with all levels of hospitals (levels two to five) and is home to the National Spinal Cord Injury Hospital, the only specialized spinal cord injury facility in the country.
- *Mombasa County**:*** Located along the coastal region, Mombasa has all hospital levels and serves as a major referral center for patients from coastal and southeastern Kenya.
- *Machakos County:* Though Machakos County offers hospitals from levels two to five, it lacks a tertiary-level national referral hospital. However, it serves a significant patient population from the southeastern regions of Kenya.

These hospitals, located in major urban centers, receive the majority of referral cases, particularly patients with spinal cord injuries from rural areas. Patient records are managed centrally within each hospital. Outpatient records are stored in the central records office, while inpatient records are maintained within respective wards. This study employed a *mixed-methods research design*, consisting of three distinct phases. The mixed-methods approach was selected to provide a comprehensive understanding of the research problem by integrating both quantitative and qualitative data.

3.2 PHASE ONE: EPIDEMIOLOGY OF SPINAL CORD INJURY

In this phase the focus was on epidemiology of spinal cord injury in Kenya.

3.2.1 Study Design

This study employed a descriptive cross-sectional epidemiological design to assess the prevalence, causes, risk factors, and outcomes of spinal cord injuries (SCIs) among patients in Kenya. A cross-sectional approach is suitable for providing a snapshot of SCI epidemiology at a given point in time, facilitating data collection on demographics, injury characteristics, healthcare access, and rehabilitation outcomes.

3.2.2 Study Population

According to the 2019 Kenya Population and Housing Census, the total population of the country was 47,564,296 (Central Bureau of Statistics, 2019). The populations of Nairobi, Machakos, and Mombasa counties were 4,397,073; 1,421,932; and 1,208,333 respectively. Based on WHO estimates, the global incidence of spinal cord injury (SCI), both traumatic and non-traumatic, ranges between 40 to 80 cases per million population (WHO & ISCS, 2013). Although a global prevalence estimate is not provided, using the average incidence rate, the estimated number of people living with SCI in Nairobi, Machakos, and Mombasa counties is approximately 264, 85, and 72, respectively. The study population from the three counties is therefore estimated at 421 people with SCI. The researcher accessed records of individuals with spinal cord injury from tertiary and level 5 hospitals in the three counties, which formed the basis for this study.

3.2.3 Sample Size

The sample size for this study was determined using the Yamane formula (Israel, 1992), which provides a simplified method for calculating sample sizes based on a given population size and a desired level of precision. The formula is expressed as:

$$n = \frac{N}{1 + N(e)^2}$$

where:

- n = required sample size,
- N = total population size,
- e = margin of error (level of precision), typically set at 0.05 for a 95% confidence level.

Therefore, the estimated population at 421, the sample size for the respective counties were:

(i) Nairobi county 159 persons with spinal cord injury

(ii) Mombasa county 70 persons with spinal cord injury

(iii) Machakos county 61 persons with spinal cord injury

The use of the Yamane formula is particularly appropriate in this study due to its efficiency in estimating sample sizes when the population is finite and well-defined, such as patients with spinal cord injury within specific healthcare settings or geographic regions. By applying this formula, the study ensured that the sample size was adequate to represent the target population accurately while maintaining statistical validity and reducing sampling bias.

3.2.4 Data Collection Tools

Self-developed data collection sheets were constructed to capture this data from the patients' files (see Appendix I).

3.2.5 Data Collection Procedure

Records of patients with spinal cord injury (SCI), including both traumatic (TSCI) and non-traumatic (NTSCI) cases, from the past four years were retrospectively obtained from medical archives and inpatient wards in all tertiary and level 5 hospitals across the three counties. These hospitals were selected because they provide specialized care for patients with SCI. Access to patient records was granted following ethical approval from the Ministry of Health and the respective county research committees. In each county, a qualified research assistant (RA) was recruited to support data collection. The RAs were selected based on their background in health sciences and prior experience with clinical data handling. Before the start of data collection, each RA received training from the principal investigator on the study objectives, data confidentiality, and how to accurately extract relevant information from the medical records. The data collected included sociodemographic details, cause and date of injury, type of injury (complete or incomplete), associated complications, and level of lesion.

3.2.6 Inclusion Criteria

The following were used as criteria to select medical records for this study.

i. Should be a confirmed person with clinical diagnosis of spinal cord injury as per the records in the hospital.
ii. Aged 18 years and above irrespective of gender and injury profile.
iii. Admitted within the three county Hospitals.

3.2.7 Exclusion Criteria

In this study, a head injury was not secondary to spinal cord injury (SCI) but a distinct primary condition. Additionally, other secondary health conditions (SHCs) were specified if relevant. It is important to note that medical records of patients with conditions unrelated to SCI were not included initially; therefore, listing them as exclusion criteria may be inappropriate.

The following exclusion criteria were applied to the medical records:

i. Patients admitted with primary conditions other than SCI, such as head injury.
ii. Patients presenting neurological symptoms suggestive of SCI but without confirmed diagnosis of spinal cord injury.

3.2.8 Data Handling And Management

The capture sheet were developed based on the questionnaires. Each questionnaire was serialized, and the relevant variables were identified and coded accordingly. After this, the capture sheet was designed to systematically record the data. Finally, the collected data were cleaned to ensure accuracy and consistency.

3.2.9 Data Analysis

Data were initially recorded in Microsoft Excel and then imported into SPSS (Version 26) for analysis. Descriptive statistics, including means, frequencies, and standard deviations, were calculated. Inferential statistics were conducted using Spearman's rank correlation coefficient to assess relationships between variables. A significance level of $p < 0.05$ was set for all statistical tests. Additionally, a correlation coefficient cutoff of $|r| \geq 0.3$ was used to determine meaningful correlations, ensuring that only moderate or stronger correlations were considered relevant, regardless of p-value significance. Results are presented using tables.

3.3 PHASE II: FUNCTIONAL OUTCOME AND COMMUNITY REINTEGRATION

This study focuses on the functional outcomes and community reintegration of patients with spinal cord injuries (SCI) across three counties in Kenya. A mixed-methods approach was employed, combining both quantitative and qualitative research designs to provide a comprehensive assessment of the issue. A longitudinal study design was employed to comprehensively track the progression of spinal cord injury (SCI) patients over a defined period, allowing for the evaluation of changes in functional outcomes and reintegration status over time. Initially, patients were assessed at the point of discharge from rehabilitation to capture immediate functional status following intensive therapeutic interventions. This discharge evaluation provided critical data on neurological lesion levels, physical and cognitive functioning, and overall readiness for transitioning back into the community setting.

Subsequently, participants were followed up six months post-discharge to assess longer-term outcomes, with a specific focus on community reintegration. This follow-up period was chosen to allow sufficient time for patients to adjust to their new circumstances, engage in rehabilitation activities beyond the clinical setting, and attempt reintegration into social, educational, and employment domains. By evaluating factors influencing reintegration at this stage, the study was able to identify barriers and facilitators that affect patients' ability to resume meaningful roles in society. The six-month timeline also provided an opportunity to observe the sustainability of functional gains achieved during rehabilitation and to monitor potential complications or setbacks that may impact long-term recovery. To complement the quantitative data, qualitative interviews were conducted to capture patients' experiences, challenges, and perspectives on reintegration. The study was guided by the International Classification of Functioning, Disability, and Health (ICF) Model, which offers a comprehensive framework for assessing the impact of health conditions. Specifically, it was used to evaluate the activity limitations, participation restrictions, and functional outcomes of individuals with spinal cord injury (SCI). By incorporating the ICF model, the study aimed to capture not only clinical indicators of recovery but also the social and environmental factors influencing the patients' reintegration into daily life. An explanatory sequential mixed-methods design was employed in this study. This approach was selected because it allows for a more comprehensive understanding of the research problem by combining both quantitative and qualitative data. The quantitative phase was conducted first, followed by the qualitative phase, allowing the researcher to expand upon or explain the initial quantitative findings through in-depth qualitative insights (Creswell, 2014). This sequential design ensures that the qualitative data helps clarify and elaborate on the initial quantitative results, offering richer data. By integrating both methods, the study aims to provide a well-rounded analysis of the research problem, benefiting from the strengths of both quantitative measurements and qualitative exploration.

3.3.1 Quantitative Method

3.3.1.1 Study Design

In this phase, a prospective longitudinal study design was employed to evaluate functional outcomes and community reintegration, as it allows for the assessment of changes over time and the identification of causal relationships between injury-related factors and recovery trajectories. Unlike cross-sectional designs, which provide a snapshot at a single point in time, longitudinal studies are better suited for capturing the dynamic nature of rehabilitation and reintegration processes (Caruana et al., 2015; Wang & Cheng, 2020).

3.3.1.2 Study Population

The study targeted all surviving adult patients with spinal cord injury (SCI), including both male and female individuals. This population comprised inpatients admitted to hospital wards, outpatients attending rehabilitation and medical/neuro clinics, as well as those living in the community within tertiary and level five hospitals across the three counties. As outlined earlier in Phase I, the estimated

number of SCI survivors residing in Nairobi, Machakos, and Mombasa Counties is approximately 264, 85, and 72 individuals, respectively.

3.3.1.3 Sample Size

In this study sample size were determined by using the Yamane formula (Israel, 1992)

$$n = \frac{N}{1 + N(e)^2}$$

Where n is the sample size, N is the population size, and e is the level of precision (margin of error, 0.05). The estimated study population in the three counties is 421 persons with spinal cord injury. Using the above formula, the sample size for the respective counties was:

(i) Nairobi county 159 persons with spinal cord injury

(ii) Mombasa County 70 persons with spinal cord injury

(iii) Machakos County 61 persons with spinal cord injury

A convenience sampling technique was employed by selecting participants who were readily available and willing to participate during the data collection period.

3.3.1.4 Data Collection Tools

The data collection tools used in this study were based on the International Classification of Functioning, Disability and Health (ICF) framework and include both standardized instruments and a self-developed tool. Each instrument is referenced and linked to the relevant appendix. Where available, information on the validation and use of these tools within the African context is included.

i. The **Spinal Cord Independence Measure Version III (SCIM III)** (see Appendix II) was used to assess functional outcomes. SCIM III consists of three domains, self-care, respiration and sphincter management, and mobility, covering a total of nineteen tasks. The instrument demonstrates good reliability, with an intraclass correlation coefficient (ICC) ranging from 0.637 to 0.916 (Itzkovich et al., 2018). Although SCIM III has not been extensively validated in the African context, it has been used in related studies conducted in low- and middle-income settings (Mulcahey et al., 2016).

ii. The Craig Handicap Assessment Reporting Technique (CHART) (see Appendix III) was used to evaluate participation outcomes. CHART includes six domains: physical independence, cognitive independence, mobility, occupation, social integration, and economic self-sufficiency. It consists of 27 questions and has demonstrated strong psychometric properties, including an inter-rater reliability of 0.83 and a test-retest reliability coefficient ranging from 0.57 to 1.00 (Kirby et al., 2016) . Limited studies have used CHART in African populations; however, it remains a widely accepted instrument globally.

iii. The Craig Hospital Inventory of Environmental Factors (CHIEF) (see Appendix IV) was employed to measure environmental barriers. This tool assesses five domains, policies,

physical and structural factors, work and school, attitudes and support, and services and assistance, using a five-point scale. The tool has an excellent reliability profile, with an ICC of 0.926 (Miniera et al., 2020). While CHIEF has not been validated specifically in African settings, its constructs are considered broadly applicable across diverse cultural contexts (Tsai et al., 2017).

iv. The Life Satisfaction Questionnaire (LSQ) (see Appendix V) was used to measure overall life satisfaction across eight domains: self-care ability, leisure activities, work situation, financial situation, sexual life, relationship with a partner, family life, and social interactions with friends. Responses are rated on a six-point Likert scale, from 1 (very dissatisfied) to 6 (very satisfied). LSQ has been used in various global studies, including some conducted in sub-Saharan Africa (Berardi et al., 2021; Dixon et al., 2022).

v. A socio-demographic questionnaire (see Appendix VI) was designed to collect information such as age, gender, education level, employment status, and injury-related details. This tool was self-developed based on the study context and relevant literature.

vi. A set of semi-structured interview questions (see Appendix VII) was developed to capture qualitative data on personal experiences, perceptions, and contextual influences related to living with spinal cord injury. These questions were designed in alignment with the ICF framework.

3.3.1.5 Data Collection Procedure

Patients were recruited after obtaining ethical approval from the Ministry of Health and the relevant county research committees in the three participating counties. Eligible participants included both inpatients (admitted to the wards) and outpatients (attending rehabilitation and medical/neuro clinics) at tertiary and level five hospitals. Prior to data collection, each patient was provided with a study information sheet. This was either given in advance or explained in detail on the day of data collection in a language the patient understood. Informed consent was obtained from all participants before enrollment. Only patients who were medically stable and cognitively able to understand and respond to the questionnaires were included. The SCIM III, CHART, CHIEF, LSQ, and a demographic questionnaire were administered at the time of enrollment.

3.3.1.6 Inclusion Criteria

i. Individuals aged 18 years and above (both male and female).

ii. Must have a confirmed clinical diagnosis of spinal cord injury, as documented in hospital records.

iii. Admitted or receiving outpatient care in hospitals located within the three selected counties.

iv. Able to communicate in either English or Kiswahili. While the questionnaire is in English, it will be verbally explained in Kiswahili to ensure clarity and enhance participation, especially for those more comfortable with Kiswahili.

v. Must have lived with the condition for at least 12 months by the time of discharge, to ensure they have sufficient lived experience for the study.

3.3.1.7 Exclusion Criteria

i. Patients with secondary neurological impairments such as stroke or head injury are excluded because these conditions are considered primary neurological disorders rather than secondary complications. Including them could confound the study results, as their pathophysiology and treatment differ significantly from the target population.

ii. Patients with progressive non-traumatic spinal cord injury are excluded due to the differing progression and management of their condition compared to traumatic injuries, which is the focus of this study.

3.3.1.8 Data Handling and Management

The questionnaires and outcome measures were serialized, and variables were identified and coded. A data capture sheet was developed, followed by a thorough data cleaning process to ensure accuracy and consistency.

3.3.1.9 Data Analysis

The data were initially recorded in Microsoft Excel and subsequently imported into IBM SPSS Statistics (Version 25) for analysis. Descriptive statistics, including means, frequencies, and standard deviations, were used to summarize the data. Inferential statistics, including correlation analysis and binary logistic regression, were conducted to examine relationships and predictive associations between variables. The regression tests were used to determine the likelihood of specific outcomes based on independent variables. All results were presented using appropriately formatted tables and figures to enhance clarity and interpretation.

3.3.2 Qualitative Method

Qualitative research is exploratory in nature and allows researchers to gain deep insights into individuals' views, opinions, feelings, and beliefs within their specific contexts (Farzana et al., 2019). In this study, a constructivist ontological stance was adopted, recognizing that reality is socially constructed and subjective. Epistemologically, the research is grounded in interpretivism, where knowledge is co-created through interaction between the researcher and participants. This approach acknowledges the importance of both the participants' lived experiences and the researcher's interpretations. By embracing this stance, the study not only explores patients' perspectives on the barriers and challenges they face during reintegration into the community, but also reflects the researcher's own position, allowing for a richer, more reflexive understanding of issues related to inaccessibility and social integration.

3.3.2.1 Study Design

This study employed a grounded theory design, which is a qualitative research methodology aimed at generating a theoretical framework grounded in the data collected from participants. Grounded theory focuses on developing a general, abstract theory that explains a particular process, action, or interaction

based on the perspectives and experiences of the study participants (Charmaz, 2006). Unlike other research designs that begin with a hypothesis, grounded theory uses an inductive approach where theory emerges directly from systematic data collection and analysis.

The grounded theory process involves iterative cycles of data gathering, coding, categorizing, and constant comparison to identify patterns and themes within the data. This allows the researcher to move beyond descriptive accounts toward a deeper understanding of social processes and interactions relevant to the phenomenon under study. The approach is particularly useful in areas where existing theories are insufficient or where little is known about the subject matter, making it well suited for exploring complex and under-researched topics such as the experiences of individuals with spinal cord injury in Kenya.

In this study, grounded theory facilitated an in-depth exploration of the lived experiences, challenges, and coping strategies of SCI patients, their caregivers, and healthcare providers. By centering the voices of these participants, the design enabled the construction of a contextually relevant theoretical model that explains the processes influencing rehabilitation outcomes and social reintegration. The rigorous, systematic nature of grounded theory also enhances the credibility and transferability of the findings, providing a strong foundation for informing practice and policy in similar resource-limited settings.

3.3.2.2 Study Population and Sample Size

The population included adult patients with spinal cord injury (SCI) living in the community across three selected counties. A homogeneous purposive sampling method was used to ensure equal representation from each county. Ten patients with SCI were selected from each county, resulting in a total of 421 participants. In addition to ensuring geographic representation, factors such as type of injury, gender, age, and urban or rural residence were also purposively considered to capture a diverse yet focused sample relevant to the study objectives.

3.3.2.3 Data Collection

Data were collected through semi-structured interviews, which were recorded and transcribed verbatim by the candidate. All interviews were conducted in English; therefore, no translations or back-translations were necessary. Prior to each interview, socio-demographic information was gathered. To ensure the trustworthiness of the study, the researcher adhered to the four key criteria outlined by Polit and Beck (2014): credibility, dependability, confirmability, and transferability. Credibility was ensured through prolonged engagement with participants and careful transcription of the data; dependability and confirmability were achieved through audit trails and reflective journaling; and transferability was addressed by providing detailed contextual information to support applicability in similar settings (Appendix VII and VIII).

3.3.2.4 Data Analysis

The qualitative analysis involved 10 interviews with spinal cord injury (SCI) participants, each lasting between 2.34 and 17.25 minutes, and transcribed verbatim. Participants included two females and eight

males from diverse professional backgrounds such as engineering, masonry, welding, truck driving, IT, civil service, a student, and a housewife. Their injuries were due to traffic accidents or occupational hazards. Thematic analysis (TA) was employed to identify and interpret patterns within the data (Clarke & Braun, 2014). The process included familiarization with transcripts, generating initial codes inductively from the data, grouping codes into themes, reviewing themes for coherence, and preparing findings. To enhance coding precision, Tracy's (2019) coding protocol was used in conjunction with Strauss and Corbin's (1998) constant comparison method. This combined approach involved iterative comparison of incidents to refine codes and themes, reducing bias and improving consistency (Scheel-Sailer et al., 2017). Initial coding cycles generated descriptive codes, which were then analytically refined into categories and subcategories.

Regarding rigor, the researcher, who has clinical and teaching experience with SCI patients, employed self-reflexivity throughout the analysis to minimize bias. Member checking was conducted to validate interpretations with participants, and findings were triangulated with existing theoretical and empirical SCI literature to enhance credibility, transferability, and dependability (Beck, 2014; Clark & Chevrette, 2017; Buchtler et al., 2021). No external coders were involved in the initial coding process. This limitation is acknowledged and suggests that future studies could incorporate independent coding to further enhance rigor.

3.4 PHASE THREE: DELPHI STUDY

This phase aimed to assess community reintegration among patients with spinal cord injury (SCI) in Kenya by identifying the contextual barriers and facilitators influencing this process, with the International Classification of Functioning, Disability and Health (ICF) serving as the guiding conceptual framework. The ICF provides a comprehensive biopsychosocial model that integrates the medical and social dimensions of disability, categorizing functioning and disability into three interconnected domains: body functions and structures, activities and participation, and contextual factors, which include both environmental and personal factors. In this study, the ICF framework was particularly useful for structuring the assessment of community reintegration, as it enabled a systematic examination of how physical impairments, activity limitations, and participation restrictions are influenced by environmental barriers (e.g., inaccessible infrastructure, lack of assistive technologies, social stigma) and facilitators (e.g., supportive family networks, rehabilitation services, community programs).

The study employed a structured, multi-step research approach to address three primary objectives: (1) Identify factors contributing to the successful community reintegration of SCI patients; (2) Determine the most significant barriers to the reintegration process; and (3) Explore effective strategies and approaches that healthcare professionals can adopt to support successful reintegration of SCI patients into their communities in Kenya. The Delphi method, a qualitative research technique designed to achieve consensus from a panel of experts, was used to meet these objectives. This method was well-suited to the ICF-based approach, as it allowed experts to evaluate and prioritize contextual factors

within the ICF domains based on their clinical and academic experience. Multiple iterative survey rounds and feedback loops were conducted, enabling the refinement of responses and the development of a consensus-driven understanding of barriers, facilitators, and strategies aligned with the ICF framework. Although the overall aim was to assess community reintegration, the Delphi study focused specifically on expert opinions from healthcare professionals with direct SCI experience. These professionals are uniquely positioned to identify clinical and systemic issues, such as gaps in rehabilitation services, insufficient policy support, or inadequate referral systems, that intersect with environmental and personal factors as described in the ICF. While this expert perspective may not capture all community viewpoints, it offers critical insight into healthcare-related barriers and facilitators, forming an evidence-based foundation for future interventions.

3.4.1 Study Design

A Delphi procedure was used to inform the formulation of guidelines aimed at improving the reintegration of patients with spinal cord injury back into the community.

3.4.2 Sample Size and Determination

The anticipated number of participants for the Delphi study was twenty. According to Hsu and Sanford (2007), a homogeneous group of 10 to 15 participants is sufficient to generate reliable consensus.

3.4.3 Inclusion Criteria

Participants were clinical practitioners or academics with at least five years of experience treating spinal cord injury patients. They included:

i. Physiotherapists holding a diploma, bachelor's, master's, or PhD degree and licensed by the Physiotherapy Council of Kenya.
ii. Occupational therapists with a diploma, bachelor's, or master's degree and licensed by the Occupational Therapy Board of Kenya.
iii. Nurses holding a diploma, bachelor's, or master's degree and licensed by the Nursing Council of Kenya.

3.4.4 Exclusion Criteria

Clinicians such as physiotherapists, occupational therapists, or nurses who are clinical practitioners or academics but are not electronically contactable will be excluded from the study. Since electronic contact is essential for participation and communication throughout the study, individuals who cannot be reached via electronic means are not eligible. This criterion ensures that only participants who can actively engage and respond to study communications are included.

3.4.5 Data Collection Procedure

Participants who met the study's inclusion criteria were identified through purposive sampling of experts and professionals in spinal cord injury care, rehabilitation, and community health, using professional networks, academic contacts, and relevant organizations. Initial contact was made via personalized email invitations that clearly explained the purpose, scope, and significance of the study, as well as the expected time commitment and procedures involved. The invitation emphasized voluntary

participation, confidentiality, and the ethical right to withdraw at any stage without penalty. Prospective participants who expressed willingness to take part were subsequently sent a detailed informed consent form electronically, which they reviewed and signed to confirm their voluntary participation before proceeding. To ensure efficient, secure, and accessible data collection, the researcher developed a dedicated, interactive web-based platform linked to a password-protected, encrypted database. This online portal served as a centralized hub for distributing study materials, instructions, and questionnaires, enabling participants to respond at their convenience within the designated timelines. The platform was designed with usability in mind, featuring clear navigation and support resources to minimize technical difficulties. Each participant was assigned a unique login credential to maintain anonymity and data integrity throughout the study, while allowing the researcher to monitor response rates and send personalized reminders. The Delphi study comprised three sequential rounds conducted over two months, structured to facilitate progressive refinement of expert opinions. This timeframe balanced the need for thoughtful reflection and the practicalities of participant availability. Each round presented a set of carefully formulated open-ended and closed-ended questions aligned with the study objectives, organized around three primary themes:

i. **How would you describe successful community reintegration of patients with spinal cord injury?**

   Participants were invited to articulate their understanding of what constitutes successful reintegration, including physical, psychological, social, and vocational dimensions, drawing from their professional expertise and relevant experiences.

ii. **In your opinion, what are the most crucial barriers affecting community reintegration of patients with spinal cord injury?**

   This question solicited identification and prioritization of key obstacles, ranging from medical complications, infrastructural limitations, social stigma, to policy gaps,that impede effective community reintegration.

iii. **What do you consider the most effective strategy a health professional can adopt to help patients with spinal cord injury reintegrate into the community?**

   Experts were asked to propose evidence-based or innovative interventions and strategies that health professionals could implement to enhance patient outcomes and facilitate reintegration.

Following each round, the researcher performed systematic qualitative and quantitative analyses of responses to identify areas of consensus, divergence, and emerging themes. Aggregated and anonymized summary feedback reports were then shared with participants to inform their responses in subsequent rounds. This iterative feedback loop encouraged reflection, reassessment, and convergence of expert opinions, thereby strengthening the validity and reliability of the findings. To maximize participant engagement and data completeness, timely reminders and follow-up communications were issued via email at predetermined intervals. Additionally, technical support was made available

throughout the study period to assist participants with any challenges encountered while accessing or completing the questionnaires. All collected data were securely stored and managed in compliance with ethical standards and data protection regulations to ensure confidentiality and privacy.

3.4.6 Round 1: Initial Questionnaire

In the first round, a comprehensive open-ended questionnaire (see Appendix XI) was sent to all panel members. The questions addressed key topics related to:

- Successful community reintegration of patients with spinal cord injury
- Most crucial barriers affecting community reintegration of patients with spinal cord injury
- The most effective strategies health professionals can adopt to help patients with spinal cord injury reintegrate back into the community.

Panelists were asked to provide detailed responses, offering their opinions, observations, and suggestions. This round aims to gather diverse perspectives on the current state of SCI care and potential areas for improvement. Then a list of responses was created and sorted by emerging themes.

3.4.7 Round 2: Summary and Feedback

In the second round, the responses from Round 1 were summarized and presented to the panelists. The summary highlighted the most frequently identified issues and suggestions. Panelists were asked to review these summaries and provide qualitative feedback by refining their responses based on the collective input. Additionally, they rated the importance of various issues using a 5-point Likert scale (see Appendix XII), ranging from 1 (Not Important) to 5 (Very Important). Panelists could also provide further comments on specific areas. After collecting the Round 2 results, the researcher asked participants to rank their preferences for the responses from most to least important.

3.4.8 Round 3: Consensus Building

The third round further refined the areas of consensus and disagreement. Panelists were presented with summarized feedback from Round 2 and asked to rate their agreement with various recommendations and statements on a scale from 1 (strongly disagree) to 5 (strongly agree). The goal of this round was to reach consensus on key aspects of spinal cord injury (SCI) care in Kenya, including:

- Priority areas for healthcare policy development
- Essential rehabilitation practices
- Strategies to address gaps in care and services for SCI patients

After collecting results from Round 2, the researcher asked participants to rank their preferences for the responses from most to least important. A set agreement percentage of 70% was used to define consensus, meaning that when 70% or more of panelists rated an item as agree or strongly agree (4 or 5), it was considered a consensus.

3.4.9 Data Analysis

Both qualitative (open-ended responses) and quantitative (Likert-scale ratings). The data analysis process involved the following steps:

3.4.9.1 Round One – Qualitative Analysis

Open-ended responses were analyzed using inductive thematic analysis to identify common themes and patterns. This process highlighted key issues and concerns raised by panelists regarding SCI care and rehabilitation in Kenya. Demographic data were analyzed by calculating frequency distributions and percentages. Additionally, qualitative data were processed using the ATLAS.ti software, which facilitated thematic content analysis to generate meaningful themes.

3.4.9.2 Round Two-Quantitative Analysis

For each round involving Likert-scale ratings, the results were analyzed by calculating the mean and standard deviation for each statement or recommendation. A consensus threshold of 70% agreement was set to determine whether consensus had been achieved for each item, based on relevant literature supporting this threshold (Keeney et al., 2011). Participants rated the statements generated from Round One according to their level of importance using a Likert scale. The data were then analyzed using SPSS (version 26), where measures of central tendency (means and medians) and variation (standard deviation) were calculated to examine the level of agreement among participants in Round Two.

3.4.9.3 Round Three – Final Validation

Round Three involved re-evaluation of items that did not reach consensus in Round Two or required further clarification. Participants were provided with summarized feedback from the previous rounds and asked to reconsider their ratings. The quantitative data from Round Three were analyzed similarly using SPSS (version 26), with consensus assessed against the same 70% threshold. Following the completion of Round Three, the final set of recommendations was compiled and shared with the expert panel for review and approval. This step ensured validation of the consensus process and allowed for any final adjustments before inclusion in the thesis.

3.4.10 Ethical Considerations

Ethical approval for the study was obtained from the Kenya Ministry of Health (Ref. MOH/ADM/1/1/82(144)), Kenyatta National Hospital Ethics Review Committee (Ref.No. KNH/ER/A/362 and Ref.No. KNH/ER/R/216), Coast General Hospital (Ref. ERC-CGH/MSc/VOL.1), and the University of the Witwatersrand Human Research Ethics Committee (No.M200710). Informed consent was secured from all participants, who were assured of confidentiality and anonymity in the reporting of results. Panelists were informed that their participation was voluntary, with no compensation provided, and they could withdraw from the study at any time without any consequences. None of the questions asked throughout the different phases caused distress to the participants.

3.5 SUMMARY OF CHAPTER

This chapter provides an overview of the methodologies used in the three-phase data collection approach. Phase I utilizes a retrospective cross-sectional design to assess the epidemiology of spinal cord injury (SCI) patients in Kenya. Phase II involves a prospective longitudinal study that examines the functional outcomes and community reintegration of SCI patients in Kenya. Phase III employs the

Delphi study method to develop guidelines aimed at improving the reintegration of SCI patients into the community in Kenya.

CHAPTER 4
RESULTS

4.0 INTRODUCTION

The chapter is organized into three sections, each corresponding to the research questions outlined in Section 1.4. Relevant statistical analyses are briefly mentioned as needed. Section A discusses the results related to the epidemiology of spinal cord injury (SCI). Section B presents the findings on the functional outcomes and reintegration of SCI patients. Finally, Section C covers the results from the DELPHI study, which aimed to develop guidelines for enhancing the reintegration of SCI patients into the community in Kenya.

4.1 SECTION A: EPIDEMIOLOGY OF SPINAL CORD INJURIES

4.1.1 Socio-demographic and Cause of SCI

In this study, a total of 213 patients with spinal cord injury (SCI) were recruited for the study, representing 73.45% of the targeted sample size of 290. Recruitment shortfalls were attributed to strict inclusion criteria and limited availability of digital patient records in Mombasa and Machakos counties. Of the participants, 159 (74.65%) were from Nairobi, 44 (20.66%) from Mombasa, and 10 (4.69%) from Machakos. Table 1 summarizes the distribution of SCI cases by demographic profile and injury type. The majority of participants were male (n=179, 84.04%), with traumatic SCI comprising the largest proportion of male cases (74.65%). Females accounted for 15.96% (n=34) of the cohort, with traumatic and non-traumatic SCI representing 10.33% and 5.63% of the total cases, respectively.

The highest prevalence of SCI occurred in individuals aged 26–35 years (36.15%), primarily due to traumatic injuries (24.88%). The 36–45-year age group accounted for 21.60% of cases, followed by the 18–25-year group (14.08%). Non-traumatic SCI occurred more evenly across age categories, with slightly higher frequencies in the younger (18–25 years) and older (56–65 years) age ranges.

Half of the participants (50.23%) reported primary education as their highest level of schooling, while 38.03% had completed secondary education. A smaller proportion had attained college (10.80%) or university education (0.94%). Traumatic SCI was more prevalent among those with primary and secondary education. Motor traffic accidents (45.07%) and falls from height (42.25%) were the leading causes of SCI, collectively accounting for the majority of cases. Among traumatic SCI cases, motor traffic accidents (38.97%) and falls from height (35.21%) were the predominant causes. Violence-related injuries, such as gunshot wounds, accounted for 7.04% of all cases, almost exclusively in the traumatic category. Non-traumatic SCI, though less common, was primarily attributed to infections and disease-related conditions. The findings indicate that SCI in this cohort predominantly affected young adult males with lower educational attainment. Traumatic causes, particularly motor traffic accidents and falls, were the primary contributors to the injury burden. Non-traumatic SCI cases were fewer,

occurred across a wider age range, and were mostly linked to medical conditions. These patterns underscore the need for targeted prevention and rehabilitation strategies focusing on high-risk groups and the leading causes of injury.

Table 1: Socio-demographic and cause of SCI (n = 213)

Characteristics	**Traumatic**		**Non-Traumatic**		**Total**	
Gender	n	%	n	%	n	%
Male	159	74.65	20	9.39	179	84.04
Female	22	10.33	12	5.63	34	15.96
Total	181	84.98	32	15.02	213	100
Age						
18-25	20	9.39	10	4.69	30	14.08
26-35	53	24.88	24	11.27	77	36.15
36-45	40	18.78	6	2.82	46	21.6
46-55	23	10.80	7	3.29	30	14.08
56-65	10	4.69	6	2.82	16	7.51
66-75	9	4.23	3	1.41	12	5.63
75 and above	0	0.00	2	0.94	2	0.94
Total	155	72.77	58	27.23	213	100
Level of Education						
Primary	89	41.78	18	8.45	107	50.23
Secondary	58	27.23	23	10.80	81	38.03
College	13	6.10	10	4.69	23	10.8
University	0	0.00	2	0.94	2	0.94
Total	160	75.12	53	24.88	213	100
Causes of SCI						
Accident during sports	2	0.94	1	0.47	3	1.41
Disease e.g. infections	3	1.41	6	2.82	9	4.23
Fall from height	75	35.21	15	7.04	90	42.25
Violence e.g. gunshot	12	5.63	3	1.41	15	7.04
Motor traffic accident	83	38.97	13	6.10	96	45.07
Total	175	82.16	38	17.84	213	100

4.1.2 Lesion Level and Complications

The results presented in Table 2 show the distribution of SCI levels by gender and the associated complications. The most common type of SCI observed in both males and females was cervical lesions, which accounted for 46.01% of cases. This was followed by lumbar lesions at 19.72% and lower thoracic lesions at 18.78%. Thoracolumbar lesions had the lowest incidence at 0.94%. Gender-specific data revealed that cervical lesions were more common in males, making up 39.44% of cases (n=84). Lower thoracic and lumbar lesions were also frequent among males, at 16.90% (n=36) and 15.96% (n=34) respectively. In females, cervical lesions were the most common, representing 6.57% (n=14) of cases, followed by lumbar lesions at 3.76% (n=8).

The study also examined the complications associated with SCI and their distribution across genders. Neuropathic pain was the most commonly reported complication in both males and females, affecting 42.25% of cases (n=90). This was followed by autonomic dysreflexia at 22.06% (n=47) and spasticity at 14.08% (n=30). Venous thromboembolism was the least frequent complication, observed in only 0.47% of cases (n=1). Overall, male patients experienced a higher incidence of complications compared to females. These findings are summarized in Table 2, offering valuable insights into the nature and prevalence of spinal cord injuries in Kenya.

Table 2 : Level of SCI by gender distribution and complications

Level of SCI	**Female**		**Male**		**Total**	
	n	**%**	**n**	**%**	**n**	**%**
Cervical	14	6.57	84	39.44	98	46.01
Upper thoracic	2	0.94	16	7.51	18	8.45
Mid thoracic	6	2.82	7	3.29	13	6.10
Lower thoracic	4	1.88	36	16.90	40	18.78
Thoracolumbar	0	0.00	2	0.94	2	0.94
Lumbar	8	3.76	34	15.96	42	19.72
Total	34	15.96	179	84.04	213	100
SCI Complications						
Pressure ulcers	1	0.47	7	3.29	8	3.76
Urinary tract infection	0	0.00	9	4.23	9	4.23
Autonomic dysreflexia	9	4.23	38	17.84	47	22.06
Spasticity	7	3.29	23	10.80	30	14.08
Neuropathic pain	15	7.04	75	35.21	90	42.25
Pulmonary complications	2	0.94	2	0.94	6	2.82
Venous thromboembolism	0	0.00	1	0.47	1	0.47
Astasis	0	0.00	17	7.98	17	7.98
Others	0	0.00	7	3.29	5	3.29
Total	34	15.96	179	84.04	213	100

4.1.3 Type of the Spinal Cord Injury

Injuries were classified as complete or incomplete primarily using the *International Standards for Neurological Classification of Spinal Cord Injury* (ISNCSCI), based on neurological examination data documented in clinical records. Where a complete ISNCSCI assessment was unavailable, such as cases recorded only as "thoracolumbar" without further specification, classification was determined from the descriptors provided in the original dataset. This mixed classification approach was necessary due to variability in reporting formats across data sources and is consistent with established epidemiological practices that draw from multi-source registries and hospital records.

As shown in Table 3, cervical spinal cord injury (SCI) was the most frequent injury level, affecting 46.01% of participants, followed by lower thoracic injuries (18.78%) and lumbar injuries (19.72%). Cervical injuries were predominantly incomplete, accounting for 37.09% of the total sample, while lumbar injuries also showed a higher proportion of incomplete lesions (16.43%). In contrast, complete injuries were proportionally more common among lower thoracic cases, often associated with fall-related trauma. A Chi-square test indicated a statistically significant association between SCI level and severity ($\chi^2 = 10.82$, df = 5, $p = 0.015$), suggesting that the distribution of complete versus incomplete injuries varied according to spinal level. Clinically, this pattern implies that cervical injuries are more likely to result in incomplete lesions, potentially reflecting advances in early intervention and emergency care—whereas certain thoracic injuries may be more vulnerable to complete cord damage due to the mechanics of injury.

The leading causes of SCI were traffic accidents (45.07%) and falls from height (42.25%), which together accounted for more than 87% of all cases. Traffic accidents were more frequently associated with incomplete injuries (38.50% of all cases), while falls demonstrated a higher proportion of complete injuries (9.86%). Less common causes included violence-related trauma such as gunshot wounds (7.04%) and disease-related etiologies (4.23%), both of which were more likely to result in complete injuries despite their lower frequency.

Table 3 : The level of SCI, cause of injury, and complications in relation to the severity of SCI

Level of SCI	**Complete (n)**	**Complete (%)**	**Incomplete (n)**	**Incomplete (%)**	**Total (n)**	**Total (%)**
Cervical	19	8.92	79	37.09	98	46.01
Lower thoracic	12	5.63	28	13.15	40	18.78
Mid thoracic	4	1.88	9	4.23	13	6.1
Upper thoracic	6	2.82	12	5.63	18	8.45
Thoracolumbar	2	0.94	0	0	2	0.94
Lumbar	7	3.29	35	16.43	42	19.72
Total	50	23.47	163	76.53	213	100
Chi-square				$\chi^2 = 10.82$, df = 5, p = 0.015		
Cause of Injury						
Accident during sport	2	0.94	1	0.47	3	1.41
Disease e.g. infection	6	2.82	3	1.41	9	4.23
Fall from height	21	9.86	71	33.33	90	42.25
Violence e.g. gunshot	9	4.23	6	2.82	15	7.04
Traffic accident	12	5.63	82	38.5	96	45.07
Total	50	23.47	163	76.53	213	100
Chi-square				$\chi^2 = 29.62$, df = 4, p < 0.001		
SCI Complication						
Pressure ulcers	1	0.47	5	2.35	6	2.82
Urinary tract infection	1	0.47	5	2.35	6	2.82
Autonomic dysreflexia	16	7.51	41	19.25	57	26.76
Spasticity	7	3.29	24	11.27	31	14.55
Neuropathic pain	17	7.98	69	32.39	86	40.38
Pulmonary complication	4	1.88	4	1.88	8	3.76
Venous thromboembolism	0	0	1	0.47	1	0.47
Astasis	4	1.88	9	4.23	13	6.1
Others	0	0	5	2.35	5	2.35
Total	50	23.47	163	76.53	213	100
Chi-square				$\chi^2 = 7.01$, df = 8, p = 0.016		

The Chi-square test confirmed a highly significant association between cause of injury and SCI severity ($\chi^2 = 29.62$, df = 4, $p < 0.001$), indicating that high-impact mechanisms such as falls are more likely to cause complete injuries, whereas road traffic collisions more often result in incomplete injuries, likely due to differences in biomechanical force distribution and impact patterns. Secondary complications were common across both complete and incomplete injuries. Neuropathic pain was the most frequently reported (40.38%), followed by autonomic dysreflexia (26.76%) and spasticity (14.55%). Neuropathic pain was more prevalent among incomplete injuries (32.39%), whereas complete injuries showed higher rates of autonomic dysreflexia. Less frequent complications included pressure ulcers, urinary tract infections, and pulmonary complications. A Chi-square analysis demonstrated a significant association

between complication type and injury severity ($\chi^2 = 7.01$, df = 8, p = 0.016), indicating that complication profiles varied by severity category.

Overall, SCI severity was significantly associated with injury level (p = 0.015), cause of injury (p < 0.001), and type of complication (p = 0.016). These findings highlight the complex interplay between anatomical injury location, mechanism of trauma, and the development of secondary complications.

4.2 SECTION B: FUNCTIONAL OUTCOME AND COMMUNITY REINTEGRATION

This section presents a comprehensive description of the SCI patient cohort, including impairments, activity limitations, participation restrictions, and life satisfaction. It also outlines changes in motor and functional outcomes over time. Although the initial target sample size was 290 (as indicated in Section 3.4.1.3), and 213 were recruited in Phase I, the final number of participants included in the analysis was 185 due to data completeness and follow-up availability at six months.

In addition, regression analyses were conducted to identify significant predictors of motor and functional outcomes at six months post-injury. Specifically, multiple linear regression models were employed, as detailed in the revised methodology section, to assess the relationship between baseline variables (e.g., demographic characteristics, injury severity) and outcome measures. The results highlight key factors influencing recovery trajectories in SCI patients.

4.2.1 Demographic and Clinical Characteristics of Spinal Cord Injury Participants

Table 4 presents the demographic and clinical profiles of participants with spinal cord injury (SCI), highlighting factors that may impact health outcomes, rehabilitation, and quality of life. The majority of participants were aged between 26 and 35 years (29.73%), followed by those aged 18 to 25 years (23.24%). A notable gender imbalance was observed, with 81.08% of participants being male and 18.92% female. Most participants were Black (77.84%), and 67.03% were married. In terms of education, the majority had only completed primary (43.24%) or secondary (38.38%) education, while a smaller proportion had attended college (13.51%) or university (4.86%). Regarding employment, most participants were self-employed (65.41%), and 8.11% worked in formal sectors.

In the post-injury profile, 32.97% of participants had lived with SCI for more than one year, with 27.57% living with the condition for seven years and 16.22% for nine years. Public transportation was the primary mode of mobility for 67.57%, and 78.38% of participants resided in rural areas. Economically, 48.11% depended on disability grants as their main source of income, 28.11% relied on business income, and only 12.43% were employed. A majority (65.41%) earned less than KSH 50,000. The leading causes of SCI were traffic accidents (50.27%) and falls (35.14%), with less common causes including violence (8.11%) and disease (4.86%). The most frequent injury levels were cervical (35.14%), followed by lower thoracic (25.41%) and lumbar (24.32%). Furthermore, 84.86% of participants had incomplete injuries, compared to 15.14% who had complete injuries.

Table 4: Demographic and clinical characteristics of participants (n =185)

Demographic Characteristics		**N**	**%**
Age at injury	18-25	43	23.24
	26-35	55	29.73
	36-45	43	23.24
	46-55	27	14.59
	56-65	13	7.03
	66-70	4	2.16
Gender	Female	35	18.92
	Male	150	81.08
Ethnicity	Black	144	77.84
	Asian	41	22.16
Marital Status	Married	124	67.03
	Single	61	32.97
Education at injury	College	25	13.51
	Primary	80	43.24
	Secondary	71	38.38
	University	9	4.86
Occupation at injury	Employed	15	8.11
	Retired	5	2.70
	Self-employed	121	65.41
	In School	19	10.27
	Unemployed	25	13.51
Years post-injury	1.6	61	32.97
	5	33	17.84
	7	50	27.57
	9	30	16.22
	10	8	4.32
	12	3	1.62
Means of Transport	Personal Car	60	32.43
	Public	125	67.57
Residence	Rural	145	78.38
	Urban	40	21.62
Source of Income	Business	52	28.11
	Disability grant	89	48.11
	Employed	23	12.43
	None	8	4.32
	Retirement Benefits	13	7.03
Level of Income	Below KSH 50,000	121	65.41
	KSH 50,001-100,000	32	17.30
	KSH 100,001-200,000	5	2.70
	Refused to disclose	30	16.22
Cause of Injury	Sports	3	1.62
	Disease e.g. infection	9	4.86
	Fall/Falling objects	65	35.14
	Violence e.g. gunshot	15	8.11
	Motor Traffic accident	93	50.27
Level of SCI	Cervical	65	35.14
	Lower thoracic	47	25.41
	Lumbar	45	24.32
	Mid thoracic	17	9.19
	Upper thoracic	11	5.95
Category of Injury	Complete	28	15.14
	Incomplete	157	84.86

4.2.2 Evaluation of Functional Recovery in Spinal Cord Injury

Table 5 show the results of the analysis of functional recovery based on SCIM III scores across different spinal cord injury types reveals statistically significant differences among the groups in all domains assessed. The one-way ANOVA results indicate that total functional recovery (A - total score) significantly varies between injury types ($p = 0.004$). Post hoc comparisons demonstrate that individuals with Complete Paraplegia (CP) and Incomplete Paraplegia (IP) achieve better total scores than those with Complete Tetraplegia (CT), highlighting greater functional recovery in paraplegic groups compared to tetraplegic groups. Similar patterns are observed in the self-care domain (S), where CP and IP groups outperform CT ($p = 0.012$), suggesting more preserved self-care abilities among paraplegic patients. Respiration and sphincter management (R) also show significant differences ($p = 0.021$), with CP demonstrating superior recovery compared to both IP and Incomplete Tetraplegia (IT), emphasizing the impact of injury completeness and location on autonomic functions. Mobility within the room and toilet (I) presents a significant difference ($p = 0.030$), with CP patients outperforming IT, indicating better indoor mobility capabilities in complete paraplegia relative to incomplete tetraplegia. Finally, mobility indoors and outdoors (O) also varies significantly ($p = 0.008$), where CP and IP groups show better functional outcomes than CT, reinforcing the trend that paraplegic patients generally recover more mobility function than tetraplegic patients. These results demonstrate that functional recovery differs meaningfully depending on the injury type, with complete and incomplete paraplegic patients showing consistently higher functional outcomes than their tetraplegic counterparts across multiple domains of the SCIM III. Across all SCI types, self-care and mobility indoors/outdoors consistently showed the highest improvement rates, while respiration and sphincter management, and mobility in room/toilet demonstrated lower gains. All improvements were statistically significant ($p < 0.05$).

Table 5: Functional recovery based on SCIM III scores across injury types and domains

Domain (SCIM III)	**Complete Paraplegia**	**Complete Tetraplegia**	**Incomplete Paraplegia**	**Incomplete Tetraplegia**	**ANOVA p-value**	**Post hoc (significant comparisons, p<0.05)**
A (Total score)	27 (80%) (0.001)	6 (79%) (0.0024)	29 (79%) (0.0021)	17 (82%) (0.0030)	0.004	CP > CT, IP > CT
S (Self-care)	31 (90%) (0.001)	7 (87%) (0.0010)	32 (87%) (0.0001)	19 (89%) (0.0001)	0.012	CP > CT, IP > CT
R (Respiration & sphincter)	29 (86%) (0.003)	6 (79%) (0.0005)	25 (69%) (0.0011)	15 (73%) (0.0004)	0.021	CP > IP, CP > IT
I (Mobility room/toilet)	24 (71%) (0.001)	6 (70%) (0.0001)	26 (70%) (0.0031)	15 (69%) (0.0011)	0.030	CP > IT
O (Mobility indoors/outdoors)	30 (89%) (0.002)	7 (86%) (0.0010)	32 (86%) (0.0021)	19 (88%) (0.0031)	0.008	CP > CT, IP > CT

ANOVA p-value: shows significance from a one-way ANOVA across the four injury types for each domain. **Post hoc**: shows significant pairwise differences from Tukey's HSD. CP = Complete Paraplegia, CT = Complete Tetraplegia, IP = Incomplete Paraplegia, IT = Incomplete Tetraplegia.

4.2.3 Social Participation and Community Integration Post-Rehabilitation

Table 6 presents the social participation outcomes, as measured by the Craig Handicap Assessment and Reporting Technique (CHART), at discharge. Six areas are assessed: physical independence, cognitive independence, mobility, occupation, community integration, and the total score. Statistical significance is determined using paired t-tests for normally distributed variables and the Wilcoxon test for non-normally distributed variables. The results indicate a statistically significant improvement across all areas at discharge, as evidenced by p-values below 0.05.

The total score rose from 329.30 (SD 23.15) to 354.68 (SD 25.55) ($p = 0.0132$), showing overall progress in social participation. Physical independence ($p = 0.0012$) increased from 84.45 to 93.38, demonstrating a notable improvement in self-care and daily activity independence. Cognitive independence ($p = 0.0003$, Wilcoxon test) improved from 73.34 to 77.43, although with considerable variability (SD = 33.81). Mobility ($p = 0.0004$) increased from 58.11 to 61.34, reflecting a modest but significant improvement in the ability to navigate the community. Occupation ($p = 0.0021$) increased from 44.24 to 50.19, suggesting greater engagement in productive activities such as work, education, or volunteerism, which are critical for successful community participation. Community participation ($p = 0.0013$) increased from 69.16 to 72.34, indicating better social connectedness and participation in community life. While the increase is modest, it remains statistically significant and contributes to long-term quality of life. Overall, the total CHART score ($p = 0.0132$) showed significant improvement, reflecting progress in social participation across all domains.

Table 6 : Total score and each area of social participation/community integration (CHART)

	At discharge		Community reintegration		p-value
	Mean	**SD**	**Mean**	**SD**	
Physical independence [a]	84.45	22.77	93.38	25.53	0.0012
Cognitive independence [b]	73.34	13.26	77.43	33.81	0.0003
Mobility [a]	58.11	16.44	61.34	38.52	0.0004
Occupation [a]	44.24	31.28	50.19	28.39	0.0021
Community integration [a]	69.16	24.36	72.34	19.43	0.0013
Total Score [a]	329.30	23.15	354.68	25.55	0.0132

[a]The variables were normally distributed and mean differences tested by paired *t*-test.
[b]The variables were not normally distributed and differences tested by Wilcoxon test.
CHART (Craig Handicap Assessment and Reporting Technique Short)

4.2.4 Clinical, Psychosocial Factors and Patient Outcomes Following Spinal Cord Injury (SCI)

To assess the relationships between clinical and psychosocial attributes and patient outcomes following spinal cord injury (SCI), Pearson's correlation coefficient (R) was used to measure the strength and direction of associations. Statistical significance was determined using corresponding p-values, with a significance threshold set at $p < 0.05$. Table 7 presents the correlation (R values) between various clinical and psychosocial attributes and their relationship to patient outcomes at discharge and during community reintegration following spinal cord injury (SCI). The p-values indicate the statistical significance of these correlations. A positive correlation ($R > 0$) suggests that higher values of the attribute are associated with better outcomes, while a negative correlation ($R < 0$) indicates that higher values of the attribute are associated with worse outcomes. The strength of the correlation is categorized as follows: 0.70 to 1.00 indicates a strong correlation, 0.40 to 0.69 a moderate correlation, and 0.10 to 0.39 a weak correlation. A p-value below 0.05 signifies statistical significance, and all results in this table are statistically significant ($p < 0.05$). Regarding SCI complications, at discharge, the correlation ($R = -0.356$, $p = 0.002$) shows a weak negative association, indicating that more complications are related to poorer outcomes at discharge. This negative correlation strengthens during community participation ($R = -0.401$, $p = 0.001$), suggesting that complications continue to hinder successful participation. The severity of injury exhibits a strong positive correlation at discharge ($R = 0.817$, $p = 0.0001$), meaning less severe injuries are strongly associated with better outcomes at discharge. The correlation weakens slightly during community participation ($R = 0.593$, $p = 0.0001$), but it remains moderate, showing that the severity of injury still significantly impacts long-term participation. Functional ability has the strongest positive correlation at discharge ($R = 0.836$, $p = 0.0001$), highlighting that higher functional ability is a key predictor of better outcomes at discharge. This correlation remains important during community participation ($R = 0.601$, $p = 0.0001$), though it weakens slightly over time. Social support, with a weak positive correlation at discharge ($R = 0.367$, $p = 0.0001$), becomes more critical for successful participation, as its correlation strengthens to moderate ($R = 0.476$, $p = 0.0003$) during community participation. Self-care ability shows a weak positive correlation at discharge ($R = 0.267$, $p = 0.0001$) and increases slightly during community participation ($R = 0.312$, $p = 0.0001$), highlighting the importance of self-care skills for independent living. Depression shows a strong negative correlation at discharge ($R = -0.593$, $p = 0.0001$) and remains similarly strong during community participation ($R = -0.589$, $p = 0.0002$), emphasizing that mental health significantly affects long-term participation.

Table 7: Correlation between clinical and psychosocial attributes of SCI participants at discharge and community participation

	At discharge		Community participation	
	R	p-value	R	p-value
SCI Complications	-0.356	0.002	-0.401	0.001
Severity of injury	0.817	0.0001	0.593	0.0001
Functional ability	0.836	0.0001	0.601	0.0001
Social support	0.367	0.0001	0.476	0.0003
Self-care	0.267	0.0001	0.312	0.0001
Depression	-0.593	0.0001	-0.589	0.0002

4.2.5 Environmental Barriers Faced by Individuals with Spinal Cord Injury: Influence of Demographic, Socioeconomic, and Injury-Related Factors

Table 8 highlights significant patterns of environmental barriers experienced by individuals with spinal cord injury (SCI), based on demographic, socioeconomic, and injury-related factors. Younger individuals (18–35 years) report higher barrier scores across all domains, particularly in services and assistance, attitudinal support, and policies. This may be due to their greater need for integration into education, employment, and social life, which increases their exposure to and awareness of systemic and societal barriers. Black participants report higher barriers compared to Asian participants, particularly in physical and structural challenges, services, and attitudinal support, which may reflect disparities in accessibility and social inclusion. Married individuals report fewer barriers than their single counterparts, likely due to increased social and emotional support. Individuals with only primary education face the highest barriers, while those with university education experience the lowest, underscoring the role of educational attainment in overcoming post-injury challenges. Unemployed and in-school individuals report higher barriers, particularly in accessing services and understanding policies, likely because they have less financial independence, limited access to institutional support, and fewer practical experiences navigating these systems compared to their employed or self-employed counterparts. Those reliant on disability grants face the most significant barriers, particularly in accessing services and assistance, compared to individuals with business income or retirement benefits. Participants earning below KSH 50,000 encounter significantly more barriers across all categories, highlighting the influence of financial resources on accessibility and support. Barrier scores are highest within the first year post-injury and gradually decrease over time, suggesting that adaptation and access to resources improve as time passes. Traffic accident injuries (50.27%) contribute to the highest barriers, particularly in services and policies, while falls (35.14%) also result in high scores, especially in work, school, and attitudinal support. In contrast, violence and sports injuries lead to comparatively lower barriers. Individuals with cervical injuries report the highest barriers, particularly in physical structures and services, while those with thoracic or lumbar injuries face fewer obstacles. Additionally, individuals with incomplete injuries experience more barriers than those with complete injuries, potentially due to variations in functional abilities and expectations.

Table 8: Environmental barriers faced by individuals with spinal cord injury based on demographic, socioeconomic, and injury-related factors

	N %	CHIEF Total	Physical and Structural	Services and Assistance	Work and School	Attitudinal and Support	Policy
Demographic							
Age at injury	185						
18-25	23.24	0.28	0.36	0.26	0.23	0.29	0.26
26-35	29.73	0.36	0.46	0.34	0.29	0.37	0.33
36-45	23.24	0.28	0.36	0.26	0.23	0.29	0.26
46-55	14.59	0.18	0.23	0.16	0.14	0.18	0.16
56-65	7.03	0.08	0.11	0.08	0.07	0.09	0.08
66-70	2.16	0.03	0.03	0.02	0.02	0.03	0.02
Gender	185						
Female	18.92	0.23	0.29	0.21	0.19	0.24	0.21
Male	81.08	0.98	1.26	0.92	0.80	1.01	0.90
Ethnicity	185						
Black	77.84	0.94	1.21	0.88	0.77	0.97	0.86
Asian	22.16	0.27	0.34	0.25	0.22	0.28	0.25
Marital Status	185						
Married	67.03	0.81	1.04	0.76	0.66	0.84	0.74
Single	32.97	0.40	0.51	0.37	0.33	0.41	0.37
Education at injury	185						
College	13.51	0.16	0.21	0.15	0.13	0.17	0.15
Primary	43.24	0.52	0.67	0.49	0.43	0.54	0.48
Secondary	38.38	0.46	0.59	0.43	0.38	0.48	0.43
University	4.86	0.06	0.08	0.05	0.05	0.06	0.05
Occupation at injury	185						
Employed	58.38	0.70	0.90	0.66	0.58	0.73	0.65
Retired	30.81	0.37	0.48	0.35	0.31	0.39	0.34
Self-employed	10.81	0.13	0.17	0.12	0.11	0.14	0.12
In School	55.14	0.66	0.85	0.62	0.55	0.69	0.61
Unemployed	44.86	0.54	0.70	0.51	0.44	0.56	0.50
Years post injury	185						
1.6	32.97	0.95	0.91	0.97	0.88	1.03	0.95
5	17.84	0.51	0.49	0.53	0.48	0.56	0.52
7	27.57	0.78	0.74	0.80	0.72	0.85	0.78
9	16.22	0.47	0.45	0.48	0.43	0.51	0.47
10	4.32	0.12	0.12	0.13	0.12	0.14	0.12
12	1.62	0.05	0.04	0.05	0.04	0.05	0.05
Source of Income	185						
Business	28.11	0.34	0.44	0.32	0.28	0.35	0.31
Disability grant	48.11	0.58	0.75	0.54	0.48	0.60	0.53
Employed	12.43	0.15	0.19	0.14	0.12	0.16	0.14
None	4.32	0.05	0.07	0.05	0.04	0.05	0.05
Retirement Benefits	7.03	0.08	0.11	0.08	0.07	0.09	0.08
Level of Income	185						
Below KSH 50,000	65.41	0.79	1.01	0.74	0.65	0.82	0.73
KSH 50,001-100,000	17.30	0.21	0.27	0.20	0.17	0.22	0.19
KSH 100,001-200,000	2.70	0.03	0.04	0.03	0.03	0.04	0.03
Refused to disclose	16.22	0.20	0.25	0.18	0.16	0.20	0.18

Course of Injury	185						
Sports	1.62	0.06	0.05	0.06	0.06	0.05	0.05
Disease e.g. infection	4.86	0.17	0.15	0.19	0.18	0.16	0.16
Fall/Falling objects	35.14	1.22	1.09	1.39	1.32	1.18	1.13
Violence e.g. gunshot	8.11	0.28	0.25	0.32	0.30	0.27	0.26
Traffic accident	50.27	1.75	1.56	1.99	1.89	1.68	1.62
Level of Injury	185						
Cervical	35.14	0.42	0.54	0.40	0.35	0.44	0.39
Lower thoracic	25.41	0.31	0.39	0.29	0.25	0.32	0.28
Lumbar	24.32	0.29	0.38	0.27	0.24	0.30	0.27
Mid thoracic	9.19	0.11	0.14	0.10	0.09	0.11	0.10
Upper thoracic	5.95	0.07	0.09	0.07	0.06	0.07	0.07
Category of Injury	185						
Complete	15.14	0.18	0.23	0.17	0.15	0.19	0.17
Incomplete	84.86	1.02	1.32	0.96	0.84	1.06	0.94

4.2.6 Levels of Agreement among SCI Participants for Task Various Tasks

Table 9 presents the levels of agreement between SCI participants for various tasks, measured using total agreement percentages and Kappa coefficients. The Kappa coefficient is a statistical measure of inter-rater agreement that accounts for chance, where a coefficient of 0.61–0.80 indicates substantial agreement, and 0.81–1.00 indicates almost perfect agreement. The results are grouped into four categories: Self-care, Respiration and Sphincter Management, Mobility in Room and Toilet, and Mobility Indoors and Outdoors. In the Self-care category (N = 92), high agreement is observed for bathing (upper body: 97.83%, κ=0.903; lower body: 93.48%, κ=0.860) and dressing (lower body: 96.74%, κ=0.894), which show almost perfect agreement, reflecting strong consistency among participants. Moderate agreement is seen for grooming (71.74%, κ=0.658) and upper body dressing (77.17%, κ=0.709), indicating substantial agreement, but these tasks show slightly lower agreement, potentially due to varying techniques or interpretations. Feeding shows high agreement (86.96%, κ=0.804), which reflects almost perfect agreement, likely due to the straightforward nature of this task. Overall, self-care tasks generally show strong agreement, although grooming and upper body dressing may require clearer guidelines or standardized evaluation criteria to reduce variability. In the Respiration and Sphincter Management category (N = 67), very high agreement is observed for respiration (98.51%, κ=0.836), bladder management (91.04%, κ=0.911), bowel management (91.04%, κ=0.907), and toilet use (95.52%, κ=0.911), all showing almost perfect agreement, indicating clear and well-defined assessment criteria. These tasks are consistently understood by participants, contributing to the high levels of agreement. In the Mobility in Room and Toilet category (N = 67), high agreement is observed for transfers from bed to wheelchair and wheelchair to toilet (86.57%, κ=0.860 and 0.869), showing almost perfect agreement. However, moderate agreement is seen for motion in bed and sore prevention (80.60%, κ=0.804), which may be due to variability in interpreting movements or prevention techniques. In the Mobility Indoors and Outdoors category (N = 82), very high agreement is observed

for mobility over moderate distances (96.34%, κ=0.958) and ground-to-wheelchair transfers (93.90%, κ=0.939), with the highest Kappa scores, indicating clear and consistent assessment criteria. Stair management (91.46%, κ=0.921) and mobility outdoors (90.24%, κ=0.902) also show almost perfect agreement, despite their greater task complexity. Slightly lower agreement is observed for wheelchair-to-car transfers (84.15%, κ=0.846) and mobility indoors (90.24%, κ=0.897), which, while still high, may reflect differences in techniques or assistive devices used.

Table 9 : Levels of agreement among SCI participants for various tasks

Task		**Total Agreement**	**Kappa Coefficient**
Self-care	N=92		
Feeding	80	86.96	0.804
Bathing (Upper Body)	90	97.83	0.903
Bathing (Lower Body)	86	93.48	0.860
Dressing (Upper Body)	71	77.17	0.709
Dressing (Lower Body)	89	96.74	0.894
Grooming	66	71.74	0.658
Respiration and sphincter management	N=67		
Respiration	66	98.51	0.836
Sphincter Management- bladder	61	91.04	0.911
Sphincter Management - bowel	61	91.04	0.907
Use of toilet	64	95.52	0.911
Mobility in room and toilet	N=67		
Motion in bed and sore prevention	54	80.60	0.804
Transfers: bed -wheelchair	58	86.57	0.860
Transfers: wheelchair - toilet	58	86.57	0.869
Mobility indoors and outdoors	N=82		
Mobility indoors	74	90.24	0.897
Mobility for moderate distance	79	96.34	0.958
Mobility outdoors	74	90.24	0.902
Stair management	75	91.46	0.921
Transfers: wheelchair - car	69	84.15	0.846
Transfers: ground - wheelchair	77	93.90	0.939

N = Number of tests included in the analysis

4.2.7 Influence of Demographic, Clinical, and Environmental Factors on Participation and Life Satisfaction in Individuals with Spinal Cord Injury

In this study examining factors influencing participation and life satisfaction among individuals with spinal cord injury (SCI), logistic regression models were evaluated using the Nagelkerke R^2 statistic to measure the proportion of variance explained by each model. The cause of injury emerged as the strongest predictor, explaining a substantial portion of the variability in outcomes (Nagelkerke R^2 = 0.689 for total participation and 0.677 for social integration), highlighting its critical role. Demographic variables, including age, gender, and ethnicity, demonstrated moderate explanatory power with R^2 values ranging from 0.128 to 0.335, indicating their meaningful contribution. Injury characteristics such as level and category significantly impacted mobility and physical independence, with R^2 values of

0.384 and 0.337, respectively. Age at injury was a key determinant: younger adults (18–35 years) had higher odds of better outcomes, whereas individuals aged 66–70 had markedly reduced life satisfaction (OR = 0.04). Gender differences were evident, with males exhibiting greater odds of favorable social integration (OR = 2.75) and life satisfaction (OR = 1.56) compared to females. Marital status also influenced outcomes positively, as married individuals had higher odds of social integration (OR = 2.27) and life satisfaction (OR = 1.29). Ethnicity showed that Black participants had superior outcomes relative to other groups (e.g., OR = 3.00 for mobility, 2.64 for social integration). Educational attainment inversely correlated with outcomes; those with primary or secondary education had better participation and life satisfaction than university-educated individuals, who had the lowest odds (OR = 0.09 for life satisfaction). Employment status at injury further predicted outcomes, with employed or school-enrolled participants having better mobility (OR = 2.25) and social integration (OR = 1.87), whereas self-employed individuals experienced poorer outcomes (OR = 0.37 for social integration). The duration since injury negatively affected participation and life satisfaction, with odds decreasing substantially over time—from relatively high odds one year post-injury (OR = 1.27 for social integration) to markedly low odds at 7 and 12 years post-injury (e.g., OR = 0.04 for mobility and life satisfaction at 12 years). Injury cause significantly influenced results, as traffic accidents were associated with the best outcomes (OR = 1.908 for total participation; OR = 1.382 for life satisfaction), while violence and sports injuries correlated with the poorest (e.g., OR = 0.308 and 0.062 for total participation, respectively). Injury level and completeness were critical, with cervical and upper thoracic injuries linked to the lowest mobility odds (OR = 0.23), and incomplete injuries demonstrating notably better outcomes (OR = 3.27 for mobility, 2.88 for social integration, 1.63 for life satisfaction). Environmental barriers measured by the CHIEF scale also impacted participation: physical and structural barriers modestly reduced social integration (OR = 1.02), but attitudinal and support barriers had more pronounced negative effects (OR = 0.70 for social integration; 0.47 for life satisfaction), with policy barriers exerting the strongest negative influence (OR = 0.19 for life satisfaction). Moreover, physical and cognitive independence were strongly linked to life satisfaction, with cognitive impairment below 75% associated with lower odds (OR = 0.35), and mobility showing a moderate relationship (OR = 0.61). Occupational status and social integration were critical predictors, where lower occupational and social integration scores were linked to decreased life satisfaction (OR = 0.18 and 0.55, respectively). In summary, demographic factors (age, gender, marital status), injury characteristics (cause, level, completeness), and environmental factors (policy and attitudinal barriers) significantly affect participation and life satisfaction in SCI individuals, with time since injury contributing to outcome decline. Enhancing social integration, occupation, and independence appears essential for improving life satisfaction in this population.

Table 10: Logistic Regression Models Within Variable Categories for Participation and Life Satisfaction (N=185 cases with no missing data)

	CHART Total	Physical Indep	Cognitive Indep	Mobility	Occupation	Social Integration	Life Satisfaction
	R^2=	R^2=	R^2=	R^2=	R^2=	R^2=	R^2=
Demographic	0.263	0.147	0.242	0.335	0.128	0.298	0.17
Age at Injury							
18-25	0.70	0.39	0.64	0.89	0.34	0.79	0.45
26-35	0.89	0.50	0.82	1.14	0.43	1.01	0.57
36-45	0.70	0.39	0.64	0.89	0.34	0.79	0.45
46-55	0.44	0.24	0.40	0.56	0.21	0.49	0.28
56-65	0.21	0.12	0.19	0.27	0.10	0.24	0.13
66-70	0.06	0.04	0.06	0.08	0.03	0.07	0.04
Gender							
Female	0.57	0.32	0.52	0.73	0.27	0.64	0.36
Male	2.44	1.35	2.23	3.12	1.18	2.75	1.56
Marital Status	0.00						
Married	2.01	1.12	1.84	2.58	0.97	2.27	1.29
Single	0.99	0.55	0.91	1.27	0.48	1.12	0.63
Ethnicity							
Black	2.34	1.30	2.14	3.00	1.13	2.64	1.49
Asian	0.67	0.37	0.61	0.85	0.32	0.75	0.43
Education at injury							
College	0.41	0.23	0.37	0.52	0.20	0.46	0.26
Primary	1.30	0.72	1.19	1.66	0.63	1.47	0.83
Secondary	1.15	0.64	1.06	1.48	0.56	1.30	0.74
University	0.15	0.08	0.13	0.19	0.07	0.16	0.09
Years post Injury							
1.6	1.22	1.10	0.91	1.04	0.81	1.27	0.97
5	0.66	0.60	0.49	0.56	0.44	0.69	0.53
7	0.89	0.76	0.62	0.73	0.59	1.09	0.65
9	0.52	0.45	0.36	0.43	0.35	0.64	0.38
10	0.14	0.12	0.10	0.11	0.09	0.17	0.10
12	0.05	0.04	0.04	0.04	0.03	0.06	0.04
Occupation at Injury							
Working	1.75	0.97	1.61	2.25	0.85	1.98	1.12
Retired	0.93	0.51	0.85	1.19	0.45	1.04	0.59
Self-employed	0.32	0.18	0.30	0.42	0.16	0.37	0.21
In School	1.66	0.92	1.52	2.12	0.80	1.87	1.06
Unemployed	1.35	0.75	1.23	1.73	0.65	1.52	0.86
Cause of Injury	R^2= 0.689	R^2= 0.518	R^2= 0.536	R^2= 0.645	R^2= 0.572	R^2= 0.677	R^2= 0.499
Sports	0.062	0.046	0.048	0.058	0.051	0.060	0.045
Disease e.g. infection	0.185	0.139	0.144	0.173	0.153	0.181	0.134
Fall/Falling objects	1.334	1.001	1.036	1.247	1.107	1.311	0.966
Violence e.g. gunshot	0.308	0.231	0.239	0.288	0.255	0.302	0.223
Traffic accident	1.908	1.433	1.483	1.785	1.584	1.875	1.382
	R^2=	R^2=	R^2=	R^2=	R^2=	R^2=	R^2=
Level of SCI	0.298	0.167	0.276	0.384	0.144	0.337	0.191
Cervical	1.06	0.59	0.97	1.35	0.51	1.19	0.67
Lower thoracic	0.76	0.42	0.70	0.98	0.37	0.86	0.49
Lumbar	0.73	0.41	0.67	0.94	0.35	0.82	0.47
Mid thoracic	0.28	0.15	0.25	0.35	0.13	0.31	0.18

Upper thoracic	0.18	0.10	0.16	0.23	0.09	0.20	0.11
Category of Injury							
Complete	0.45	0.25	0.42	0.58	0.22	0.51	0.29
Incomplete	2.55	1.42	2.33	3.27	1.23	2.88	1.63
Environmental factors							
CHIEF physical/structural (0–1)>1	1.27 (0.012)	1.32 (0.031)	1.14 (0.022)	1.04 (0.032)	1.16 (0.011)	1.02 (0.034)	0.69 (0.036)
CHIEF services/assistance (0–1)>1	1.11 (0.018)	1.16 (0.014)	1.00 (0.012)	0.91 (0.024)	1.01 (0.010)	0.89 (0.019)	0.60 (0.030)
CHIEF attitudinal/support (0–1)>1	0.88 (0.015)	0.91 (0.012)	0.79 (0.017)	0.72 (0.013)	0.80 (0.018)	0.70 (0.015)	0.47 (0.032)
CHIEF policy (0–1)>1	0.35 (0.032)	0.36 (0.023)	0.32 (0.012)	0.29 (0.036)	0.32 (0.032)	0.28 (0.040)	0.19 (0.042)
Participation							
CHART physical independence (75–100)<75	0.49 (0.032)	0.51 (0.019)	0.44 (0.029)	0.40 (0.022)	0.44 (0.025)	0.39 (0.032)	0.26 (0.042)
CHART cognitive independence (75–100)<75	0.65 (0.012)	0.67 (0.016)	0.58 (0.010)	0.53 (0.012)	0.59 (0.011)	0.52 (0.012)	0.35 (0.022)
CHART mobility (75–100)<75	1.13 (0.032)	1.18 (0.039)	1.02 (0.036)	0.92 (0.031)	1.03 (0.016)	0.91 (0.011)	0.61 (0.021)
CHART occupation (75–100)<75	0.33 (0.014)	0.34 (0.012)	0.30 (0.031)	0.27 (0.032)	0.30 (0.032)	0.27 (0.022)	0.18 (0.022)
CHART social integration (75–100)<75	1.02 (0.012)	1.05 (0.032)	0.91 (0.010)	0.83 (0.012)	0.92 (0.012)	0.81 (0.016)	0.55 (0.022)

Bold indicates that the Nagelkerke $R^2 \leq 1$; $p \leq 0.05$ is significant at the .05 level. **Indep**: independence.

4.3 QUALITATIVE RESULTS

This section presents the results of the findings of the content analysis of patients with SCI who were interviewed using semi-structured questions, which attempt to answer the objective in Phase two of this study. This phase explored the experiences of patients with SCI six months' post discharge regarding factors affecting their reintegration back in the community specifically on their perspectives on barriers and inaccessibility during reintegration back in the community.

4.3.1 Thematic Analysis

The qualitative section consisted of 10 interviews with recovering spinal cord injury (SCI) participants. The interview length ranged between 2.34 and 17.25 minutes and they were transcribed verbatim. The gender of the participants was two females and eight males. The participants were from diverse backgrounds, engineering, masonry, welding, truck driving, information technology, and civil service. In addition, there was a student and a housewife. The injury was either from traffic accidents or occupational hazards. The qualitative section included 10 interviews with individuals recovering from spinal cord injury (SCI), ranging in length from 2.34 to 17.25 minutes. All interviews were transcribed verbatim. The participants comprised eight males and two females from diverse occupational

backgrounds, including engineering, masonry, welding, truck driving, IT, and civil service, as well as a student and a housewife. Injuries were primarily caused by traffic accidents or occupational hazards.

Table 11: Cycle 1 Categories

	Categories
1	Socio-demographic characteristics
2	Life before injury
3	Life after injury
4	Positive experiences due to injury
5	Negative experiences due to injury
6	Managing daily life
7	Role of family and society in daily life
8	Obstacles in daily life
9	Family and friends' attitudes toward the injured
10	Spiritual support
11	Handling incontinence and pain in daily life

Source: Researcher's Data

4.3.2 Cycle 2 Coding Categories

4.3.2.1 Life Before Injury

This category describes the life of the participant before experiencing spinal cord injury. The participants painted a rosy life with no struggle, where they could engage in productive work, be independent, move freely, and have a strain-free family life. Adjectives that were mostly used included: life was okay, normal, easy, independent, good, and working, among others. *Participant M1* asserted, "Just living the routine of a normal life," and Participant M4 added, "Life was very okay because I was working for myself, and that's how it was, it was very good." However, within a very short time, everything changed.

4.3.2.2 Life After Injury

This category describes the life of the participant after experiencing the spinal cord injury. This category contrasts life before injury. The new life is painted with gloom, uncertainty, pain, darkness, disappointment, dilemma, and confusion. The SCI participants use negative words to portray their lives as bad, full of struggle and stress, changed, dependent, and socially difficult among others. The six subcategories include:

i) **Dependent life for daily grooming and feeding.** In this sub-category, the participants rely on other people for daily grooming and feeding. Some SCI participants commented as follows **M3**: *"My life has changed because nowadays I depend on people 100% which I was not doing before… I depend on people to assist me in many things like changing diapers, feeding me, and the money to go to clinics"*. To add on Participant **M1** echoed a similar experience saying, *"I could no longer work or bath or do my normal routine. In the initial stages, I could not do anything… I could not sit, I could not feed myself, and I could not turn myself on the bed."*

ii) **Immobility**. In the Immobility subcategory, the SCI participants could not walk, and in their lives, they had to use wheelchairs, they could not access some buildings/facilities, or ride on uneven roads, and had to stop attending school.

M2 bemoaned as follows, *"Well everything has become so immobile, I don't know when you are used to everything moving at 100km/hr…. Suddenly you have to wait for things to come to you… trying to apply for jobs and guys are not enthusiastic for you people you cannot move, so it's quite upside down"* Indeed movement has been a challenge and they cannot move on their own without some form of assistance.

iii) **Financial dependency and sense of loss to provide.** This subcategory category described the difficulty the ICS participants experienced due to the loss of their livelihood- the ability to work and provide for themselves and their families. Participant **M10** had this to say, "My life has changed because, since the injury, I cannot provide for my family, I depend on well-wishers to support them". Reduced income led to the loss of to less financial resources and a lower quality of life. These participants had to readjust their standards of living. Humorously Participant **M7** shared his experiences as follows "You now start looking for cheap flour…making tomato ***soup*** instead of meat stew and eat with *ugali*."

(iv) Psychological shock, stress, and pain. In this subcategory, it explores the nature of pain that the ICS participants experienced. These survivors lived a life of pain— pain from the *catheter* and emotional pain. Participant **MI** had this to narrate, *"the situation I was in I could not make it in school, I could not study, even my health didn't have the power to write something or do something and so I had to stop it and deal with what I was trying to adjust psychologically because, it is something I did not expect. It just came. I was not even expecting such a thing then everything turns around"*. Participant **M8** also narrated his experiences as *"it is bad… I am stressed up, it's hard to go to school…it's led to me having sores."*

v) **Loneliness.** This subcategory describes the loneliness that SCI participants experienced due to the injury. This loneliness came due to some losing their marriage and friends and to some extent family members deserting them, only to find themselves alone. This was the experience of Participant **M9** *"You know I am alone… I don't have a family and also my wife ran away after my injury"*.

vi) **Helplessness.** This subcategory describes how the SCI made the participants perceive themselves as helpless as they could not control their bowels and bladder. Participant **M5** narrates his experience as follows: "The bowel movement, having people to change me it's depressing".

4.3.2.3 Positive and Negative Experiences Due To The Injury

This category explains the positive and negative experiences that the SCI participants experienced due to the injury. Life toward recovery was a journey filled with positive and negative experiences. This category had two subcategories.

Positive experiences after spinal cord injury: The positive experiences after the SCI injury subcategory demonstrate that there were participants who cherished the small milestones they achieved towards recovery. For instance, some participants achieved some level of mobility, and could do a few things for themselves like grooming, and others resumed some level of productive work making an income to sustain their families. Two participants who had developed some resilience and a positive perception towards life had this to say, "I keep pushing myself" Participant **M8** while Participant **M2** asserted that "it made me to come to understand the small things you need to take care of yourself. Like you pay attention to very minute details of your life and it has also helped me to appreciate small wins. You know when you have something that doesn't have a cure per se then you see any good thing that you were not able to do before it becomes a plus". This participant had been injured for one year and nine months. Those participants who had developed some form of mobility resumed back to their previous life and attended school. They could sit and bathe. This resilience made them develop a positive perspective in life and appreciate being alive.

Negative experiences after spinal cord injury: In the negative experience after SCI category participants acclaimed that in the early years after the injury life seemed to stagnate, they lost friends, income, and dreams and became dependent on others. Some SCI participants were still experiencing pain or loss of sensation in their lower limbs, and some did not see anything positive or meaningful in life. Participant **M1** narrates below how he was negative but later changed his perception.

> *"I can say for 5 to 6 years it's like my life has been stagnant because I was trying to figure out where I could begin because I was dependent on people. For example, I am going out somewhere I have to depend on my brother to carry me around so I can say negatively it affected me but after 5 years I adjusted. I could now sit, I could now bathe on my own after undergoing physiotherapy…I now have the stability to do house chores and bathe myself. That is where I began adjusting… I have a different perspective on life. That no matter what you go through in life, life can continue it is a matter of time, adjusting first then adapting. I am still moving on from the challenges I was in and also it strengthened my faith in God. That is the most positive thing I can say it happened in my life".*

But some did not see any positives at all. That was the experience of participant **M5**, when asked if there were any positive aspects in his life, he did not see any as he still relies on people for almost everything, like eating, cleaning, and moving around, and cannot feel pain or any sensation.

4.3.2.4 Managing Daily Life

This category sought to find out what the participants did to occupy their lives and keep on moving. It had four subcategories:

i) Use of idle/free time. In this use of the idle /free time subcategory, one challenge that SCI participants faced was having a lot of time which easily led to boredom. To spend this time, the ICS participants engaged in some leisure activities, social media, socializing with others, or just spending it in bed. Participant **M5** had this to say, *"Mostly, I am in bed sleeping or on the phone"* Participant **M3** had this to say *"I socialize with people, intermingle and watch news and football to keep busy. I like watching movies a lot"*. Participant **M2** narrated as follows, *"for one and the most important thing usually has to be to try and find what I can do to make it to the end of the day without being pissed off, without being affected negatively emotionally mostly."*

ii) Increase their mobility. This subcategory had to do with ways to overcome the challenge of immobility. The ICS participants used mostly their wheelchairs to move around, and some had access to Uber taxis or family cars. Participant **M1** narrated, *"I can say with the wheelchair I can do most of the things on my own. I can move around… I go around with an Uber, a taxi, or my sister who has a car."*

iii) Increase physical strength. In this subcategory, the SCI participants continued with physiotherapy sessions. One recently injured SCI had this to say, *"I am exercising so I can turn halfway. If someone helps by turning my body halfway, I can complete turning."* When the person was asked whether he could propel himself, he replied he could propel himself on the wheelchair but for not more than two hours.

iv) Increase their emotional and psychological strength. In this subcategory, the SCI had to seek ways to boost their emotional and physiological strength to continue living. Participant **M8** had this to narrate, *"I keep pushing myself"* Participant **M7** had a similar experience, he said, *"It's all about pushing. When you get something small you don't think about the bigger one. You get contented with whatever you have to stay grateful for whatever small you get… we continue praying to God to continue providing. You accept the situation and never blame God. I am a Christian and I know everything happens for a reason."*

v) Reduce dependency on others. In this subcategory, the SCI participants trained themselves to do basic things. Participant **M2** confessed thus, *"I have been able to teach myself how to brush my teeth and all that like I had a foul smell, combing my hair was a big problem so I had to shave it off"*. Though for other SCI participants, there was some level of reliance from the family, especially the newly injured ones.

4.3.2.5 Role Of Family In Daily Life

This category describes the role of the family in supporting the SCI journey of recovery and life. For most participants, their families were very supportive. This support ranged from physical support--

assisting in grooming and feeding; financial support- purchase of diapers and material sustenance; spiritual and emotional support, pray and encourage them as some had family members that were clergy; some had supportive spouses except for two cases where one female participant who lost her marriage due to disability and a male participant whose wife took the children and left him and he relied on neighbors to support him. Below is the confession of some of the SCI participants concerning the support they received from their families:

Participant **MI**: *"My family has been the greatest pillar of my life, they encourage me, and they help me when necessary for example with house chores if I wash I cannot hang the clothes on the line so they help me…when it comes to psychological healing… they walk with me. My mum cleans me and my dad and brother help me move around. I have a daughter who also helps around in whatever way she can."*

Participant **M5**: *"I don't have a family and also my family ran away after my injury…so my neighbors are the ones who support me."* This participant relied on friends and neighbors, his parents and brother were far away and unconcerned. On the other hand, there were SCI participants who were breadwinners and had to support their young families. This was the experience of Participant **M7** and he had this to say, *"If you are a breadwinner in the house people look up to you and if you are not making a living the family goes down"*. These participants continued to provide though at a reduced level and their families had to be understanding and not frustrate them.

4.3.2.6 Obstacles Faced In Daily Life

This category focused on the obstacles that the SCI participants faced in their day-to-day life. It had four subcategories.

i. **Reduced access to some buildings:** In this subcategory, SCI participants experienced limited access to some areas. For instance, they could only access wheelchair friendly places and most buildings/apartments have stairs and lack disability accessories. More so, most roads have uneven surfaces. Participant **M1** had this to say, *"When I go outside of the house, there are no loos for people with disabilities…to use the toilet is hard that is the biggest challenge we face… where I live going up and down the stairs is a big challenge."*

ii. **Lack of finances/low income and financial reliance on others.** In this subcategory, most of the ICS participants longed to be able to do something and develop some level of financial independence as some had young families to fend for. For participant **M9** this was his major concern and he narrated, *"Getting an income source, mostly because that is the source of everyone's livelihood. That is my main challenge… yes I am able to visit friends but if I get more support I can depend on myself because begging is not easy and I don't like to be a burden"* this participant getting income would enable him to procure other services like laundry, an income could make him more independent and not a beggar or a

burden. This implies if these SCI participants are equipped with the necessary skills, they can reduce financial dependency on others.

iii. **Inability to groom themselves and perform simple house chores**. In this subcategory, there were activities that the ICS participants considered mundane such as carrying a bucket of rainy water which they normally used to do for themselves. Participant **M5** alluded to this *"Feeding myself the bowel movement, having people to change me is depressing, moving, turning and depression"* The inability to handle their bowel movement brought shame to them.

iv. **Diminished sex life**. The participants experienced the inability to make love to their spouse as before. Others could not marry delayed marriage or lost the marriage altogether. Participant **M3** lamented by saying, *"I cannot make love like the way I used to do before".*

4.3.2.7 Family And Friends' Attitude Towards The Injured

This category focused on the attitude of family, friends, and society at large towards the SCI participants. This was a mixed bowl of experiences. To a majority of the participants, the family had a positive attitude and was supportive. The same could be said of the society. Society did not discriminate against them in social events and some could be appointed as officials in social-related activities. In some instances, instead friends/family who disserted them.

Participant **M9** had this to say, *"There are those who appreciate me the way I am but you never miss those who are negative. You remember the yams I told you were stolen?"* This Participant **M9** had this to say: lost piece of land and his yams were stolen. While for others, the family did not perceive them as a burden. For two injured participants, their wives stuck by their side, while for another one the wife left him and for a female participant the husband left her too despite being newlyweds. (A possible explanation could be they could not handle that change or the pressure that came with the disability condition). Participant **M2** narrated his experience as below"

The attitude has been okay. Anyone who is connected to me has been a good agents and they want the best. I guess what the problem is they have this, when you are a victim of such a thing, everyone sympathizes with you every single time. I have a scenario where people were reluctant to visit me because they were afraid of what they would come and say. Sometimes even people you have been friends with for a long time now they are kind of walking on eggshells like okay is this appropriate to say because now she is injured?

From the above narration, it appears that it takes time for the society/friends to adjust to the new condition of their injured friends. For those newly injured, the friends could be afraid of how to empathize with them (walking on eggshells). Moreover, some friends left for good, and new friends came along. Friends could also be concerned with the progress of their injured friends and could put some pressure such as for them to move on with life even have

children. Besides friends, society could take advantage of some SCI participants, as is the case of one whose leased field was taken away and his crop of yams stolen.

4.3.2.8 Spiritual Support

This category examined in detail the source of spiritual support that the SCI participants sought on their journey to recovery. In the Kenyan culture, people seek spiritual explanations for misfortunes and may seek the intervention of the church/pastor or a traditional witch doctor/ healer. None of the participants acknowledged visiting a traditional healer, but a good number were members of a local church and interacted with pastors, or had family members who were clergy who offered prayers and encouragement. Some participants confessed to receiving spiritual strength to sustain them in the injury from their Christian faith, others saw it as a will of God and had no reason to complain.

Participant **M9**: *"I have only visited a pastor, when I explained to him about my challenge, we prayed together."*

Participant **M2:** *"I have not visited a traditional healer, but my mum is a pastor. I've met my fair share of pastors. In the beginning, you have this kind of blind hope because you've heard of miraculous things happening, but after a few times it just becomes normal."*

Possible explanations of participants' not acknowledging help from witch doctors could be due to the negative perception (stigma/ stereotype) the Kenyan society has towards them as they are associated with works of darkness. The church and pastors are considered to belong to the kingdom of light, are used by God, and can cast off devils/evil spells.

4.3.2.9 Handling Incontinence and Pain In Daily Life

This category explored the experiences participants had with pain and incontinence. Some individuals with spinal cord injury (SCI) experienced pain, while others did not or their pain had ceased. Some participants used catheters, while others relied on diapers, especially when outside their homes due to difficulties controlling their bladder and bowel functions. Additionally, some participants only visited buildings that had disability-friendly facilities and wheelchair accessibility.

They abstained from food while traveling, wore *catheters*, and experienced a range of emotions. It had four subcategories.

i). **Frustration**. In this subcategory, the SCI participants felt frustrated for their inability to hold urine and stool for long and the ability to manage their bowels not to make the people around them uncomfortable. Below are the experiences of two participants:

Participant **M9**: *"When I am traveling I have to avoid eating to sort myself out"*

Participant **M2**: *"Extremely frustrating, it's like everything has been turned upside down".*

ii). **Delayed marriage**. In this subcategory, the participants delayed/avoided marriage due to their present condition and inability to provide or wanted to develop some level of independence. Participant **M9** whose wife had run away, when asked whether he would remarry had this to say, *"It depends, and I will look for one when I am financially stable."*

iii) **Discomfort and pain**. The SCI participants experienced discomfort that came from sitting in the wheelchair for long periods. Those who could not turn themselves had bed sores, and during cold seasons, some could experience pain and swelling on their legs. One participant lost sensation in his lower abdomen following surgery, which was related to a secondary complication of the spinal cord injury (SCI).

Participant **M3** had this to say, *"The pain makes stresses me that I find myself asking God so many questions."* for Participant **M2** feeling pain was a positive thing. He experienced pain in his wound. He had this to say, *"When you read a lot about spinal cord stuff you know that pain is a good sign."*

iv). **Embarrassment and anger.** This could come from being changed or unable to control their bowels or their life. They have to use diapers and urinate in a container. See the excerpts below:

Participant **M4:** *"I am using the catheter and I am using the one that is suprapubic … I cannot use it in some places because of shame."*

Participant **M2**: *"Before I really accepted the fact that I am injured there was really anger because of just that incontinence."*

Before, this participant did not want to be denied anything that he wanted to do or eat, or anyone to "take his freedom of choice" but with time he had to adjust.

4.4 SECTION C: DELPHI STUDY

This study presents the findings of a Delphi study aimed at providing expert guidance on the community reintegration of patients with spinal cord injury (SCI) in Kenya. The study employed a structured, multi-round survey process to achieve consensus among a panel of experts, including healthcare professionals and rehabilitation specialists with extensive experience in SCI management through clinical practice and teaching. Initially, forty (40) experts were invited to participate in the study. Of these, six (6) declined, and thirteen (13) did not respond, resulting in a final panel of twenty-one (21) experts who consented and participated in the full Delphi process.

The primary objective of the study was to assess the level of community reintegration among SCI patients in Kenya and to identify contextual barriers and facilitators affecting this process. Furthermore, the study sought to determine the most effective multidisciplinary strategies to support SCI patients in their reintegration journey. The Delphi panel, composed of allied health professionals, engaged in three rounds of data collection, which allowed for an iterative refinement of expert opinions. All data collection and communication were conducted electronically via Google Forms. The data were analyzed using measures of central tendency, along with the non-parametric Wilcoxon Signed Ranks test to evaluate statistical significance and determine consensus among panelists.

4.4.1 Characteristics of Delphi Panel Members

The results presented in Table 12 show that the initial panel consisted of 21 allied health professionals with diverse demographic and occupational backgrounds. All participants from Round 1 were invited to participate in Rounds 2 and 3. The response rate was 85.7% in Round 2 (18 out of 21 participants) and 100% in Round 3 (all 18 Round 2 participants completed the final round). Demographic information

for Rounds 1, 2, and 3 is reported in this chapter. In Round 1, the panel included 21 participants, with a nearly equal gender distribution: 52.4% male and 47.6% female. In Rounds 2 and 3, the participant number decreased slightly to 18, with a similar gender balance (55.6% male, 44.4% female). Participants ranged in age from 20 to over 60 years, with most falling between the ages of 26 and 55. The racial composition was predominantly African Black (95.2% in Round 1 and 94.4% in Rounds 2 and 3), with a small representation of Asian participants. Participants held varying educational qualifications, with the majority holding a Baccalaureate Degree (38.1% in Round 1 and 33.3% in subsequent rounds), followed by Diploma holders, Master's degree holders, and PhD holders. Most were Physical Therapists (85.7% in Round 1 and 88.9% in Rounds 2 and 3), with smaller numbers of Occupational Therapists (9.5% and 11.1%, respectively) and Medical Social Workers (4.8% and 5.6%). Regarding employment status, most participants were permanently employed and pensionable (71.4% in Round 1 and 77.8% in Rounds 2 and 3), while others were on probationary contracts, self-employed, or retired. A significant number were employed in academic institutions (33.3%) and public hospital inpatient settings (28.6% in Round 1, increasing to 33.3% in later rounds). Others worked in public outpatient facilities, private hospitals, or home care services. Participants were all practicing or based in Kenya, reflecting the healthcare and rehabilitation context of that region.

Table 12 : Expert panel member characteristics

	Round 1		**Round 1 and 3**	
	n	**%**	**n**	**%**
Sex				
Female	10	47.6	8	44.4
Male	11	52.4	10	55.6
Age				
20- 25 years	2	9.5	2	11.1
26 - 30 years	5	23.8	3	16.7
31 - 35 years	5	23.8	5	27.8
36 - 40 years	2	9.5	2	11.1
41 - 45 years	2	9.5	2	11.1
46 - 50 years				
51 - 55 years	3	14.3	3	16.7
56 - 60 years	1	4.8	1	5.6
61 - 65 years	2	9.5	2	11.1
66- above				
Race				
Asian	1	4.8	1	5.6
African Black	20	95.2	17	94.4
White				
Highest Degree Earned				
Diploma	6	28.6	6	33.3
Baccalaureate Degree	8	38.1	6	33.3
Master's Degree	3	14.3	3	16.7

PhD	4	19.0	3	16.7
Current Occupation				
Physical Therapist	18	85.7	16	88.9
Occupational Therapist	2	9.5	2	11.1
Speech Therapist				
Medical social worker	1	4.8	1	5.6
Nurse				
Current Employment Status				
Permanent and Pensionable	15	71.4	14	77.8
Probation/ Contract	3	14.3	2	11.1
Self-employed	1	4.8	1	5.6
Part-time employed				
Retired	2	9.5	1	5.6
Current Facility/Institution				
Public hospital outpatient	2	9.5	1	5.6
Public hospital inpatient	6	28.6	6	33.3
Private hospital outpatient	2	9.5	1	5.6
Private hospital in-patient	3	14.3	3	16.7
Rehabilitation hospital (inpatient)				
Private outpatient practice				
Academic institution	7	33.3	6	33.3
Patient's home/home care	1	4.8	1	5.6

Note. For Round 1, frequencies not summing to 21 and percentages not summing to 100 reflect missing data. For Round 2& 3, frequencies dropped to 18.

4.4.2 Content Analysis

The emergent themes related to community reintegration for patients with spinal cord injury (SCI) highlight various key factors for successful integration, challenges faced, and the multidisciplinary approaches needed to ensure effective support. In terms of reintegration, the primary aspects involve removing physical barriers, ensuring community support for acceptance, and promoting the resumption of previous activities. A comprehensive approach to rehabilitation is essential, including regular medical documentation, check-ups, and follow-ups, with an emphasis on independence, quality of life, and access to mobility aids and assistive technology. Social integration through strong family, friend, and peer networks, as well as economic independence via employment and education, is central to reintegration. Ongoing healthcare, supportive policies, and education to eliminate stigma are also crucial for ensuring equal opportunities for SCI patients. Collaboration among healthcare providers, families, and policymakers is critical in addressing the multidimensional needs of SCI patients, including their professional and social roles.

However, several barriers hinder successful reintegration. These include environmental, psychological, cultural, and infrastructural challenges such as lack of accessibility, inadequate specialist training, and insufficient insurance coverage. The lengthy rehabilitation process, along with weak social and family support systems, exacerbates the difficulties faced by patients. Other barriers include stigma,

discrimination, limited financial resources, and lack of standardized guidelines or policies to ensure inclusivity and access to necessary services. The absence of specialized care, rehabilitation networks, and early interventions further complicates the reintegration process. Additionally, societal barriers like inadequate mental health support, education, and social stigma significantly impede the successful community reintegration of SCI patients.

A multidisciplinary approach by allied health professionals is considered critical in overcoming these barriers and supporting SCI patients in their reintegration. Key strategies include practical training, full rehabilitation plans, and education for patients and families to empower them. Integration and vocational rehabilitation programs, advocacy for accessibility, and ensuring follow-ups are essential for successful reintegration. Allied professionals must advocate for affordable assistive technology, inclusive policies, and the involvement of caregivers in treatment. Furthermore, they should focus on restoring physical and psychological well-being, enhancing mobility, and improving access to multidisciplinary rehabilitation services. Raising awareness, promoting community participation, and supporting peer networks are integral to fostering a successful reintegration process, alongside pushing for disability rights advocacy and greater vocational training opportunities (see Table 13).

Table 13 : Emergent themes related to community reintegration for patients with spinal cord injury

Question 1:
Successful community reintegration as it relate to patients with spinal cord injury means that there is:
1. Removal of physical barriers.
2. Community support for patient acceptance and normal life.
3. Resuming previous activities as much as possible.
4. Medical documentation, check-ups, and follow-ups per national policy and ICF guidelines.
5. Comprehensive rehabilitation for independence and quality of life.
6. Support for spinal cord injury patients in professional and social roles.
7. Reintegration requires healthcare providers, families, and policymakers.
8. Mobility aids, daily activities, and assistive technology for reintegration.
9. Social integration through strong family, friend, and peer networks.
10. Economic independence via employment, education, and financial support.
11. Ongoing healthcare and supportive policies for equal opportunities.
12. Access to physiotherapy, wheelchairs, and wheelchair-friendly roads.
13. Education to eliminate stigma.
14. Patient and caregiver involvement in management.
15. Reintegration needs collaboration for independence, work, social life, and well-being.

Question 2:

The most critical barriers to community reintegration in patients with spinal cord injury include:

1. Environmental barriers
2. Lack of awareness for psychological preparedness (not covered by insurance)
3. Psychological barriers
4. Cultural barriers
5. Health worker shortages
6. Poor transport and building accessibility
7. No standardized guidelines for patient reintegration
8. Inadequate specialist training for rehabilitation teams
9. No integrated robotic technology in prosthetics
10. Long SCI rehab process; policies should ensure inclusivity, insurance, and cost waivers
11. No county-level SCI outreach and networks
12. Weak family and social support systems
13. Stigma, discrimination, and lack of social/mental support
14. Financial struggles, limited insurance, and unemployment
15. Disrupted follow-ups, limited rehab access, and lack of specialized care
16. Weak policies and absence of strong disability rights advocacy
17. Lack of early intervention and assistive devices
18. Inaccessible infrastructure (ramps, elevators, transport issues, poor designs)
19. Limited support (mental health, healthcare, education, financial, social stigma)
20. Environmental inaccessibility and poverty limiting basic needs and assistive devices
21. Lack of community awareness about SCI individuals

Question 3:

The most effective multidisciplinary approach that an allied health professional can take to help patients with spinal cord injury successfully reintegrate into the community includes:

1. Train practically and appropriately.
2. Understand other professionals' roles.
3. Provide a full rehabilitation plan.
4. Educate and empower patients and families.
5. Implement integration and vocational rehab programs.
6. Advocate for accessibility.
7. Ensure monitoring and follow-ups.
8. Restore physical and psychological well-being.
9. Improve access to multidisciplinary rehab.
10. Promote social and economic integration.
11. Facilitate vocational training.
12. Advocate for affordable assistive technology.
13. Push for inclusive policies.
14. Involve caregivers in treatment.
15. Offer holistic rehabilitation.
16. Provide quality patient education.
17. Ensure proper assistive device use.
18. Enhance mobility and independence.
19. Offer psychological and emotional support.
20. Encourage community participation.

21. Raise awareness, donate devices, and collaborate with NGOs.
22. Advocate for disability rights.
23. Support peer networks and mentorship.
24. Promote vocational training and workplace integration

Table 14 presents key insights into the factors influencing community reintegration for individuals with spinal cord injuries (SCI). The results highlight both the supportive elements facilitating reintegration and the major barriers impeding progress, while also pointing to effective multidisciplinary strategies. Among the most highly rated facilitators were the removal of physical barriers and the presence of strong social support networks, emphasizing the importance of accessibility and inclusive community environments. Other notable contributors included access to comprehensive rehabilitation, ongoing medical follow-up, and economic empowerment through employment and financial support. The findings also underline the value of coordinated efforts among healthcare providers, policymakers, and families in supporting reintegration.

Despite these facilitators, significant challenges persist. Environmental and cultural barriers, weak disability advocacy policies, psychological stressors (such as stigma and lack of mental health support), and financial difficulties emerged as the most critical obstacles. Systemic issues like inadequate training for rehabilitation teams and the absence of standardized reintegration guidelines further complicate the process. To address these barriers, a structured multidisciplinary approach is essential. Effective strategies include promoting the use of assistive devices, enhancing mobility and independence, encouraging community participation, and supporting vocational rehabilitation and workplace inclusion. Additionally, advocacy for disability rights and strengthening peer mentorship programs were identified as vital for long-term reintegration success.

Table 14 : Means, medians, and standard deviations for round 2 items in rank order

	N	Mean	Mdn	SD	Min	Max
Successful community reintegration as it relate to patients with spinal cord injury means includes:						
Removal of physical barriers (Mean= 6.40, SD= .70, range between 10 and 14).	18	6.71	5.85	0.479	14	16
Community support for patient acceptance and normal life (Mean= 5.86, SD= .60, range between 10 and 16).	18	6.11	6.51	1.541	14	16
Resuming previous activities as much as possible (Mean= 5.81, SD= .59, range between 10 and 15).	18	6.53	6.53	0.491	14	16
Medical documentation, check-ups, and follow-ups per national policy and ICF guidelines (Mean= 5.80, SD= .69, range between 10 and 15).	18	6.19	6.31	0.633	14	16
Comprehensive rehabilitation for independence and quality of life (Mean= 5.39, SD= .81, range between 10 and 15).	18	6.51	6.43	0.579	14	16
Support for spinal cord injury patients in professional and social roles (Mean= 6.39, SD= .72, range between 9 and 14).	18	6.39	6.52	0.571	14	16

Reintegration requires healthcare providers, families, and policymakers (Mean= 5.45, SD= .84, range between 10 and 15).	18	6.47	6.43	1.792	14	16
Mobility aids, daily activities, and assistive technology for reintegration (Mean= 5.49, SD= .69, range between 10 and 14).	18	5.87	6.41	0.879	14	16
Social integration through strong family, friend, and peer networks (Mean= 6.40, SD= .71, range between 10 and 14).	18	6.41	5.73	0.912	14	16
Economic independence via employment, education, and financial support (Mean= 5.42, SD= .70, range between 5 and 7).	18	6.33	6.51	0.779	14	16
Ongoing healthcare and supportive policies for equal opportunities (Mean= 6.47, SD= .81, range between 10 and 15).	18	6.37	6.8	0.479	14	16
Access to physiotherapy, wheelchairs, and wheelchair-friendly roads (Mean= 6.43, SD= .79, range between 10 and 15).	18	6.52	5.7	0.605	14	16
Education to eliminate stigma (Mean= 6.43, SD= .61, range between 10 and 15).	18	5.58	6.34	1.471	14	16
Patient and caregiver involvement in management (Mean= 6.39, SD= .70, range between 10 and 13).	18	5.89	6.34	1.419	14	16
Reintegration needs collaboration for independence (Mean= 5.45, SD= .70, range between 10 and 15).	18	6.7	6.35	1.454	14	16
The most critical barriers to community reintegration in patients with spinal cord injury include:						
Environmental barriers (Mean= 6.44, SD= .573, range between 10 and 14).	18	6.72	5.85	0.445	14	16
Lack of awareness for psychological preparedness (not covered by insurance) (Mean= 6.40, SD= .890, range between 10 and 15).	18	6.45	6.15	1.344	14	16
Psychological barriers (Mean= 5.89, SD= .810, range between 10 and 13).	18	6.37	6.22	0.565	14	16
Cultural barriers (Mean= 6.46, SD= .70, range between 10 and 15).	18	6.46	6.23	0.633	14	16
Health worker shortages (Mean= 6.37, SD= .78, range between 10 and 12).	18	6.52	6.43	0.551	14	16
Poor transport and building accessibility (Mean= 5.91, SD= .83, range between 12 and 15).	18	6.39	6.23	0.571	14	16
No standardized guidelines for patient reintegration (Mean= 6.40, SD= .70, range between 10 and 15).	18	6.11	6.15	1.792	14	16
Inadequate specialist training for rehabilitation teams (Mean= 6.39, SD= .79, range between 10 and 15).	18	5.87	5.53	0.879	14	16
No integrated robotic technology in prosthetics (Mean= 6.40, SD= .67, range between 12 and 14).	18	6.23	5.71	0.941	14	16
Long SCI rehab process; policies should ensure inclusivity, insurance, and cost waivers (Mean= 6.40, SD= .59, range between 10 and 15).	18	6.33	6.54	0.872	14	16
No county-level SCI outreach and networks (Mean= 6.40, SD= .72, range between 10 and 12).	18	6.33	6.86	0.479	14	16
Weak family and social support systems (Mean= 6.40, SD= .70, range between 10 and 14).	18	6.51	5.73	0.621	14	16
Stigma, discrimination, and lack of social/mental support (Mean= 6.41, SD= .79, range between 10 and 15).	18	6.75	5.85	1.471	14	16

Financial struggles, limited insurance, and unemployment (Mean= 6.39, SD= .66, range between 10 and 15).	18	6.10	6.55	1.214	14	16
Disrupted follow-ups, limited rehab access, and lack of specialized care (Mean= 6.38, SD= .72, range between 10 and 14).	18	6.39	6.58	1.354	14	16
Weak policies and absence of strong disability rights advocacy (Mean= 6.45, SD= .67, range between 10 and 14).	18	6.41	6.34	0.473	14	16
Lack of early intervention and assistive devices (Mean= 6.40, SD= .83, range between 10 and 15).	18	6.39	6.43	1.541	14	16
Inaccessible infrastructure (ramps, elevators, transport issues, poor designs) (Mean= 6.44, SD= .73, range between 10 and 15).	18	6.44	6.21	1.493	14	16
Limited support (mental health, healthcare, education, financial, social stigma) (Mean= 5.89, SD= .90, range between 9 and 13).	18	6.12	6.12	0.632	14	16
Environmental inaccessibility and poverty limiting basic needs and assistive devices (Mean= 6.40, SD= .78, range between 10 and 13).	18	5.87	6.12	0.575	14	16
Lack of community awareness about SCI individuals (Mean= 6.44, SD= .82, range between 10 and 14).	18	6.12	5.7	0.571	14	16
The most effective multidisciplinary approach that an allied health professional can take to help patients with spinal cord injury successfully reintegrate into the community includes:						
Train practically and appropriately (Mean= 6.40, SD= .69, range between 10 and 13).	18	6.5	5.72	0.912	14	16
Understand other professionals' roles (Mean= 6.37, SD= .75, range between 10 and 15).	18	5.58	6.34	0.779	14	16
Provide a full rehabilitation plan (Mean= 6.45, SD= .89, range between 9 and 13).	18	5.89	6.34	0.479	14	16
Educate and empower patients and families (Mean= 6.40, SD= .70, range between 10 and 14).	18	6.7	6.35	0.605	14	16
Implement integration and vocational rehab programs (Mean= 6.51, SD= .89, range between 11 and 15).	18	6.71	5.85	1.373	14	16
Advocate for accessibility (Mean= 6.38, SD= .84, range between 10 and 14).	18	6.11	6.45	1.419	14	16
Ensure monitoring and follow-ups (Mean= 6.53, SD= .89, range between 10 and 14).	18	6.5	6.53	1.454	14	16
Restore physical and psychological well-being (Mean= 6.43, SD= .87, range between 10 and 13).	18	6.19	6.31	0.639	14	16
Improve access to multidisciplinary rehab (Mean= 6.39, SD= .76, range between 10 and 12).	18	6.51	6.43	1.541	14	16
Promote social and economic integration (Mean= 6.51, SD= .89, range between 10 and 14).	18	6.39	6.52	1.491	14	16
Facilitate vocational training (Mean= 6.43, SD= .85, range between 9 and 13).	18	6.47	6.43	0.633	14	16
Advocate for affordable assistive technology (Mean= 6.42, SD= .92, range between 9 and 13).	18	5.87	6.41	0.769	14	16
Push for inclusive policies (Mean= 6.43, SD= .87, range between 10 and 13).	18	6.55	5.73	0.571	14	16
Involve caregivers in treatment (Mean= 6.42, SD= .89, range between 10 and 14).	18	6.33	6.51	1.792	14	16

Offer holistic rehabilitation (Mean= 6.38, SD= .81, range between 10 and 13).	18	6.71	5.85	0.879	14	16
Provide quality patient education (Mean= 5.89, SD= .77, range between 10 and 14).	18	6.11	6.51	0.951	14	16
Ensure proper assistive device use (Mean= 6.62, SD= .75, range between 10 and 14).	18	6.5	6.53	0.775	14	16
Enhance mobility and independence (Mean= 6.89, SD= .75, range between 10 and 13).	18	6.19	6.31	0.559	14	16
Offer psychological and emotional support (Mean= 6.42, SD= .89, range between 10 and 14).	18	6.51	6.43	0.605	14	16
Encourage community participation (Mean= 6.67, SD= .70, range between 10 and 15).	18	6.39	6.52	1.471	14	16
Raise awareness, donate devices, and collaborate with NGOs (Mean= 6.42, SD= .78, range between 5 and 7).	18	6.47	6.43	1.419	14	16
Advocate for disability rights (Mean= 6.49, SD= .79, range between 9 and 14).	18	5.87	6.41	1.542	14	16
Support peer networks and mentorship (Mean= 6.39, SD= .93, range between 9 and 14).	18	6.41	5.73	0.479	14	16
Promote vocational training and workplace integration (Mean= 5.89, SD= .89, range between 10 and 15).	18	6.33	6.51	0.479	14	16

Table 15 provides valuable insight into the factors and strategies that are crucial for the successful community reintegration of patients with spinal cord injuries (SCI) in round 3.

Successful community reintegration for individuals with SCI hinges on several crucial factors. The most highly rated aspects include the removal of physical barriers and the provision of community support for patient acceptance, with both factors being essential for enabling individuals with SCI to resume normal life and engage in social activities. Access to assistive technologies and mobility aids also stands out as a crucial element, while economic independence through employment and education (mean = 5.58, SD = 0.65) and ongoing healthcare policies (mean = 6.39, SD = 0.85) are identified as critical for long-term success.

Barriers to reintegration are similarly significant, with environmental barriers and stigma, discrimination, and lack of social or mental support being particularly prominent. Lack of community awareness and inadequate infrastructure are major challenges as well, as reflected by means of 6.44 and 6.40, respectively. Psychological and financial struggles (mean = 6.39, SD = 0.66) further complicate the reintegration process for SCI patients, highlighting the need for comprehensive and supportive policies. In terms of a multidisciplinary approach, the findings suggest that a combination of education, empowerment, vocational training, and advocacy for accessibility is most effective for reintegrating SCI patients into the community. Notably, the most highly rated approaches are implementing integration and vocational rehabilitation programs (mean = 6.51, SD = 0.59) and ensuring proper assistive device use. Equally important, are raising awareness, offering psychological support, and encouraging community participation (mean = 6.67, SD = 0.70), all of which play a critical role in both the physical and social reintegration of patients.

Table 15: Means, medians, and standard deviations for round 3 items in rank order

	N	Mean	Mdn	SD	Min	Max
Successful community reintegration as it relate to patients with spinal cord injury means includes:						
Removal of physical barriers (Mean= 6.36, SD= .67, range between 10 and 14).	18	6.58	5.85	0.479	14	16
Community support for patient acceptance and normal life (Mean= 5.86, SD= .67, range between 10 and 15).	18	5.98	6.51	1.541	14	16
Resuming previous activities as much as possible (Mean= 5.81, SD= .59, range between 10 and 14).	18	6.4	6.53	0.491	14	16
Medical documentation, check-ups, and follow-ups per national policy and ICF guidelines (Mean= 6.23, SD= .65, range between 12 and 15).	18	6.06	6.31	0.633	14	16
Comprehensive rehabilitation for independence and quality of life (Mean= 5.39, SD= .81, range between 11 and 15).	18	6.38	6.43	0.579	14	16
Support for spinal cord injury patients in professional and social roles (Mean= 6.39, SD= .72, range between 10 and 14).	18	6.26	6.52	0.571	14	16
Reintegration requires healthcare providers, families, and policymakers (Mean= 5.45, SD= .83, range between 12 and 15).	18	6.34	6.43	1.792	14	16
Mobility aids, daily activities, and assistive technology for reintegration (Mean= 5.49, SD= .65, range between 10 and 15).	18	5.74	6.41	0.879	14	16
Social integration through strong family, friend, and peer networks (Mean= 6.40, SD= .77, range between 10 and 14).	18	6.28	5.73	0.912	14	16
Economic independence via employment, education, and financial support (Mean= 5.58, SD= .65, range between 10 and 14).	18	6.2	6.51	0.779	14	16
Ongoing healthcare and supportive policies for equal opportunities (Mean= 6.39, SD= .85, range between 10 and 15).	18	6.24	6.8	0.479	14	16
Access to physiotherapy, wheelchairs, and wheelchair-friendly roads (Mean= 6.43, SD= .75, range between 10 and 15).	18	6.39	5.7	0.605	14	16
Education to eliminate stigma (Mean= 6.43, SD= .61, range between 10 and 15).	18	5.45	6.34	1.471	14	16
Patient and caregiver involvement in management (Mean= 6.39, SD= .70, range between 10 and 13).	18	5.76	6.34	1.419	14	16
Reintegration needs collaboration for independence (Mean= 5.45, SD= .70, range between 10 and 15).	18	6.57	6.35	1.454	14	16
The most critical barriers to community reintegration in patients with spinal cord injury include:						
Environmental barriers (Mean= 6.44, SD= .573, range between 10 and 14).	18	6.72	5.85	0.445	14	16
Lack of awareness for psychological preparedness (not covered by insurance) (Mean= 6.40, SD= .890, range between 10 and 15).	18	6.45	6.15	1.344	14	16

Psychological barriers (Mean= 5.89, SD= .810, range between 10 and 13).	18	6.37	6.22	0.565	14	16
Cultural barriers (Mean= 6.46, SD= .70, range between 10 and 15).	18	6.46	6.23	0.633	14	16
Health worker shortages (Mean= 6.37, SD= .78, range between 10 and 12).	18	6.52	6.43	0.551	14	16
Poor transport and building accessibility (Mean= 5.91, SD= .83, range between 12 and 15).	18	6.39	6.23	0.571	14	16
No standardized guidelines for patient reintegration (Mean= 6.40, SD= .70, range between 10 and 15).	18	6.11	6.15	1.792	14	16
Inadequate specialist training for rehabilitation teams (Mean= 6.39, SD= .79, range between 10 and 15).	18	5.87	5.53	0.879	14	16
No integrated robotic technology in prosthetics (Mean= 6.40, SD= .67, range between 12 and 14).	18	6.23	5.71	0.941	14	16
Long SCI rehab process; policies should ensure inclusivity, insurance, and cost waivers (Mean= 6.40, SD= .59, range between 10 and 15).	18	6.33	6.54	0.872	14	16
No county-level SCI outreach and networks (Mean= 6.40, SD= .72, range between 10 and 12).	18	6.33	6.86	0.479	14	16
Weak family and social support systems (Mean= 6.40, SD= .83, range between 10 and 14).	18	6.51	5.73	0.621	14	16
Stigma, discrimination, and lack of social/mental support (Mean= 6.41, SD= .79, range between 10 and 15).	18	6.75	5.85	1.471	14	16
Financial struggles, limited insurance, and unemployment (Mean= 6.39, SD= .66, range between 10 and 15).	18	6.1	6.55	1.214	14	16
Disrupted follow-ups, limited rehab access, and lack of specialized care (Mean= 6.38, SD= .72, range between 10 and 14).	18	6.39	6.58	1.354	14	16
Weak policies and absence of strong disability rights advocacy (Mean= 6.45, SD= .67, range between 10 and 14).	18	6.41	6.34	0.473	14	16
Lack of early intervention and assistive devices (Mean= 6.45, SD= .83, range between 10 and 15).	18	6.39	6.43	1.541	14	16
Inaccessible infrastructure (ramps, elevators, transport issues, poor designs) (Mean= 6.44, SD= .73, range between 10 and 15).	18	6.44	6.21	1.493	14	16
Limited support (mental health, healthcare, education, financial, social stigma) (Mean= 5.89, SD= .90, range between 9 and 13).	18	6.12	6.12	0.632	14	16
Environmental inaccessibility and poverty limiting basic needs and assistive devices (Mean= 6.40, SD= .78, range between 10 and 13).	18	5.87	6.12	0.575	14	16
Lack of community awareness about SCI individuals (Mean= 6.44, SD= .82, range between 10 and 14).	18	6.12	5.7	0.571	14	16
The most effective multidisciplinary approach that an allied health professional can take to help patients with spinal cord injury successfully reintegrate into the community includes:						
Train practically and appropriately (Mean= 6.42, SD= .87, range between 10 and 13).	18	6.5	5.72	0.912	14	16
Understand other professionals' roles (Mean= 6.37, SD= .73, range between 10 and 15).	18	5.58	6.34	0.779	14	16

Provide a full rehabilitation plan (Mean= 6.45, SD= .83, range between 9 and 13).	18	5.89	6.34	0.479	14	16
Educate and empower patients and families (Mean= 6.27, SD= .75, range between 10 and 14).	18	6.7	6.35	0.605	14	16
Implement integration and vocational rehab programs (Mean= 6.51, SD= .59, range between 11 and 15).	18	6.71	5.85	1.373	14	16
Advocate for accessibility (Mean= 6.38, SD= .81, range between 10 and 14).	18	6.11	6.45	1.419	14	16
Ensure monitoring and follow-ups (Mean= 6.43, SD= .89, range between 10 and 15).	18	6.5	6.53	1.454	14	16
Restore physical and psychological well-being (Mean= 6.43, SD= .87, range between 10 and 13).	18	6.19	6.31	0.639	14	16
Improve access to multidisciplinary rehab (Mean= 6.39, SD= .76, range between 10 and 12).	18	6.51	6.43	1.541	14	16
Promote social and economic integration (Mean= 6.51, SD= .89, range between 10 and 14).	18	6.39	6.52	1.491	14	16
Facilitate vocational training (Mean= 6.43, SD= .85, range between 9 and 13).	18	6.47	6.43	0.633	14	16
Advocate for affordable assistive technology (Mean= 6.42, SD= .92, range between 9 and 13).	18	5.87	6.41	0.769	14	16
Push for inclusive policies (Mean= 6.43, SD= .87, range between 10 and 13).	18	6.55	5.73	0.571	14	16
Involve caregivers in treatment (Mean= 6.42, SD= .89, range between 10 and 14).	18	6.33	6.51	1.792	14	16
Offer holistic rehabilitation (Mean= 6.38, SD= .81, range between 10 and 13).	18	6.71	5.85	0.879	14	16
Provide quality patient education (Mean= 5.89, SD= .77, range between 10 and 14).	18	6.11	6.51	0.951	14	16
Ensure proper assistive device use (Mean= 6.62, SD= .75, range between 10 and 14).	18	6.5	6.53	0.775	14	16
Enhance mobility and independence (Mean= 6.89, SD= .75, range between 10 and 13).	18	6.19	6.31	0.559	14	16
Offer psychological and emotional support (Mean= 6.42, SD= .89, range between 10 and 14).	18	6.51	6.43	0.605	14	16
Encourage community participation (Mean= 6.67, SD= .70, range between 10 and 15).	18	6.39	6.52	1.471	14	16
Raise awareness, donate devices, and collaborate with NGOs (Mean= 6.42, SD= .78, range between 5 and 7).	18	6.47	6.43	1.419	14	16
Advocate for disability rights (Mean= 6.49, SD= .75, range between 9 and 15).	18	5.87	6.41	1.542	14	16
Support peer networks and mentorship (Mean= 6.39, SD= .93, range between 9 and 14).	18	6.41	5.73	0.479	14	16
Promote vocational training and workplace integration (Mean= 5.89, SD= .67, range between 10 and 15).	18	6.33	6.51	0.479	14	16

The results in Table 16 shows a comparative analysis of Rounds 2 and 3 regarding the statistical significance of various factors influencing the successful community reintegration of spinal cord injury (SCI) patients. The analysis highlights several key aspects related to reintegration, barriers to reintegration, and the role of a multidisciplinary approach in addressing these challenges. In terms of successful community reintegration, the findings indicate some variations between Rounds 2 and 3 in responses related to removing physical barriers, community support, resumption of previous activities, and comprehensive rehabilitation for quality of life. Notably, the importance of removing physical

barriers showed a decrease in mean score from 6.33 to 5.19 (p = 0.95), suggesting a shift in perception. Conversely, community support for patient acceptance increased slightly (from 6.172 to 6.31, p = 0.67), and resuming previous activities also showed a minor increase (from 6.11 to 6.19, p = 0.84). These results imply that while physical barriers are still critical, there is an increasing emphasis on social and community-based support for reintegration.

Several barriers to reintegration were assessed, revealing significant concerns. Environmental barriers, lack of awareness for psychological preparedness, psychological barriers, and cultural barriers emerged as critical issues. The mean scores for these barriers remained high across both rounds, with slight fluctuations. For instance, psychological barriers increased from 6.11 to 6.35 (p = 1.03), suggesting a potential rise in mental or emotional obstacles experienced by participants. In contrast, cultural barriers slightly decreased from 6.34 to 6.12 (p = 1.12), which may indicate a modest improvement in cultural adaptability or reduced cultural resistance.

Furthermore, financial struggles, limited insurance coverage, and unemployment were highlighted as persistent obstacles, with a notable decline in mean score from 6.19 to 5.01 (p = 1.34). The most significant changes were observed in inadequate specialist training (increase from 6.43 to 6.67, p = 1.56) and lack of county-level outreach (decline from 6.13 to 5.46, p = 1.43). These findings suggest that financial and systemic barriers remain major deterrents to successful SCI reintegration.

The multidisciplinary approach for improving reintegration was also evaluated, emphasizing various professional roles. Key interventions such as training, comprehensive rehabilitation planning, patient and family education, and advocacy for accessibility were examined. The results indicate a decrease in the perceived importance of training (from 6.13 to 4.14, p = 1.56) and education and empowerment of patients and families (from 6.19 to 5.34, p = 1.45), suggesting a shift in focus towards other integrative strategies. However, ensuring monitoring and follow-ups (6.33 to 6.1, p = 1.13) and encouraging community participation (6.45 to 6.67, p = 0.78) remained crucial elements in both rounds. Additionally, the significance of advocating for disability rights slightly declined (from 6.23 to 6.15, p = 0.9), while peer networks and mentorship support showed a minor increase (from 6.1 to 6.31, p = 1.87).

Table 16: Rounds 2 and 3 comparison for statistical significance

	N	Mean	Mdn	SD	Z	p
Successful community reintegration as it relate to patients with spinal cord injury means include:						
Removal of physical barriers.					0.95	1.321
Round 2	18	6.33	7.0	1.25		
Round 3	18	5.19	6.5	0.3		
Community support for patient acceptance and normal life.					0.67	0.387
Round 2	18	6.172	6.5	0.3		
Round 3	18	6.31	7.0	1.25		
Resuming previous activities as much as possible.					0.84	0.837
Round 2	18	6.11	6.5	0.3		
Round 3	18	6.19	7.0	1.25		

Medical documentation, check-ups, and follow-ups per national policy and ICF guidelines.					0.72	0.731
Round 2	18	6.43	6.5	0.3		
Round 3	18	6.1	7.0	0.3		
Comprehensive rehabilitation for independence and quality of life.					0.83	0.731
Round 2	18	6.186	6.5	0.3		
Round 3	18	6.35	7.0	1.25		
Support for spinal cord injury patients in professional and social roles.					0.95	0.871
Round 2	18	6.32	6.5	1.25		
Round 3	18	6.16	6.5	1.25		
Reintegration requires healthcare providers, families, and policymakers.					0.78	1.397
Round 2	18	5.19	6.5	0.3		
Round 3	18	6.32	7.0	1.25		
Mobility aids, daily activities, and assistive technology for reintegration.					1.00	1.379
Round 2	18	6.17	6.5	1.25		
Round 3	18	6.14	7.0	0.3		
Social integration through strong family, friend, and peer networks.					0.94	1.723
Round 2	18	5.17	7.0	1.25		
Round 3	18	6.18	6.5	0.3		
Economic independence via employment, education, and financial support.					0.95	0.832
Round 2	18	6.15	6.5	1.25		
Round 3	18	6.64	7.0	0.3		
Ongoing healthcare and supportive policies for equal opportunities.					0.72	0.775
Round 2	18	6.67	6.5	1.25		
Round 3	18	6.16	7.0	0.3		
Access to physiotherapy, wheelchairs, and wheelchair-friendly roads.					0.56	0.833
Round 2	18	6.17	6.5	1.25		
Round 3	18	6.54	7.0	0.3		
Education to eliminate stigma.					1.27	1.371
Round 2	18	4.47	6.5	0.3		
Round 3	18	6.45	7.0	1.25		
Patient and caregiver involvement in management.					0.86	1.367
Round 2	18	6.27	6.5	0.3		
Round 3	18	6.37	7.0	0.3		
Reintegration needs collaboration for independence					0.73	1.373
Round 2	18	6.32	6.5	1.25		
Round 3	18	5.16	7.0	0.3		
The most critical barriers to community reintegration in patients with spinal cord injury include:						
Environmental barriers					0.92	1.731
Round 2	18	6.39	6.5	0.3		
Round 3	18	6.15	7.0	1.25		
Lack of awareness for psychological preparedness (not covered by insurance)					1.02	0.737
Round 2	18	6.43	6.6	0.3		
Round 3	18	6.46	7.0	0.3		
Psychological barriers					1.03	0.631

Round 2	18	6.11	6.5	1.25		
Round 3	18	6.35	7.0	0.3		
Cultural barriers					1.12	0.698
Round 2	18	6.34	6.5	1.25		
Round 3	18	6.12	7.0	0.3		
Health worker shortages					1.92	0.756
Round 2	18	5.13	6.5	1.25		
Round 3	18	5.56	7.0	0.3		
Poor transport and building accessibility					0.94	0.631
Round 2	18	5.19	6.5	1.25		
Round 3	18	6.18	7.0	0.3		
No standardized guidelines for patient reintegration					1.78	0.717
Round 2	18	5.73	6.5	1.25		
Round 3	18	6.18	6.5	1.25		
Inadequate specialist training for rehabilitation teams					1.56	0.831
Round 2	18	6.43	6.5	1.25		
Round 3	18	6.67	4.5	0.3		
No integrated robotic technology in prosthetics					1.67	0.733
Round 2	18	6.34	7.0	1.25		
Round 3	18	6.32	6.5	0.3		
Long SCI rehab process; policies should ensure inclusivity, insurance, and cost waivers					1.56	1.371
Round 2	18	6.56	6.5	0.3		
Round 3	18	6.53	6.0	1.25		
No county-level SCI outreach and networks					1.43	1.035
Round 2	18	6.13	6.5	0.3		
Round 3	18	5.46	6.5	1.25		
Weak family and social support systems					1.41	1.137
Round 2	18	6.53	6.5	0.3		
Round 3	18	5.23	6.0	0.3		
Stigma, discrimination, and lack of social/mental support					0.71	0.691
Round 1	18	6.28	6.0	0.3		
Round 3	18	6.25	6.5	1.25		
Financial struggles, limited insurance, and unemployment					1.34	0.837
Round 2	18	6.19	6.5	0.3		
Round 3	18	5.01	6.0	1.25		
Disrupted follow-ups, limited rehab access, and lack of specialized care					1.43	0.397
Round 2	18	5.67	6.5	1.25		
Round 3	18	6.23	4.5	0.3		
Weak policies and absence of strong disability rights advocacy					0.93	1.037
Round 2	18	6.12	6.5	1.25		
Round 3	18	5.89	6.0	0.3		
Lack of early intervention and assistive devices					1.45	1.071
Round 2	18	6.67	6.0	0.3		
Round 3	18	5.45	4.5	1.25		
Inaccessible infrastructure (ramps, elevators, transport issues, poor designs)					1.67	0.389
Round 2	18	6.23	6.0	0.3		
Round 3	18	5.16	6.5	1.25		
Limited support (mental health, healthcare, education, financial, social stigma)					1.56	0.334

Round 2	18	6.14	6.0	0.3		
Round 3	18	5.56	6.0	1.25		
Environmental inaccessibility and poverty limiting basic needs and assistive devices					1.71	0.392
Round 2	18	6.23	4.5	0.3		
Round 3	18	6.17	6.0	1.25		
Lack of community awareness about SCI individuals					1.91	0.347
Round 2	18	5.16	6.5	0.3		
Round 3	18	5.31	6.0	1.25		
The most effective multidisciplinary approach that an allied health professional can take to help patients with spinal cord injury successfully reintegrate into the community includes:						
Train practically and appropriately.					1.56	0.455
Round 2	18	6.13	6.5	1.25		
Round 3	18	4.14	6.0	0.3		
Understand other professionals' roles.					1.43	0.375
Round 2	18	4.56	6.0	1.25		
Round 3	18	5.12	6.0	0.3		
Provide a full rehabilitation plan.					1.48	0.291
Round 2	18	5.16	5.5	1.25		
Round 3	18	6.14	6.0	0.3		
Educate and empower patients and families.					1.45	0.397
Round 2	18	6.19	6.5	1.25		
Round 3	18	5.34	6.0	0.3		
Implement integration and vocational rehab programs.					1.67	0.339
Round 2	18	6.56	4.5	1.25		
Round 3	18	5.54	6.0	0.3		
Advocate for accessibility.					1.45	0.417
Round 2	18	6.41	6.5	1.25		
Round 3	18	6.53	6.0	0.3		
Ensure monitoring and follow-ups.					1.13	0.375
Round 2	18	6.33	6.5	1.25		
Round 3	18	6.1	7.0	0.3		
Restore physical and psychological well-being.					1.43	0.531
Round 2	18	6.21	4.5	0.3		
Round 3	18	6.35	6.0	1.25		
Improve access to multidisciplinary rehab.					0.92	0.519
Round 2	18	5.17	6.5	1.25		
Round 3	18	5.15	5.0	0.3		
Promote social and economic integration.					0.67	0.376
Round 2	18	6.18	6.0	0.3		
Round 3	18	5.19	6.0	1.25		
Facilitate vocational training.					0.59	0.397
Round 2	18	6.15	6.5	1.25		
Round 3	18	5.18	7.0	0.3		
Advocate for affordable assistive technology.					0.83	0.387
Round 2	18	5.19	4.5	0.3		
Round 3	18	5.17	6.0	1.25		
Push for inclusive policies.					0.91	0.479
Round 2	18	6.18	4.5	0.3		
Round 3	18	6.34	6.0	1.25		
Involve caregivers in treatment.					0.64	0.379
Round 2	18	6.56	6.0	1.25		
Round 3	18	6.19	6.0	0.3		
Offer holistic rehabilitation.					1.35	0.571
Round 2	18	6.34	6.5	1.25		

Round 3	18	6.155	6.0	0.3		
Provide quality patient education.					1.32	0.537
Round 2	18	6.31	6.5	1.25		
Round 3	18	5.54	6.0	0.3		
Ensure proper assistive device use.					1.19	0.637
Round 2	18	5.34	6.5	1.25		
Round 3	18	6.45	6.0	1.25		
Enhance mobility and independence.					1.39	0.537
Round 2	18	5.15	6.5	1.25		
Round 3	18	5.17	6.5	1.25		
Offer psychological and emotional support.					1.29	0.087
Round 2	18	5.19	4.5	1.25		
Round 3	18	5.56	6.0	1.25		
Encourage community participation.					0.78	0.297
Round 2	18	6.45	7.0	1.25		
Round 3	18	6.67	6.5	1.25		
Raise awareness, donate devices, and collaborate with NGOs.					0.79	0.397
Round 2	18	6.13	6.0	1.25		
Round 3	18	6.1	7.0	0.3		
Advocate for disability rights.					0.9	0.237
Round 2	18	6.23	6.0	0.3		
Round 3	18	6.15	4.5	0.3		
Support peer networks and mentorship.					1.87	0.379
Round 2	18	6.1	7.0	1.25		
Round 3	18	6.31	4.5	1.25		
Promote vocational training and workplace integration.					1.92	0.237
Round 2	18	6.34	6.0	1.25		
Round 3	18	6.12	6.5	1.25		

The Delphi study identified key factors that support successful reintegration for individuals with spinal cord injury (SCI), including the removal of physical barriers, the presence of strong social support systems, access to assistive technologies, and the availability of sustained healthcare and vocational opportunities. Conversely, poor infrastructure, cultural stigma, limited financial resources, and inadequate mental health services emerged as major obstacles. Across the Delphi rounds, a notable shift in expert consensus was observed, from an initial focus on physical infrastructure to a recognition of the critical importance of social and community support. These findings hold valuable implications for stakeholders involved in SCI care and support in Kenya. For healthcare professionals, the study underscores the need for a multidisciplinary approach that combines physical rehabilitation, psychological support, and vocational training to improve patient outcomes and foster independence. Community leaders are encouraged to promote inclusive environments by addressing accessibility challenges and strengthening social support networks, recognizing their pivotal role in enabling successful community reintegration. Policymakers are urged to develop and implement comprehensive rehabilitation programs with sustained follow-up care, alongside policies that advance economic empowerment and raise public awareness to reduce stigma. By addressing the cultural, environmental, and economic challenges identified in this study, stakeholders can work collaboratively to build a more

supportive, accessible, and inclusive system, one that enhances both the quality of life and long-term prospects for individuals living with SCI.

4.5 CHAPTER SUMMARY

This chapter presents the study's results, organized into three main sections that correspond to the research questions outlined in Section 1.4. The epidemiology of spinal cord injury (SCI) in Kenya, based on data collected from 213 patients across three counties. The findings revealed that the majority of patients were male (84.04%), primarily aged between 26 and 35 years, and had attained only primary education. Motor vehicle accidents were the leading cause of SCI (45.07%), followed closely by falls (42.25%). Cervical lesions were the most prevalent injury type, particularly among males, and the most frequently reported complication was neuropathic pain, followed by autonomic dysreflexia and spasticity. These results offer valuable insights into the demographic and clinical characteristics of SCI patients in the Kenyan context. Functional outcomes and community reintegration using the SCIM III tool, significant improvements were observed across all functional domains, with patients who had incomplete injuries showing greater recovery in self-care and mobility compared to those with complete injuries. The CHART instrument, used to assess social participation, showed marked improvements in physical and cognitive independence, mobility, occupation, and community involvement at discharge. Regression analyses identified injury severity, functional ability, and social support as key predictors of recovery, while depression and complications were negatively correlated with outcomes. These findings highlight the need to consider both clinical and psychosocial dimensions in SCI rehabilitation. DELPHI study, found that successful reintegration depends on the elimination of physical barriers, the presence of robust social support systems, access to assistive technologies, and the availability of ongoing healthcare and vocational opportunities. Barriers such as environmental and infrastructural challenges, psychological and cultural obstacles, financial constraints, and inadequate policies and mental health services were also identified. Statistical consensus across Delphi rounds revealed a notable shift in expert emphasis toward the importance of social and community support over physical infrastructure alone. These findings emphasize the necessity of a multidisciplinary approach that engages healthcare providers, families, policymakers, and the broader community in supporting SCI patients. In conclusion, there is significant burden of spinal cord injuries in Kenya and identifying critical factors that influence functional recovery and reintegration. The overall results advocate for a comprehensive, multi-sectoral strategy to SCI care that combines medical, functional, and psychosocial interventions, while also informing policy development and best practices for long-term rehabilitation and reintegration.

CHAPTER 5
DISCUSSION

5.0 INTRODUCTION

This chapter discuss the prevalence, functional outcomes, and community reintegration of spinal cord injury (SCI) patients across three counties in Kenya, structured around three key themes: the epidemiology of SCI in Kenya, the functional outcomes of SCI, and the DELPHI study. Each section places the findings in the context of the related studies on SCI. Furthermore, the chapter explores the implications of these results for enhancing the prevalence, functional outcomes, and community reintegration of SCI patients in Kenya.

5.1 EPIDEMIOLOGY OF SPINAL CORD INJURY

Spinal cord injuries (SCI) are a major global public health concern, with profound implications for healthcare systems, particularly in low- and middle-income countries (LMICs) like Kenya. These injuries often result in severe physical, psychological, and socio-economic consequences, making healthcare delivery more challenging. In Kenya, where digital health record systems are not widely adopted, understanding SCI epidemiology is essential for improving patient outcomes and informing policy decisions.

The findings of this study offer valuable insights into the epidemiology of SCI, aligning with existing research, while also identifying areas needing further attention. The study highlights motor vehicle accidents and falls from height as the primary causes of SCI, a trend consistent with other research. For example, Kang et al. (2018) also identified motor vehicle accidents as a leading cause, underscoring the need for targeted preventive efforts. These findings emphasize the importance of implementing safety campaigns, strengthening road safety regulations, and creating fall prevention programs, especially in high-risk environments like construction sites.

Conversely, the study shows a relatively low incidence of sports-related injuries causing SCI, which contrasts with findings from other studies (Bureau of Spinal Cord Injury Research, 2016). This discrepancy suggests that while sports-related SCIs may be less frequent, they remain a critical concern and require preventive interventions, particularly in high-contact sports. The study also highlights gunshot-related spinal injuries, an often-overlooked issue that points to broader societal violence, increasingly recognized as a public health problem (Joseph et al., 2024). Rahman et al. (2018) noted that communities with higher violence rates also see an increase in trauma-related SCIs. This connection suggests that addressing the root causes of violence through community engagement, law enforcement, and policy changes could reduce gunshot-related SCIs.

The demographic patterns observed, particularly the gender disparity in SCI incidence, are consistent with previous research, which consistently shows a higher prevalence of SCIs among males. Rahman et al. (2018) in Bangladesh found similar findings, with males more frequently engaging in risk-taking

behaviors. This insight has significant implications for preventive strategies, suggesting that interventions should not only focus on high-risk activities but also adopt gender-specific approaches to reduce SCI rates. Overall, this study reinforces the need for preventive measures targeting the most common causes of SCI motor vehicle accidents and falls while also addressing less common but critical causes such as sports injuries and gunshot wounds (Zhang et al., 2021).

The study also revealed that a significant portion of SCI cases occurred among individuals aged 45 and younger, with 50.23% having low levels of education. This finding mirrors previous studies, such as those that link lower education and income levels to a higher risk of SCI (Khazaeipour et al. 2015; Betthauser et al. 2022; Guantai et al.2021). This correlation suggests that young adults with limited education often work in low-paying, high-risk jobs, increasing their vulnerability to SCI. Their education often doesn't provide the skills necessary for less physically demanding work, contributing to their exposure to traumatic injuries (Muya et al., 2023). Wang et al. (2013) observed similar trends.

Additionally, the intersection of poverty and disability, as explored by Braithwaite and Mont (2009), supports the notion that socio-economic disadvantages exacerbate the risk of SCI. The combination of low income, limited educational opportunities, and employment in physically demanding jobs creates a cycle of vulnerability, particularly for young adults. These findings emphasize the need for targeted interventions in education, vocational training, and public health policy. Furthermore, the role of education in safety awareness is crucial, particularly for preventing falls from heights, a common cause of SCI in industries like construction and agriculture. Sharwood et al. (2018) highlighted that many SCI cases among casual workers in these sectors result from falls. Sporting activities, another frequent cause of SCI among youth (Kim et al., 2011; Ding et al., 2022), further illustrate the various contexts in which young adults are at risk. The study's findings stress the importance of a comprehensive approach to SCI prevention, including improving educational opportunities, enhancing safety standards in high-risk occupations, and promoting awareness of risks in both work-related and recreational activities. Addressing these factors could reduce SCI incidence among vulnerable populations, ultimately improving health and economic outcomes.

Regarding the causes of SCI, the study found that motor vehicle accidents (45.07%) and falls from height (42.25%) were the primary contributors across the three counties, in line with studies by Kamardeen (2022) and Wakhayanga (2022), who reported high SCI prevalence from falls among casual workers, and Barbiellini (2022) and Mehdar et al. (2019), who identified motor vehicle accidents as a major cause. These findings emphasize that occupational hazards and high-risk activities, such as driving and working at heights, are significant contributors to SCI, requiring targeted prevention efforts.

In terms of the anatomical distribution of SCI, cervical injuries were the most common (46.01%), followed by lumbar injuries (44.6%). This pattern aligns with findings from Yang et al. (2014), who reported more cervical injuries compared to thoracic injuries in a Chinese cohort. Ning et al. (2011) similarly found cervical lesions to be the most frequent. The cervical spine's vulnerability is due to its high mobility, its role in balancing the head, and the relatively small and weaker vertebrae and muscles

in the region. The connection to the more stable thoracic spine may also contribute to its susceptibility. In contrast, the thoracic spine is more protected by the rib cage and stronger vertebrae, making it less prone to injury. Moreover, the study suggests that the higher number of quadriplegic cases may be attributed to improved clinical management and better handling of patients at the scene, which enhances survival rates after high cervical spinal injuries (Bromley, 2006). When examining SCI complications, the study found neuropathic pain (42.25%), autonomic dysreflexia (22.06%), and spasticity (14.08%) to be the most common, particularly among men. These findings align with studies by Dada and Ogunleye (2022), Pilusa et al. (2021), and Lofvenmark et al. (2016), which identified pain and bladder issues as frequent complications. The prevalence of autonomic dysreflexia, particularly in patients with lesions at or above T6, was consistent with the findings of Balik and Sulla (2022). In this study, classification of injuries as complete or incomplete was conducted primarily using the International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI), based on available clinical documentation. However, in cases where full neurological assessment data were not available, such as injuries recorded simply as "thoracolumbar," the classification followed the reporting format of the original dataset. This approach reflects the variability in clinical reporting practices across sources. It is important to note that the use of alternate classification systems, or incomplete neurological assessments, may under- or over-estimate the proportion of complete versus incomplete injuries. Therefore, caution is advised when comparing these results to studies that applied ISNCSCI uniformly, as methodological differences in injury classification can influence epidemiological estimates. The study found that most SCI cases involved incomplete lesions, with cervical lesions being the most common (37.09%), followed by mid-thoracic (16.90%), lower thoracic (13.15%), and upper thoracic lesions (4.22%). These findings align with Wyndaele and Wyndaele (2006) and Yang et al. (2014), who reported a higher prevalence of incomplete spinal cord lesions compared to complete lesions. This suggests that the mechanisms leading to incomplete lesions are either more common or better managed, resulting in less severe damage.

When comparing findings with other studies on SCI etiology (Ning et al., 2012; Mehdar et al., 2019; Barbiellini et al., 2022; Golestani et al., 2022), it is clear that motor vehicle accidents, falls from height, gunshot injuries, and sports remain significant risk factors for SCI across various populations (Rahimi-Movghar et al., 2013). However, factors like age, gender, and socio-economic status can also influence SCI causes. Different age groups may be more susceptible to certain types of SCI due to varying activity levels or vulnerabilities (Yoon et al., 2015). Additionally, gender differences in injury patterns and outcomes are observed, with males more at risk due to higher engagement in risky activities (Aminian et al., 2016). Regional differences in healthcare access, infrastructure, and environmental hazards also play a role in SCI causes and recovery. In regions with limited access to emergency care or rehabilitation, SCI patient outcomes may be less favorable (Kim et al., 2018).

5.2 FUNCTIONAL OUTCOME AND COMMUNITY REINTEGRATION

This study offers an in-depth analysis of functional outcomes and community reintegration of individuals living with spinal cord injury (SCI), aiming to identify factors influencing health outcomes, rehabilitation, and quality of life. The results presented in Table 1 reveal several trends and disparities that can guide the development of targeted interventions for SCI patients. The demographic profile indicates that SCI predominantly affects young adults in their prime working years. This pattern is consistent with global studies, which show the highest incidence of SCI in early adulthood when risk behaviours and occupational activities are prevalent (Sekhon et al., 2019). The sample also showed a significant male predominance, reflecting global trends where men are more likely to experience SCI due to risk-taking behaviours and occupational hazards (Tator & Fehlings, 2009). The study also highlighted notable racial and socioeconomic disparities. Most participants were Black, mirroring the local demographic. Additionally, majority had primary education, and completed secondary education, suggesting an educational gap that may affect post-injury employment and social reintegration (Priebe et al., 2020). Furthermore, the high percentage of self-employed participants points to reliance on informal labor, often lacking healthcare benefits and social security, which may exacerbate post-injury challenges. Economic hardship was another key finding, with most of participants relying on disability grants as their primary income, and earning below KSH 50,000 per month. This underscores the need for vocational rehabilitation and economic empowerment programs to support financial independence and improve quality of life (Furlan et al., 2013). Clinically, the leading causes of SCI were traffic accidents and falls, with traffic accidents aligning with global trends (Cohen et al., 2014). The high incidence of cervical injuries is concerning due to their association with severe disabilities, such as tetraplegia. Notably, majority of the injuries were classified as incomplete, suggesting a more favourable prognosis for recovery, emphasizing the potential for functional improvement with appropriate rehabilitation (Green et al., 2019). Challenges related to accessibility and healthcare were also significant, with most of participants living in rural areas, highlighting barriers to specialized healthcare. The reliance on public transport exacerbates these challenges, underscoring the need for community-based care models and improved healthcare accessibility in rural areas (Dijkers, 2016).

This study underscores the need for targeted interventions addressing socioeconomic challenges, vocational training, and the prevention of SCI, particularly related to road safety. The high proportion of incomplete injuries suggests that many individuals have significant potential for functional recovery with appropriate rehabilitation. A comprehensive approach integrating medical, economic, and social interventions is essential for improving long-term outcomes for individuals with SCI.

This study also assessed the functional recovery of SCI patients using the Spinal Cord Independence Measure III (SCIM III), which evaluates recovery across five domains: total score (SCIM III-A), self-care (SCIM III-S), respiration and sphincter management (SCIM III-R), mobility in room and toilet (SCIM III-I), and mobility indoors and outdoors (SCIM III-O). The analysis, covering patients with complete and incomplete paraplegia and tetraplegia, identified statistically significant improvements in

functional recovery across all SCI types ($p < 0.05$). Incomplete SCI injuries showed greater recovery potential, aligning with previous studies suggesting better outcomes due to preserved neural pathways (Cao et al., 2020; Marino et al., 2017). Self-care (SCIM III-S) and mobility indoors/outdoors (SCIM III-O) demonstrated the highest improvements, particularly in complete paraplegia and incomplete tetraplegia (89%), supporting the importance of rehabilitation targeting daily living activities (Noreau et al., 2019). However, recovery in respiration and sphincter management (SCIM III-R) and mobility in room/toilet (SCIM III-I) was more modest, indicating areas requiring further intervention, particularly for individuals with more severe injuries (Mendelson et al., 2017). The findings emphasize the need for rehabilitation strategies to focus on these domains to enhance overall recovery. The statistical significance of improvements across domains validates the SCIM III as a reliable tool for evaluating SCI recovery. The study suggests prioritizing interventions to enhance respiration, sphincter management, and mobility in confined spaces, ensuring that rehabilitation efforts are holistic and tailored to individual needs.

This study highlights the effectiveness of the SCIM III in capturing functional recovery in SCI patients, with incomplete injuries showing better recovery outcomes. The results underscore the importance of focusing rehabilitation strategies on underperforming domains to optimize recovery and improve quality of life for SCI patients. Future research should explore advanced rehabilitation techniques for these specific areas. The study also assessed social participation and community integration using the Craig Handicap Assessment and Reporting Technique (CHART), which evaluates physical independence, cognitive independence, mobility, occupation, and community participation. The results demonstrated statistically significant improvements in all domains, reflecting the success of rehabilitation in enhancing social participation and integration. The total CHART score increased significantly with physical independence showing the largest improvement consistent with research highlighting the importance of regaining autonomy for participation (Dijkers, 2016). Cognitive independence also improved significantly, indicating enhanced decision-making and communication abilities (Lloyd et al., 2017). Although mobility improvements were more modest, variability in recovery highlights the need for personalized rehabilitation strategies (Heinemann et al., 2015). Improvements in occupation and community integration further emphasize the importance of vocational rehabilitation and social reintegration (DeVivo, 2015; Saunders et al., 2016). These findings highlight the need for continued personalized rehabilitation efforts to support long-term community participation. Overall, the results confirm that rehabilitation significantly enhances social participation, with physical and cognitive independence being key areas of progress. The variability observed in cognitive independence and mobility underscores the need for individualized interventions, ensuring sustained progress and successful participation into society.

This study emphasizes the value of the CHART in measuring rehabilitation outcomes and provides a solid foundation for improving rehabilitation programs aimed at enhancing the quality of life for patients with SCI. This study also investigated the clinical and psychosocial factors that influence

patient outcomes following spinal cord injury (SCI) during discharge and community reintegration. The findings highlight the complex nature of recovery, emphasizing the critical roles of both medical and psychosocial factors in shaping long-term outcomes. In terms of injury severity, a strong predictor of patient outcomes, a robust positive correlation was found at discharge, with a slightly weaker, yet still moderate, correlation during community participation. These results align with previous studies, showing that less severe injuries are associated with better recovery and participation outcomes (Fouad & Tator, 2016). Functional ability also proved to be a significant predictor at both discharge and reintegration confirming that patients with higher levels of physical function are more likely to experience favourable outcomes, consistent with other research on SCI rehabilitation (Dijkers, 2010). Psychosocial factors, including social support and depression, played a substantial role in long-term recovery. Social support showed a weak positive correlation at discharge but this significance increased during community participation, highlighting the importance of a strong social network during reintegration, a finding consistent with broader literature on chronic illness management (Rintala et al., 2007). Depression had a strong negative correlation at both discharge and community reintegration, underscoring its persistent impact on recovery and corroborating studies that identify depression as a significant barrier to SCI recovery (Benedict et al., 2019). Self-care ability, although a weaker predictor at discharge, became more significant over time, with a slight increase in correlation during community participation. This suggests that as patient's transition into the community, the ability to care for themselves becomes increasingly crucial for independent living, aligning with previous research emphasizing the importance of self-care in SCI rehabilitation (Anderson, 2004). SCI complications negatively impacted patient outcomes, especially during community participation. The weak negative correlation at discharge became more pronounced during participation, suggesting that complications significantly hinder long-term recovery.

This highlights the need for effective post-discharge medical management, a point supported by other studies on the adverse effects of SCI-related complications on reintegration (McKinley et al., 2017). Overall, the study found that functional ability and injury severity were the most critical predictors of outcomes at discharge and during community participation. However, psychosocial factors such as social support and mental health were also vital for long-term recovery, with social support becoming increasingly important during reintegration and depression consistently hindering progress. Self-care ability and SCI-related complications also emerged as significant factors warranting targeted interventions. Recommendations for improving SCI rehabilitation include focusing on functional recovery and enhancing self-care abilities in early rehabilitation, strengthening psychosocial support, addressing depression, prioritizing post-discharge medical management to prevent complications, and integrating self-care skills training to foster independence. Furthermore, this study examined the environmental barriers faced by individuals with SCI, considering demographic, socioeconomic, and injury-related factors. Younger individuals, particularly those aged young adults, reported the highest barrier scores, particularly in services, assistance, and policies.

This suggests that younger individuals may face more challenges in reintegrating into society due to societal roles and expectations. Barrier scores generally decreased with age, indicating better adaptation and access to support systems among older individuals (Chen et al., 2020; Johnson & Smith, 2018). Gender differences were also observed, with males reporting higher barrier scores than females, reflecting societal norms where men may experience greater obstacles in physical accessibility and societal perceptions (Brown et al., 2017). Patients with spinal cord injury (PWSCI) experience barriers irrespective of race, especially in physical challenges and attitudinal support, highlighting systemic inequalities in accessibility and social inclusion (Morris et al., 2019). Marital status was another influencing factor, as married individuals reported fewer barriers than singles, underscoring the importance of social and emotional support (Williams & Johnson, 2016).

Educational attainment also affected barrier scores, with those holding a primary education reporting greater challenges compared to those with higher levels of education (Lee et al., 2018). Employment status correlated with barrier scores, as unemployed and in-school individuals reported higher barriers, particularly in accessing services, pointing to the economic challenges faced by those with SCI (Davenport et al., 2019). Financial resources were a major determinant of accessibility and support, with lower-income individuals reporting the highest barrier scores (Barker et al., 2021). Additionally, time post-injury was a critical factor, with barrier scores highest in the first year post-injury, gradually decreasing as individuals integrated into their communities and received ongoing rehabilitation (Jackson & Williams, 2017). Injury severity also played a role, with individuals with cervical injuries reporting the highest barriers, particularly in physical structures and services, consistent with studies indicating that cervical injuries are more disabling (Gray & Smith, 2022). Furthermore, incomplete injuries tended to result in more barriers than complete injuries due to ongoing functional challenges (Harrison et al., 2019). These findings highlight the complex interplay between environmental, social, economic, and injury-related factors in shaping the experiences of individuals with SCI. Targeted interventions are needed, particularly for younger individuals, low-income groups, and those with lower educational attainment. Policy improvements should focus on enhancing services, assistance programs, and attitudinal support, while improving healthcare access and community reintegration for those with cervical injuries and those in the early stages of recovery. By addressing these barriers through comprehensive, targeted strategies, society can foster a more inclusive environment for individuals with SCI, promoting greater independence, integration, and quality of life.

This study also, investigated the environmental barriers faced by individuals with spinal cord injury (SCI) and how demographic, socioeconomic, and injury-related factors shape their experiences. The findings underscore significant patterns in barrier scores across various subgroups, providing insight into the complex interplay between individual characteristics and societal challenges. Younger adults, reported higher barrier scores, notably in services, attitudinal support, and policies. This suggests greater societal and structural challenges during reintegration, potentially due to limited access to services and reduced community support. In contrast, older individuals experienced fewer barriers,

which may reflect increased adaptation and societal acceptance over time. Additionally, this may be attributed to the fact that many older individuals do not leave the house as frequently and often have caregivers, not necessarily due to spinal cord injury (SCI), but rather as a result of age-related factors (Giroux, E. 2018; Jeske, 2015). Gender differences were notable, with males reporting higher barrier scores than females, particularly in physical access and attitudinal support. This finding contradicts some literature suggesting that women face more challenges due to gendered expectations, despite the significant shifts toward gender equality in the past two decades (Jeske, 2015). However, it aligns with studies highlighting how societal norms around masculinity can hinder help-seeking behaviors (Graham et al., 2012). Racial disparities were also evident. Additionally, those with higher educational attainment reported fewer barriers, highlighting education's role in accessing resources and services (Krause et al., 2004). Socioeconomic factors further impacted experiences, with unemployed individuals and those with low incomes encountering more barriers, especially regarding services and policies. This finding reinforces research linking financial instability to limited healthcare access (Hall et al., 2012).

Injury-related factors also played a key role. Participants within the first year post-injury faced the highest barrier scores, with gradual improvement over time (McColl et al., 2003). Cervical injuries were associated with the highest barriers due to severe functional limitations (Krause & Acierno, 2011), and those with incomplete injuries reported higher barrier scores, possibly due to differing societal expectations for recovery (Ditunno et al., 2004). The cause of injury significantly influenced barriers, with traffic accidents associated with the highest scores, particularly in services and policies. This highlights the need for targeted interventions addressing barriers specific to injury causes. The inter-rater agreement analysis using Kappa coefficients revealed substantial to almost perfect agreement in participant assessments. High agreement was observed in self-care tasks, such as bathing and lower-body dressing, suggesting consistent understanding of these tasks. However, moderate agreement for grooming and upper-body dressing indicates a need for clearer assessment criteria (Miller & Thompson, 2015). Similarly, strong agreement was found in respiration and sphincter management tasks, with almost perfect agreement for bladder and bowel management, likely due to clear, standardized protocols (Jones et al., 2017). Mobility tasks showed generally high agreement, though tasks like motion in bed and wheelchair-to-car transfers had moderate agreement, highlighting areas for improved training (Smith et al., 2019).

The findings on participation and life satisfaction underscore the impact of demographic, clinical, and environmental factors. Traffic accidents were associated with the most favorable outcomes, while violence- and sports-related injuries yielded poorer outcomes, aligning with prior research on injury severity (Anderson et al., 2012; Kalsi-Ryan et al., 2014). Younger participants reported better participation outcomes, likely due to higher resilience and social support (Fawcett et al., 2014), while older participants experienced declines, consistent with aging-related challenges (Charlifue et al., 2012). Gender disparities favored males, while married participants showed better outcomes, emphasizing the value of social support (Sullivan et al., 2016). Ethnicity findings revealed that Black

participants had better outcomes in mobility and integration, suggesting potential cultural resilience (Sampson et al., 2019), while those with lower education levels reported better life satisfaction, possibly due to increased community engagement (Pollard et al., 2015). Clinically, cervical injuries had the worst outcomes, and incomplete injuries showed better outcomes than complete injuries, reflecting recovery potential (Groah et al., 2014). Environmental barriers, particularly policy and attitudinal challenges, strongly hindered participation and life satisfaction (Mulcahey et al., 2016). This study highlights how demographic, socioeconomic, and clinical factors shape barriers and outcomes for individuals with SCI. Targeted interventions should address the needs of younger, low-income, and less-educated individuals while improving healthcare access and community support for those with cervical injuries and early post-injury stages. Future research should explore these factors longitudinally to inform effective policy and practice improvements.

5.3 DELPHI STUDY

This approach is a structured, iterative process that gathers expert consensus on complex issues through multiple rounds of surveys. This approach is particularly useful in fields where empirical data is limited, and expert opinions are essential for decision-making. In the context of spinal cord injury (SCI) in Kenya, the Delphi study was conducted to identify challenges, establish priorities, and develop recommendations for improving SCI management, rehabilitation, and policy implementation. The study engaged a panel of multidisciplinary experts, including, physiotherapists, occupational therapists, medical social workers, Nurses, and clinical psychologists. The aim was to establish the level, contextual barriers and facilitators of reintegration of patients with spinal cord injury back in the community in Kenya. This study evaluates several key factors that contribute to the successful community reintegration of individuals with spinal cord injuries (SCI), as well as significant barriers and effective multidisciplinary approaches. These findings are aligned with existing literature on SCI rehabilitation and reintegration, although certain nuances highlight specific challenges faced in different contexts. One of the most critical aspects identified in this study is the removal of physical barriers, which scored highly across all rounds. This finding corroborates previous research emphasizing the importance of creating accessible environments for SCI patients, as physical barriers are among the most persistent obstacles to reintegration. A study by O'Rourke et al. (2015) similarly identified environmental factors, such as inaccessible infrastructure and inadequate mobility aids, as major barriers to SCI reintegration.

Social support networks, another highly rated factor in this study, align with findings from other studies that stress the role of family, friends, and peer support in helping individuals with SCI navigate the social and psychological challenges of reintegration. Similarly, the focus on community acceptance and economic empowerment through employment and education is consistent with research by Lind et al. (2019), which highlighted the importance of fostering social inclusion and economic independence to improve quality of life for SCI patients. However, some areas in the study, such as the emphasis on comprehensive rehabilitation programs and ongoing medical follow-ups, reveal a gap in the healthcare

system that may hinder successful reintegration. This finding is supported by literature on SCI rehabilitation, which often underscores the lack of standardized care and follow-up procedures. A study by Bickenbach (2017) found that inadequate post-rehabilitation support and fragmented healthcare systems often lead to suboptimal long-term outcomes for individuals with SCI. In terms of barriers, this study found significant challenges related to environmental and cultural barriers. This is consistent with the work of Yao et al. (2018), who reported that cultural stigmas and lack of public awareness about SCI create substantial barriers to community participation and integration. The persistence of psychological and financial struggles in this study echoes findings from numerous studies that highlight the economic difficulties and psychological burdens faced by SCI patients, exacerbated by limited insurance coverage and unemployment (Harrison et al., 2014).

The study also identifies key strategies for overcoming these barriers through a multidisciplinary approach. The emphasis on assistive device use, vocational rehabilitation programs, and advocating for accessibility is aligned with best practices in SCI rehabilitation. These strategies are supported by existing research, such as that by Malkinson et al. (2016), which highlights the importance of integrating physical, psychological, and vocational support to improve outcomes for SCI patients. The role of healthcare professionals, particularly physical therapists and occupational therapists, in fostering independence and promoting social integration is also a common theme in rehabilitation literature. When comparing the findings with other related studies, the results of this study highlight both commonalities and unique regional challenges. For example, while the importance of physical accessibility and social support networks is universally acknowledged, the specific barriers related to cultural stigma and financial struggles may vary depending on the local context.

Studies in high-income countries often focus on healthcare system barriers and technological advancements, whereas this study emphasizes more foundational issues, such as community awareness and economic instability that may be more pressing in lower-resource settings. Furthermore, the shift in the perceived importance of various interventions between rounds such as the decrease in the emphasis on training and education suggests a growing recognition of the importance of community-based interventions, which are sometimes underemphasized in traditional healthcare models. The results suggest that while significant strides have been made in addressing the physical and social aspects of SCI reintegration, considerable challenges remain in areas like financial support, psychological well-being, and systemic barriers. Therefore, ongoing efforts are needed to address these gaps and ensure a more inclusive, supportive environment for individuals with SCI.

5.4 STRENGTHS OF THE STUDY

This study offers valuable, context-specific epidemiological data on spinal cord injuries (SCI) in Kenya, addressing a critical gap in regions with limited digital health records. Its findings align with global and regional research, confirming key risk factors such as motor vehicle accidents, falls from height, and gunshot injuries. The study also highlights important socio-economic dimensions of SCI, emphasizing

how low education, youth, and high-risk occupations intersect with poverty to increase injury risk. Clinically, it provides detailed information on injury patterns and common complications, grounded in recognized classification standards. Significantly, the study draws attention to under-recognized causes of SCI, including violence-related injuries, and advocates for targeted preventive strategies tailored by gender and age. By acknowledging methodological limitations in injury classification, it maintains transparency and encourages cautious interpretation. Overall, the findings contribute meaningfully to evidence-based public health policies aimed at reducing SCI incidence and improving patient outcomes in low-resource settings. Additionally, the study delivers a comprehensive, multidimensional analysis of SCI outcomes by integrating clinical, functional, psychosocial, socioeconomic, and environmental factors. Using validated tools like the SCIM III and CHART, it demonstrates notable improvements in functional recovery and social participation, especially among individuals with incomplete injuries. It identifies key predictors of positive outcomes—such as injury severity, functional ability, social support, and mental health, and underscores the rising importance of self-care during reintegration. The research also profiles demographic trends and socioeconomic disparities, highlighting challenges faced by vulnerable groups, including rural populations reliant on informal labor. Furthermore, it examines evolving environmental barriers shaped by age, gender, injury type, and socioeconomic status, advocating for personalized rehabilitation strategies. The study aligns with and extends existing literature, offering actionable recommendations that address the medical, psychological, vocational, and social dimensions of SCI rehabilitation. It emphasizes the need for integrated, patient-centered approaches to optimize recovery, enhance community participation, and improve quality of life for individuals living with SCI.

Finally, the study's use of the Delphi method provides a structured, iterative approach to gather expert consensus in a field lacking extensive empirical data. The involvement of a multidisciplinary panel—including physiotherapists, occupational therapists, social workers, nurses, and psychologists—ensures a holistic perspective on SCI management and community reintegration. By focusing on the Kenyan context, it identifies unique environmental, cultural, and economic barriers, making its recommendations locally relevant. It highlights critical facilitators such as physical accessibility and social support networks, contextualizing these within Kenya's specific challenges. The emphasis on community reintegration, economic empowerment, and vocational rehabilitation reflects a commitment to improving social inclusion and quality of life. The study also reveals gaps in healthcare systems, particularly in rehabilitation and follow-up care, and promotes multidisciplinary strategies that integrate physical, psychological, and vocational support. Its comparative analysis with high-income countries underscores foundational challenges like community awareness and economic instability more pronounced in low-resource settings. The dynamic consensus-building process of the Delphi rounds captures evolving priorities, such as increasing focus on community-based interventions, and the study's holistic assessment covers physical, social, psychological, and economic factors critical to successful SCI reintegration.

5.5 LIMITATIONS OF THE STUDY

Despite the valuable insights gained from this study on the epidemiology, functional outcomes, and community reintegration of patients with spinal cord injuries (SCI) in Kenya, several limitations should be acknowledged. These limitations may have influenced the findings and should be considered when interpreting the results and designing future research. Kenya lacks a centralized national registry for spinal cord injuries, leading to fragmented and inconsistent data collection. Many healthcare facilities do not have comprehensive electronic medical records, making it difficult to obtain reliable historical data. Additionally, variations in record-keeping practices across different hospitals may have introduced reporting biases and missing data, which could impact the accuracy of epidemiological estimates. The study primarily relied on patients who sought medical care in hospitals, rehabilitation centers, or outreach programs. This excludes individuals with SCI who do not access healthcare due to financial constraints, geographic barriers, or cultural beliefs. As a result, the study may not fully capture the true prevalence and burden of SCI in the community, particularly in rural and underserved areas. Tracking patients over time to assess their long-term functional outcomes and community reintegration proved difficult. High incidences of loss to follow-up were observed, primarily due to changes in residence, financial limitations, and inadequate communication infrastructure.

This challenge may have resulted in an underestimation of the long-term impact of SCI and rehabilitation outcomes. The reintegration of individuals with SCI into their communities is influenced by complex cultural and socioeconomic factors that were challenging to quantify in this study. Stigmatization, traditional beliefs about disability, and family dynamics play a crucial role in determining social acceptance and employment opportunities. However, due to the qualitative nature of these factors, they were difficult to measure objectively and may not be fully represented in the findings. Kenya faces a significant shortage of specialized rehabilitation centers, assistive devices, and Rehabilitation healthcare professionals for SCI management. This limitation affects the generalizability of functional outcome assessments, as many patients do not receive standardized rehabilitation interventions. Disparities in access to rehabilitation services may have led to variations in functional recovery and reintegration outcomes across different patient groups. Many aspects of the study, particularly functional outcomes and community reintegration, relied on self-reported questionnaires and interviews.

This introduces the risk of recall bias, where patients may overestimate or underestimate their abilities and experiences. Additionally, social desirability bias may have influenced responses, particularly regarding employment status, social participation, and quality of life. SCI patients present with varying injury severities, comorbidities, and pre-existing conditions, making it challenging to establish uniform conclusions. The study grouped patients into broad categories, which may not fully capture the nuances of individual recovery trajectories. Future research with more granular stratification based on injury severity, rehabilitation access, and psychological support is needed. There is limited use of standardized functional assessment tools for SCI in Kenya. The absence of universally adopted metrics made it

difficult to compare findings with studies from other regions. While internationally validated scales were incorporated where possible, it is important to acknowledge that these tools may not have been previously contextualized for use in African or Kenyan settings. Cultural and contextual differences could have influenced their applicability and interpretation within the study population. Nevertheless, their inclusion was guided by their widespread use and relevance to the research objectives. Additionally, resource limitations impacted certain aspects of the study, including sample size, data collection procedures, and follow-up assessments. Conducting a nationwide study with a more representative sample would require greater funding and logistical support.

These constraints may have restricted the depth of analysis and the ability to explore additional variables that influence SCI outcomes. While this study provides critical insights into the epidemiology, functional outcomes, and community reintegration of patients with SCI in Kenya, these limitations highlight the need for further research. Future studies should aim to establish a national SCI registry, improve long-term follow-up mechanisms, standardize outcome assessments, and address socioeconomic barriers to rehabilitation and reintegration. Addressing these limitations will enhance the accuracy and impact of research in this field, ultimately improving SCI care and quality of life for affected individuals in Kenya.

5.6 CHAPTER SUMMARY

This chapter discusses the study's findings in relation to the research questions and compares them with existing literature. The demographic and socio-economic characteristics of the SCI patients involved in the rehabilitation outcomes study reflect the broader SCI population in sub-Saharan Africa. While the study participants were less impaired than those typically admitted to inpatient settings both locally and internationally, they faced similar challenges in performing certain instrumental activities of daily living and resuming roles they held before the SCI. The findings, which highlight the initial level of motor impairment and functional activity as key predictors of outcomes six months post-SCI, align with results from previous studies. Although the content of physiotherapy in this study was comparable to that in other countries, the intensity was considerably lower. The study's results were similar to some previous research while differing in other aspects. However, it is crucial to note that the sample in this study was unique, as it consisted of SCI patients still in the acute to sub-acute stage post-injury, receiving minimal rehabilitation compared to other SCI populations. The following chapter will present further conclusions and recommendations based on these findings.

CHAPTER 6
CONCLUSION, SIGNIFICANCE AND RECOMMENDATIONS

6.0 INTRODUCTION

In this chapter of the thesis, the researcher summarizes the key findings of the study and provides recommendations regarding the prevalence, functional outcomes, and community reintegration of SCI patients in Kenya. The chapter also emphasizes the significance of these findings in the context of SCI within this setting.

6.1 CONCLUSION

This study provides comprehensive insights into the epidemiological patterns, functional outcomes, psychosocial experiences, and environmental challenges faced by individuals with spinal cord injuries (SCI) in three selected counties in Kenya. The findings reveal significant disparities in injury prevalence, recovery outcomes, and access to rehabilitation services, highlighting the urgent need for targeted interventions. Epidemiological data indicate that SCI predominantly affects young, working-age males, particularly those with limited educational attainment, with motor traffic accidents and falls from height being the leading causes. Notably, incomplete injuries were more common following road traffic accidents, whereas falls resulted in more severe injuries. These insights emphasize the importance of preventive strategies, such as road safety awareness campaigns and workplace safety programs, to reduce the incidence and severity of SCI. Additionally, the high prevalence of neuropathic pain among male patients further underscores the need for specialized pain management interventions in rehabilitation programs.

The assessment of functional outcomes using the SCIM III tool demonstrated statistically significant improvements across all functional domains, with the highest recovery rates observed among individuals with incomplete injuries. However, challenges in areas such as respiration and sphincter management highlight the necessity of long-term, multidisciplinary rehabilitation tailored to the specific needs of patients. Similarly, social participation outcomes, as measured through the CHART tool, showed notable improvements in physical and cognitive independence, reinforcing the importance of community-based rehabilitation and vocational programs. The study also identified functional ability and injury severity as the strongest predictors of recovery, with psychosocial factors such as social support and depression significantly influencing reintegration into society. These findings emphasize the critical role of holistic rehabilitation approaches that address both physical and psychological aspects of recovery.

Environmental and societal barriers remain significant obstacles for individuals with SCI, particularly among younger, lower-income, and less-educated individuals, who reported the greatest difficulties in accessing healthcare services and navigating public spaces. Racial disparities were also evident, with Black participants experiencing more pronounced challenges in physical accessibility and social

acceptance compared to their Asian counterparts. Individuals with cervical injuries and those in the early post-injury phase faced the most substantial barriers, particularly in accessing rehabilitation services, underscoring the urgent need for equitable healthcare policies and improved infrastructural accessibility. Moreover, an analysis of participation and life satisfaction outcomes reaffirmed the influence of social determinants on recovery, with younger, married, and more educated individuals experiencing better life outcomes, while those with cervical or incomplete injuries reported lower satisfaction levels.

Findings from the Delphi study further identified key factors essential for successful community reintegration, based on responses from allied health professionals. The highest-rated aspects included the removal of physical barriers and the role of community support in patient acceptance, both of which were deemed crucial for facilitating social participation and the resumption of normal life. Other highly rated factors included access to assistive technology, economic independence, and supportive healthcare policies, highlighting the need for both physical and systemic support mechanisms. Conversely, major barriers to reintegration were identified, including environmental and cultural obstacles, stigma, financial constraints, and inadequate policies and infrastructure. The absence of standardized reintegration guidelines and insufficient specialist training for rehabilitation teams were also noted as systemic gaps that require urgent attention.

Addressing these challenges necessitates a multidisciplinary approach that integrates physical, social, and economic interventions. Key strategies include ensuring the proper use of assistive devices, enhancing mobility and independence, promoting community participation, and implementing vocational rehabilitation programs. Advocacy for disability rights and the strengthening of peer mentorship initiatives were also recognized as essential components of long-term reintegration success. The study's findings indicate a necessary shift in focus from merely addressing physical barriers to prioritizing social support, psychological preparedness, and systemic challenges such as financial struggles and professional training inadequacies. Ultimately, successful SCI reintegration requires a holistic, multi-sectoral approach that fosters collaboration among healthcare providers, families, policymakers, and communities. By addressing the diverse barriers faced by individuals with SCI, it is possible to create an inclusive environment that promotes independence, social participation, and economic stability, thereby enhancing the overall quality of life for affected individuals.

6.2 SIGNIFICANCE OF THE STUDY FINDINGS

This study is significant as it provides a comprehensive understanding of the epidemiological trends, functional recovery, psychosocial experiences, and environmental challenges faced by individuals with spinal cord injuries (SCI) in Kenya. By identifying key disparities in injury prevalence, recovery outcomes, and access to rehabilitation services, the study highlights critical areas for targeted interventions. The findings emphasize the necessity of preventive measures, such as road safety awareness and workplace safety programs, to reduce the incidence and severity of SCI. Additionally,

the study underscores the importance of specialized rehabilitation approaches, particularly for managing neuropathic pain and addressing persistent functional challenges such as respiration and sphincter control. The study further demonstrates that functional ability and injury severity are strong predictors of recovery, while psychosocial factors, including social support and depression, play a crucial role in community reintegration. Environmental and societal barriers remain significant obstacles, particularly for lower-income and less-educated individuals, reinforcing the need for equitable healthcare policies and improved accessibility. The Delphi study findings highlight the essential role of removing physical barriers, ensuring access to assistive technology, and fostering economic independence in promoting successful reintegration. By advocating for a multidisciplinary approach that integrates physical, social, and economic interventions, this study provides valuable insights for policymakers, healthcare providers, and rehabilitation specialists. Ultimately, by addressing the diverse barriers faced by individuals with SCI, this study provides a foundation for developing inclusive policies and interventions that promote independence, social participation, and economic stability, thereby significantly enhancing the quality of life for affected individuals.

6.3 RECOMMENDATIONS

Based on the findings of this study on the epidemiology, functional outcomes, and community reintegration of individuals with spinal cord injuries (SCI) in Kenya, several key recommendations are proposed to enhance prevention strategies, healthcare services, rehabilitation programs, and societal support systems. A multifaceted approach is essential to improving the prevention, treatment, and reintegration of individuals living with SCI. First, targeted preventive measures should be implemented, including road safety campaigns, workplace hazard reduction programs, and public awareness initiatives aimed at reducing the incidence of SCI, particularly among young, working-age males. The length of stay in rehabilitation facilities is a critical factor that should be considered, as it directly influences both clinical outcomes and the financial burden on patients, families, and the state. Extended rehabilitation may lead to better functional and psychosocial recovery; however, it also increases healthcare costs, which must be balanced against long-term benefits such as reduced dependency and improved quality of life. Therefore, cost-effective strategies that optimize rehabilitation duration without compromising outcomes are essential.

Furthermore, rehabilitation programs must be tailored to address both functional and psychosocial recovery through multidisciplinary approaches. These should include interventions aimed at improving respiration, managing sphincter dysfunction, and controlling neuropathic pain. In addition, expanding access to community-based rehabilitation and vocational training programs is vital for enhancing social reintegration and promoting economic self-sufficiency. Such comprehensive models of care not only improve individual outcomes but also reduce the long-term socioeconomic burden on the healthcare system.

Third, systemic changes are necessary to address disparities in healthcare access, particularly among lower-income, less-educated, and Black individuals, who face greater challenges in rehabilitation and reintegration. Equitable healthcare policies, improved infrastructure accessibility, and the widespread provision of assistive technologies should be prioritized to create an inclusive and supportive environment. Fourth, standardized reintegration guidelines and specialized training programs for rehabilitation professionals should be established to ensure consistent and high-quality care across different settings. Finally, a holistic approach integrating physical, social, and economic interventions, such as peer mentorship programs, advocacy for disability rights, and financial support initiatives, should be adopted to enhance long-term independence and social inclusion. Strengthening collaboration among healthcare providers, policymakers, families, and communities is essential to fostering a sustainable and supportive ecosystem that promotes the successful reintegration and improved quality of life of individuals with SCI.

Reflecting on my PhD journey, this research has profoundly shaped both my personal and academic growth. Engaging deeply with the complexities of spinal cord injury in a low-resource context has expanded my understanding of the multifaceted challenges faced by affected individuals and the critical importance of context-specific, evidence-based inquiry. The iterative and multidisciplinary nature of this study reinforced my appreciation for collaborative approaches and the value of integrating diverse expert perspectives to address complex health issues. Methodologically, I have gained greater confidence in employing rigorous frameworks like the Delphi technique and validated assessment tools, which have strengthened my commitment to transparency, critical analysis, and cautious interpretation of findings. More broadly, this experience has heightened my awareness of the socio-economic and cultural dimensions that influence health outcomes and the urgent need for holistic, patient-centered interventions. As I look ahead, this foundation will guide my future work in advancing inclusive public health policies and rehabilitation strategies that are both evidence-informed and locally relevant, ultimately contributing to improved quality of life for vulnerable populations.

REFERENCES

Alexander MS, Biering-Sorensen F, Bodner D, Brackett NL, Cardenas D, Charlifue S, Creasey G, Dietz V, Ditunno J, Donovan W, et al. International standards to document remaining autonomic function after spinal cord injury. Spinal Cord. 2009;47:36–43.

Ambrozaitis, K. V., Kontautas, E., Špakauskas, B., & Vaitkaitis, D. (2006). Pathophysiology of acute spinal cord injury. Medicina-lithuania, 42(8), 651.

Anderson, K. D. (2004). Targeting recovery: Priorities of the spinal cord injury population. Journal of Neurotrauma, 21(10), 1371-1383.

Anderson, K. D., et al. (2012). "Spinal cord injury: causes and consequences." The Lancet Neurology, 11(10), 841-849.

Ayas NT, Epstein LJ, Lieberman SL, Tun CG, Larkin EK, Brown R, Garshick E. Predictors of loud snoring in persons with spinal cord injury. J Spinal Cord Med. 2001;24:30–34.

Ayaş S, Leblebici B, Sözay S, Bayramoğlu M, Niron EA. The effect of abdominal massage on bowel function in patients with spinal cord injury. Am J Phys Med Rehabil. 2006;85:951–955.

Bao-You, F., Wei, Z., Yao, X., Shi, G., Cheng, X., Zhou, X., ... & Li, F. (2018). Microenvironment Imbalance of Spinal Cord Injury. Cell Transplantation, 27(6), 853-866.

Belegu, V., Oudega, M., Gary, D. S., & McDonald, J. W. (2006). Restoring Function After Spinal Cord Injury: Promoting Spontaneous Regeneration with Stem Cells and Activity-Based Therapies. Neurosurgery Clinics of North America, 17(4), 647-660.

Benedict, R. H., et al. (2019). Depression and quality of life in spinal cord injury: A review. Journal of Rehabilitation Research and Development, 56(2), 181-191.

Benevento BT, Sipski ML. Neurogenic bladder, neurogenic bowel, and sexual dysfunction in people with spinal cord injury. Phys Ther. 2002;82:601–612.

Berardi, A., D'Angelo, M., Panuccio, F., Grieco, G., & Galeoto, G. (2021). Measuring Quality of Life in Spinal Cord Injury. Measuring Spinal Cord Injury, 61-76.

Bickenbach, J. E. (2017). Spinal cord injury and the role of healthcare systems in long-term outcomes: A review. Disability and Rehabilitation, 39(1), 1-8.

Blackmer J. Rehabilitation medicine: 1. Autonomic dysreflexia. CMAJ. 2003;169:931–935.

Boido, M., Rupa, R., Garbossa, D., Fontanella, M., Ducati, A., & Vercelli, A. (2009). Embryonic and adult stem cells promote raphespinal axon outgrowth and improve functional outcome following spinal hemisection in mice. European Journal of Neuroscience, 30(10), 1863-1872.

Brown R, DiMarco AF, Hoit JD, Garshick E. Respiratory dysfunction and management in spinal cord injury. Respir Care. 2006;51:853–868; discussion 869-870.

Brown, R. & Green, P. (2018). Assessing mobility and transfer tasks in SCI rehabilitation: A comprehensive review. Journal of Spinal Cord Medicine, 41(2), 210-218.

Bryce TN, Ragnarsson KT, Stein AB. Spinal Cord Injury. In: Randall L, editor. Braddom, editor: Physical Medicine and Rehabilitation. 3th edition. USA: Elsevier Inc; 2007. pp. 1285–1349.

Buchtler, K., Carrard, V., Jochum, H., Ledermann, K., Lude, P., & Scheel-Sailer, A. (2021). Body experience during post-acute rehabilitation in individuals after a traumatic spinal cord injury: a qualitative interview-based pilot study. Spinal Cord Series and Cases, 7(1), 14.

Cameron KJ, Nyulasi IB, Collier GR, Brown DJ. Assessment of the effect of increased dietary fibre intake on bowel function in patients with spinal cord injury. Spinal Cord. 1996;34:277–283.

Cao, Y., Zhao, Y., Wang, Z., et al. (2020). Recovery patterns in incomplete spinal cord injury: A longitudinal study. Journal of Neurotrauma, 37(4), 897-906.

Cardenas DD, Jensen MP. Treatments for chronic pain in persons with spinal cord injury: A survey study. J Spinal Cord Med. 2006;29:109–117.

Carpenter C, Forwell SJ, Jongbloed LE, Backman CL. Community participation after spinal cord injury. Arch Phys Med Rehabil 2007; 88:427-33.

Chamberlain, J. D., Meier, S., Mader, L., von Groote, P. M., Brinkhof, M. W., & Swiss Spinal Cord Injury Cohort Study. (2015). Mortality and longevity after a spinal cord injury: Systematic review and meta-analysis. Neuroepidemiology, 44(3), 182-198.

Charlifue, S. W., et al. (2012). "Factors affecting life satisfaction in persons with spinal cord injury." Spinal Cord, 50(6), 423-431.

Chen D, Apple DF, Hudson LM, Bode R. Medical complications during acute rehabilitation following spinal cord injury--current experience of the Model Systems. Arch Phys Med Rehabil. 1999;80:1397–1401.

Chen, L., Liu, Y., Ma, B., Zhou, M., Zhao, X., Fu, X., ... & Zhu, R. (2022). Mitochondrial regulatory mechanisms in spinal cord injury: A narrative review. Medicine, 101(1), e28119.

Chiodo AE, Scelza WM, Kirshblum SC, Wuermser LA, Ho CH, Priebe MM. Spinal cord injury medicine. 5. Long-term medical issues and health maintenance. Arch Phys Med Rehabil. 2007;88:S76–S83.

Chiu, W. T., Lin, H. C., Lam, C., & Chu, S. F. (2010). Economic and mortality impact of motor vehicle accidents on a highly motorized, industrialized urban area in Taiwan: A 15-year population-based study. Accident Analysis & Prevention, 42(1), 26-32.

Christine Muya, Julie Phillips, Joseph Matheri, Sore Bilton. Prevalence of Individuals with Traumatic Spinal Cord Injury in Nairobi, Kenya. Int J Physiother Res 2023;11(5):4622-4627. DOI: 10.16965/ijpr.2023.151.

Clark, L., & Chevrette, R. (2017). Thick description. The International Encyclopedia of Communication Research Methods, 1-2.

Clarke, V., & Braun, V. (2014). Thematic analysis. In Encyclopedia of critical psychology (pp.1947-1952). Springer, New York, NY.

Coggrave MJ, Norton C. The need for manual evacuation and oral laxatives in the management of neurogenic bowel dysfunction after spinal cord injury: a randomized controlled trial of a stepwise protocol. Spinal Cord. 2010;48:504–510.

Cohen, M. A., Li, J., & Tan, D. (2014). Traumatic spinal cord injury: Causes, diagnosis, and treatment. Journal of Neurosurgery: Spine, 21(3), 295–308.

Consensus statement on the definition of orthostatic hypotension, pure autonomic failure, and multiple system atrophy. The Consensus Committee of the American Autonomic Society and the American Academy of Neurology. Neurology. 1996;46:1470.

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. Qualitative Sociology, 13(1), 3-21.

Craig A, Perry KN, Guest R, Tran Y, Middleton J. Adjustment following chronic spinal cord injury: determining factors that contribute to social participation. Br J Health Psychol. (2015 Nov) 20(4):807–23. doi: 10.1111/bjhp.12143.

Craig, A., Hancock, T., & Dickson, H. (2015). The effectiveness of rehabilitation on community reintegration and quality of life of individuals with spinal cord injury. Spinal Cord, 53(6), 416-421.

Deng, Z. Z., & Chen, Y. H. (2023). Research Progress of MicroRNAs in Spinal Cord Injury. Journal of integrative neuroscience, 22(1), 173-178.

DeVivo M, Biering- Sørensen F, Charlifue S, Noonan V, Post M, Stripling T, Wing P; Executive Committee for the International SCI Data Sets Committees. International Spinal Cord Injury Core Data Set. Spinal Cord. 2006 Sep;44(9):535-40. doi: 10.1038/sj.sc.3101958. PMID: 16955073.

DeVivo MJ, Black KJ, Stover SL. Causes of death during the first 12 years after spinal cord injury. Arch Phys Med Rehabil. 1993;74:248–254.

DeVivo MJ, Krause JS, Lammertse DP. Recent trends in mortality and causes of death among persons with spinal cord injury. Arch Phys Med Rehabil. 1999;80:1411–1419.

Devivo, M. J. (2012). Epidemiology of traumatic spinal cord injury: Trends and future implications. Spinal Cord, 50(5), 365-372.

DeVivo, M. J. (2015). Epidemiology of spinal cord injury. Handbook of Clinical Neurology, 122, 27-45.

Dijkers, M. (2010). Functional recovery and its determinants following spinal cord injury. Spinal Cord, 48(9), 664-674.

Dijkers, M. P. (2013). Quality of life and spinal cord injury. Disability and Rehabilitation, 35(4), 284-291.

Dijkers, M. P. (2016). Barriers to rehabilitation in rural areas. Spinal Cord, 54(4), 303–310.

Dijkers, M. P. (2016). Functional independence and mobility in spinal cord injury: A review of interventions and outcomes. Spinal Cord, 54(7), 533-540.

Dijkers, M. P., et al. (2012). "Gender differences in spinal cord injury outcomes: A review." NeuroRehabilitation, 31(1), 39-49.

Ding, Y., Wang, Y., Hsia, Y., Russell, N., & Heath, P. T. (2020). Systematic review and meta-analyses of incidence for group B Streptococcus disease in infants and antimicrobial resistance, China. *Emerging Infectious Diseases*, *26*(11), 2651.

Ditterline, B. L. (2015). Cardiovascular regulation and effects of respiratory motor training in patients with chronic spinal cord injury.

Dixon, R. E. (2022). Life Satisfaction After Spinal Cord Injury: Results from a New Zealand prospective cohort study (Doctoral dissertation, University of Otago).

Ebert E. Gastrointestinal involvement in spinal cord injury: a clinical perspective. J Gastrointestin Liver Dis. 2012;21:75–82.

Elbasiouny SM, Moroz D, Bakr MM, Mushahwar VK. Management of spasticity after spinal cord injury: current techniques and future directions. Neurorehabil Neural Repair. 2010;24:23–33.

Elnaggar, M. A.,(2020). Fabrication and characterization of polycaprolactone-based nanofibrous scaffolds for neuronal tissue regeneration. Materials Science and Engineering: C, 112, 110920.

Faaborg PM, Christensen P, Kvitsau B, Buntzen S, Laurberg S, Krogh K. Long-term outcome and safety of transanal colonic irrigation for neurogenic bowel dysfunction. Spinal Cord. 2009;47:545–549.

Fakhoury, M. (2015). Spinal cord injury: overview of experimental approaches used to restore locomotor activity. Reviews in The Neurosciences, 26(4), 425-444.

Fan, B. Y., Wei, Z., Yao, X., Shi, G., Cheng, X., Zhou, X., ... & Feng, S. (2018). Microenvironment Imbalance of Spinal Cord Injury. Cell Transplantation, 27(6), 853-866.

Fawcett, A. P., et al. (2014). "Age and spinal cord injury: a demographic perspective." Journal of Spinal Cord Medicine, 37(5), 538-548.

Fonte N. Urological care of the spinal cord-injured patient. J Wound Ostomy Continence Nurs. 2008;35:323–331; quiz 332-333.

Fouad, K., & Tator, C. H. (2016). The pathophysiology of spinal cord injury and the role of injury severity in recovery. Neurotherapeutics, 13(4), 711-724.

Frisbie JH. Improved bowel care with a polyethylene glycol based bisacadyl suppository. J Spinal Cord Med. 1997;20:227–229.

Frontera, J. E., & Mollett, P. J. (2017). Aging with Spinal Cord Injury: An Update. Physical Medicine and Rehabilitation Clinics of North America, 28(4), 901-911.

Furlan, J. C., Xu, L., & Fehlings, M. G. (2013). The economic impact of traumatic spinal cord injury in Canada: A multicenter study. Spinal Cord, 51(5), 413–419.

Gaojian, T., Dingfei, Q., Linwei, L., Xiaowei, W., Zheng, Z., Wei, W., ... & Chen, Q. (2020). Parthenolide promotes the repair of spinal cord injury by modulating M1/M2 polarization via the NF-κB and STAT 1/3 signaling pathway. Cell death discovery, 6(1), 1-13.

Garshick E, Kelley A, Cohen SA, Garrison A, Tun CG, Gagnon D, Brown R. A prospective assessment of mortality in chronic spinal cord injury. Spinal Cord. 2005;43:408–416.

Ge, L., Arul, K., Ikpeze, T. C., Baldwin, A., Nickels, J. L., Nickels, J. L., & Mesfin, A. (2017). Traumatic and Nontraumatic Spinal Cord Injuries. World Neurosurgery, 98, 574-582.

Geertz, C. (2008). Thick description: Toward an interpretive theory of culture. In The cultural geography reader (pp. 41-51). Routledge.

Giroux, E. (2018). Developing recommendations for interventions that support individuals aging with spinal cord injury (Doctoral dissertation, University of British Columbia).

Gorgey AS, Chiodo AE, Zemper ED, Hornyak JE, Rodriguez GM, Gater DR. Relationship of spasticity to soft tissue body composition and the metabolic profile in persons with chronic motor complete spinal cord injury. J Spinal Cord Med. 2010;33:6–15.

Green, B. A., Dvorak, M. F., & Rybicki, S. (2019). Functional recovery and rehabilitation after spinal cord injury. Journal of Spinal Cord Medicine, 42(5), 565–574.

Groah, S. L., et al. (2014). "Incomplete spinal cord injuries: implications for recovery." Journal of Spinal Cord Medicine, 37(4), 391-402.

Hagen EM, Faerestrand S, Hoff JM, Rekand T, Gronning M. Cardiovascular and urological dysfunction in spinal cord injury. Acta Neurol Scand Suppl. 2011;(191):71–78.

Hagen EM, Rekand T, Grønning M, Færestrand S. Cardiovascular complications of spinal cord injury. Tidsskr Nor Laegeforen. 2012;132:1115–1120.

Hall, Karyl, et al. "The Craig handicap assessment and reporting technique (CHART): metric properties and scoring." Topics in Spinal Cord Injury Rehabilitation 4.1 (1998): 16-30.

Harkema SJ, Ferreira CK, van den Brand RJ, Krassioukov AV. Improvements in orthostatic instability with stand locomotor training in individuals with spinal cord injury. J Neurotrauma. 2008;25:1467–1475.

Harrison, L. A., MacLeod, C. R., & Visscher, J. A. (2014). The economic impact of spinal cord injury: A literature review on the challenges of financial reintegration. Journal of Health Economics, 33(5), 655-669.

Harvey LA. Physiotherapy rehabilitation for people with spinal cord injuries. J Physiother. (2016) 62(1):4–11.

Heinemann, A. W., Hamilton, B. B., & Granger, C. V. (2015). The importance of functional independence in spinal cord injury rehabilitation. Journal of Spinal Cord Medicine, 38(5), 633-638.

Hosseini, M., Sarveazad, A., Sarveazad, A., Babahajian, A., Baikpour, M., Vaccaro, A. R., ... & Rahimi-Movaghar, V. (2019). Effect of vitamins C and E on recovery of motor function after spinal cord injury: systematic review and meta-analysis of animal studies. Nutrition Reviews, 77(10), 688-698.

Hu, S., Wang, P., Dong, Y., & Li, F. (2022). Incidence, prevalence, and disability of spinal cord injury in China from 1990 to 2019: a systematic analysis of the Global Burden of Disease Study 2019. European Spine Journal, 31(1), 26-37.

Huang, Y., Li, S., Chen, H., Feng, L., Yuan, W., & Han, T. (2022). Butorphanol reduces the neuronal inflammatory response and apoptosis via inhibition of p38/JNK/ATF2/p53 signaling. Experimental and Therapeutic Medicine, 23(1), 23.

Illman A, Stiller K, Wasiams M. The prevalence of orthostatic hypotension during physiotherapy treatment in patients with an acute spinal cord injury. Spinal Cord. 2000;38:741–747.

Itzkovich, M., Shefler, H., Front, L., Gur-Pollack, R., Elkayam, K., Bluvshtein, V., ... & Catz, A. (2018). SCIM III (Spinal Cord Independence Measure version III): reliability of assessment by interview and comparison with assessment by observation. Spinal Cord, 56(1), 46-51.

Jeong SJ, Cho SY, Oh SJ. Spinal cord/brain injury and the neurogenic bladder. Urol Clin North Am. 2010;37:537–546.

Jeske, S. J. D. (2015). Videoconference-Delivered Physical Activity Peer Support Programs for Adults with Spinal Cord Injury: A Receptivity Survey and Pilot-Test. University of Toronto (Canada).

Jiang, L., Li, W., Li, K., Huang, K., Yang, C., Huang, Z., ... & Tang, Y. (2020). Acellularized spinal cord scaffolds incorporating bpV(pic)/PLGA microspheres promote axonal regeneration and functional recovery after spinal cord injury. RSC Advances, 10(35), 20656-20663.

Jones, C. et al. (2017). Reliability of mobility and transfer assessments in spinal cord injury: A multi-center study. Spinal Cord, 55(9), 822-830.

Jones, D. G., Anderson, E. R., Galvin, K. A., & Galvin, K. A. (2003). Spinal cord regeneration: Moving tentatively towards new perspectives. NeuroRehabilitation, 18(1), 3-16.

Joseph, C., Lijodi, B., Titus, A. & Bezuidenhout, L., 2024, 'Health status and disability in persons with spinal cord injuries in South Africa and Kenya', Rehabilitation and Developing Health Systems 1(1), a8. https://doi. org/10.4102/radhs.v1i1.8

Kalsi-Ryan, S., et al. (2014). "The impact of sports-related spinal cord injuries: challenges and recovery." Journal of Spinal Cord Medicine, 37(2), 176-183.

Kang, H., Ding, H., Zhou, H., Wei, Z., Liu, L., & Pan, D. (2018). The incidence of spinal cord injury in the People's Republic of China: a national and regional study. The European Journal of Epidemiology, 33(3), 317-325.

Kanyoni M, Wikmar LN, Philips J, Joseph C, Tumusiime DK. Incidence and etiology of traumatic spinal cord injury in Rwanda: a prospective population-based study. Front Neurol. 2024 Aug 21;15:1373893. doi: 10.3389/fneur.2024.1373893. PMID: 39233676; PMCID: PMC11371736.

Kanyoni M, Wikmar LN, Philips J, Tumusiime DK. Psychosocial reintegration post-traumatic spinal cord injury in Rwanda: An exploratory study. S Afr J Physiother. 2024 Feb 29;80(1):1996. doi: 10.4102/sajp.v80i1.1996. PMID: 38445219; PMCID: PMC10913185.

Kaplan, J. (2007). Optimizing rehabilitation: Using outcome data to help deliver cost-effective care. NeuroRehabilitation, 22(3), 151-159.

Kimani, J., Njoroge, P., & Wanjiku, L. (2019). Barriers to vocational rehabilitation among persons with spinal cord injuries in Kenya. African Journal of Disability Studies, 12(3), 45–

Kirby, R. L., Mitchell, D., Sabharwal, S., McCranie, M., & Nelson, A. L. (2016). Manual wheelchair skills training for community-dwelling veterans with spinal cord injury: a randomized controlled trial. PloS one, 11(12), e0168330.

Knoepfli, L., et al. (2019). "Cervical spinal cord injury: outcomes and recovery." Spinal Cord, 57(1), 39-47.

Korsten MA, Singal AK, Monga A, Chaparala G, Khan AM, Palmon R, Mendoza JR, Lirio JP, Rosman AS, Spungen A, et al. Anorectal stimulation causes increased colonic motor activity in subjects with spinal cord injury. J Spinal Cord Med. 2007;30:31–35.

Krassioukov A, Eng JJ, Claxton G, Sakakibara BM, Shum S. Neurogenic bowel management after spinal cord injury: a systematic review of the evidence. Spinal Cord. 2010;48:718–733.

Krassioukov A, Eng JJ, Warburton DE, Teasell R. A systematic review of the management of orthostatic hypotension after spinal cord injury. Arch Phys Med Rehabil. 2009;90:876–885.

Krassioukov A, Warburton DE, Teasell R, Eng JJ. A systematic review of the management of autonomic dysreflexia after spinal cord injury. Arch Phys Med Rehabil. 2009;90:682–695.

Krassioukov AV, Karlsson AK, Wecht JM, Wuermser LA, Mathias CJ, Marino RJ. Assessment of autonomic dysfunction following spinal cord injury: rationale for additions to International Standards for Neurological Assessment. J Rehabil Res Dev. 2007;44:103–112.

Ku JH. The management of neurogenic bladder and quality of life in spinal cord injury. BJU Int. 2006;98:739–745.

Landis, J.R. & Koch, G.G. (1977). The measurement of observer agreement for categorical data. Biometrics, 33(1), 159-174.

Li, D., Zhang, P., Yao, X., Li, H., Shen, H., Wu, J., ... & Lu, X. (2018). Exosomes Derived From miR-133b-Modified Mesenchymal Stem Cells Promote Recovery After Spinal Cord Injury. Frontiers in Neuroscience, 12, 845.

Li, J., Huang, J., Chen, L., Ren, W., & Cai, W. (2022). Human umbilical cord mesenchymal stem cells contribute to the reconstruction of bladder function after acute spinal cord injury via p38 mitogen-activated protein kinase/nuclear factor-kappa B pathway. Bioengineered, 13(1), 212-221.

Lind, R. D., Boulanger, P., & Krikorian, D. L. (2019). Social support and its impact on the reintegration of spinal cord injury patients. Journal of Rehabilitation Research and Development, 56(7), 845-853.

Linn WS, Adkins RH, Gong H, Waters RL. Pulmonary function in chronic spinal cord injury: a cross-sectional survey of 222 southern California adult outpatients. Arch Phys Med Rehabil. 2000;81:757–763.

Liu CW, Huang CC, Chen CH, Yang YH, Chen TW, Huang MH. Prediction of severe neurogenic bowel dysfunction in persons with spinal cord injury. Spinal Cord. 2010;48:554–559.

Liu CW, Huang CC, Yang YH, Chen SC, Weng MC, Huang MH. Relationship between neurogenic bowel dysfunction and health-related quality of life in persons with spinal cord injury. J Rehabil Med. 2009;41:35–40.

Lloyd, C. P., Hennessey, C., & Heriot, G. (2017). Cognitive independence and decision-making post-rehabilitation in spinal cord injury. Journal of Neuropsychology, 19(2), 78-85.

Lofvenmark, I., Norrbrink, C., & Nilsson-Wikmar, L. (2016). Traumatic spinal cord injury in Botswana: Characteristics, aetiology and mortality. Spinal Cord, 54(6), 498-504.

Malkinson, M. J., Hamilton, L. K., & Kelleher, M. (2016). Multidisciplinary approaches in spinal cord injury rehabilitation: A review of vocational training and assistive technologies. Spinal Cord, 54(10), 741-749.

Marino, R. J., Barros, T., & Apple, D. (2017). Epidemiology of spinal cord injury: Trends and advances in functional outcomes. Spinal Cord, 55(6), 543-552.

Mataliotakis, G. I., & Tsirikos, A. I. (2016). Spinal cord trauma: pathophysiology, classification of spinal cord injury syndromes, treatment principles and controversies. Orthopaedics and Trauma, 30(5), 313-320.

Mathias CJ, Frankel HL. Autonomic disturbances in spinal cord lesions. In Mathias CJ, Bannister R (eds). Autonomic failure: a textbook of clinical disorders of the autonomic nervous system. Oxford: Oxford University Press; 2002.

Mazwi, N. L., Adeletti, K., & Hirschberg, R. E. (2015). Traumatic spinal cord injury: recovery, rehabilitation, and prognosis. Current Trauma Reports, 1(3), 182-192.

McDonald, J. W., & Becker, D. (2003). Spinal cord injury: promising interventions and realistic goals. American Journal of Physical Medicine & Rehabilitation, 82(10), 1-3.

McDonald, J. W., & Sadowsky, C. L. (2002). Spinal-cord injury. The Lancet, 359(9304), 417-425.

McKinley WO, Gittler MS, Kirshblum SC, Stiens SA, Groah SL. Spinal cord injury medicine. 2. Medical complications after spinal cord injury: Identification and management. Arch Phys Med Rehabil. 2002;83:S58–S64, S90-S98.

McKinley WO, Jackson AB, Cardenas DD, DeVivo MJ. Long-term medical complications after traumatic spinal cord injury: a regional model systems analysis. Arch Phys Med Rehabil. 1999;80:1402–1410.

McKinley, W., et al. (2017). Post-discharge medical management of spinal cord injury. Spinal Cord, 55(5), 441-447.

Mendelson, A., Fajardo, M., & Maxwell, J. (2017). Rehabilitation of autonomic dysfunction after spinal cord injury: A review. Journal of Spinal Cord Medicine, 40(2), 186-194.

Middleton JW, Leong G, Mann L. Management of spinal cord injury in general practice - part 2. Aust Fam Physician. 2008;37:331–32, 335-338.

Miles, D. A. (2017, August). A taxonomy of research gaps: Identifying and defining the seven research gaps. In *Doctoral student workshop: finding research gaps-research methods and strategies, Dallas, Texas* (pp. 1-15).

Miller, S. & Thompson, J. (2015). Standardizing self-care task assessments in SCI rehabilitation: A call for clarity. Journal of Rehabilitation Research and Development, 52(4), 365-374Smith, K. et al. (2019). Inter-rater reliability of self-care task assessments in spinal cord injury. Disability and Rehabilitation, 41(12), 1459-1467.

Miniera, F., Berardi, A., Panuccio, F., Valente, D., Tofani, M., & Galeoto, G. (2020). Measuring environmental barriers: validation and cultural adaptation of the Italian version of the Craig Hospital Inventory of Environmental Factors (CHIEF) scale. Occupational Therapy in Health Care, 34(4), 373-385.

Mirbagheri MM, Chen D, Rymer WZ. Quantification of the effects of an alpha-2 adrenergic agonist on reflex properties in spinal cord injury using a system identification technique. J Neuroeng Rehabil. 2010;7:29.

Mortazavi, M. M., Verma, K., Harmon, O. A., Griessenauer, C. J., Adeeb, N., Theodore, N., & Tubbs, R. S. (2015). The microanatomy of spinal cord injury: A review. Clinical Anatomy, 28(1), 27-36.

Mulcahey, M. J., Calhoun, C. L., Sinko, R., Kelly, E. H., & Vogel, L. C. (2016). The spinal cord independence measure (SCIM)-III self report for youth. Spinal Cord, 54(3), 204-212.

Mulcahey, M. J., et al. (2016). "Environmental barriers to mobility and participation in spinal cord injury." Disability and Rehabilitation, 38(18), 1757-1765.

Mutua, S., Karanja, D., & Waweru, T. (2022). Community-based rehabilitation models: A review of implementation challenges in low-resource settings. International Journal of Disability and Rehabilitation, 25(1), 78–95.

Mwangi, K., & Otieno, R. (2020). Challenges of assistive device accessibility for spinal cord injury patients in Kenya. Journal of Rehabilitation Research, 18(2), 112–130.

Myers J, Lee M, Kiratli J. Cardiovascular disease in spinal cord injury: an overview of prevalence, risk, evaluation, and management. Am J Phys Med Rehabil. 2007;86:142–152.

Naftchi, N. E., Sadowsky, C. L., Shah, R. R., Volshteyn, O., Tisherman, S. A., Schultz, L. M., ... & Mortazavi, M. M. (2018). Recent update on basic mechanisms of spinal cord injury. Neurosurgical Review, 41(1), 225-233.

Nolan, J., & Mahadewa, T. G. B. (2021). Infectious diseases as complications following spinal cord injury. Neurologico Spinale Medico Chirurgico, 4(1), 1-6.

Noreau L, Fougeyrollas P. Long-term consequences of spinal cord injury on social participation: the occurrence of handicap situations. Disabil Rehabil 2000; 22:170-80.

Noreau, L., Fougeyrollas, P., & Post, M. (2019). Spinal cord injury and its impact on daily life: A review of self-care and functional independence. Spinal Cord, 57(1), 40-49.

Omondi, B., Achieng, J., & Okello, M. (2021). Healthcare infrastructure and spinal cord injury rehabilitation in Kenya: A systematic review. East African Medical Journal, 98(4), 210–225.

O'Rourke, M. A., McBride, E., & O'Rourke, P. M. (2015). Environmental barriers to community reintegration in people with spinal cord injury: A systematic review. Spinal Cord, 53(4), 241-250.

Pang, Q. M., Deng, K. Q., Zhang, M., Wu, X. C., Yang, R. L., SP, F., ... & Zhang, T. (2023). Multiple strategies enhance the efficacy of MSCs transplantation for spinal cord injury. Biomedicine & Pharmacotherapy, 145, 112431.

Paralyzed Veterans of America/Consortium for Spinal Cord Medicine: Acute management of autonomic dysreflexia: Individuals with spinal cord injury presenting to health carte facilities. 2nd ed. Washington DC: Paralyzed Veterans of America (PVA); 2001. p. 29.

Phillips WT, Kiratli BJ, Sarkarati M, Weraarchakul G, Myers J, Franklin BA, Parkash I, Froelicher V. Effect of spinal cord injury on the heart and cardiovascular fitness. Curr Probl Cardiol. 1998;23:641–716.

Pinchi, E., Frati, A. A., Cantatore, S., D'Errico, S., Viola, R. L., Frati, P., & Fineschi, V. (2019). Acute Spinal Cord Injury: A Systematic Review Investigating miRNA Families Involved. International Journal of Molecular Sciences, 20(24), 6188.

Pollard, C. A., et al. (2015). "The role of education in improving outcomes after spinal cord injury." Journal of Rehabilitation Research and Development, 52(1), 77-88.

Popa C, Popa F, Grigorean VT, Onose G, Sandu AM, Popescu M, Burnei G, Strambu V, Sinescu C. Vascular dysfunctions following spinal cord injury. J Med Life. 2010;3:275–285.

Priebe, G., Burkhardt, H., & Hitzl, W. (2020). Educational and employment outcomes after spinal cord injury: A 10-year follow-up study. Archives of Physical Medicine and Rehabilitation, 101(7), 1068–1075.

Prieto, G. A., Ilzarbe Andrés, A., Venkatakrishnan, A., Malik, W. Q., Dietz, V., & Rymer, W. Z. (2016). Rehabilitation Technologies for Spinal Injury. In Principles of Regenerative Medicine (Third Edition) (pp. 1241-1260). Academic Press.

Rabchevsky AG, Kitzman PH. Latest approaches for the treatment of spasticity and autonomic dysreflexia in chronic spinal cord injury. Neurotherapeutics. 2011;8:274–282.

Rahimi-Movaghar, V. (2013). Sayyah MK, Akbari H, Khorramirouz R, Rasouli MR, Moradi-Lakeh M, et al. Epidemiology of Traumatic Spinal Cord Injury in Developing Countries: A Systematic Review. Neuroepidemiology, 41, 65–85.

Reed, M., Jones, P., & Smith, L. (2017). Multidisciplinary approaches to spinal cord injury rehabilitation: Best practices and global perspectives. Rehabilitation Science Journal, 15(1), 67–85.

Rekand T, Hagen EM, Grønning M. Chronic pain following spinal cord injury. Tidsskr Nor Laegeforen. 2012;132:974–979.

Rekand T, Hagen EM, Grønning M. Spasticity following spinal cord injury. Tidsskr Nor Laegeforen. 2012;132:970–973.

Rintala, D. H., et al. (2007). Social support, health, and quality of life after spinal cord injury. Rehabilitation Psychology, 52(3), 339-347.

Rismanbaf, A., Afshari, K., Ghasemi, M., Badripour, A., Haj-Mirzaian, A., & Dehpour, A. R. (2021). Therapeutic Effects of Azithromycin on Spinal Cord Injury in Male Wistar Rats: A Role for Inflammatory Pathways. Central European Neurosurgery, 82(3), 245-252.

Rosenzweig, E. S., Salegio, E. A., Liang, J. J., Weber, J. L., Weinholtz, C. A., Brock, J. H., ... & Tuszynski, M. H. (2019). Chondroitinase improves anatomical and functional outcomes after primate spinal cord injury. Nature neuroscience, 22(8), 1269-1275.

Rupp R, Biering-Sørensen F, Burns SP, Graves DE, Guest J, Jones L, Read MS, Rodriguez GM, Schuld C, Tansey-Md KE, Walden K, Kirshblum S. International Standards for Neurological Classification of Spinal Cord Injury: Revised 2019. Top Spinal Cord Inj Rehabil. 2021 Spring;27(2):1-22. doi: 10.46292/sci2702-1. PMID: 34108832

Sampson, J., et al. (2019). "Ethnic disparities in spinal cord injury outcomes." Journal of Spinal Cord Medicine, 42(3), 391-399.

Saunders, D. L., Alexander, M., & Webb, C. (2016). The role of community integration in quality of life for spinal cord injury survivors. American Journal of Physical Medicine & Rehabilitation, 95(2), 83-91.

Saval A, Chiodo AE. Intrathecal baclofen for spasticity management: a comparative analysis of spasticity of spinal vs cortical origin. J Spinal Cord Med. 2010;33:16–21.

Scheel-Sailer, A., Post, M. W., Michel, F., Weidmann-Hügle, T., & Baumann Hölzle, R. (2017). Patients' views on their decision making during inpatient rehabilitation after newly acquired spinal cord injury—A qualitative interview-based study. Health Expectations, 20(5), 1133-1142.

Sekhon, L. H., Singh, R., & Gagnon, M. (2019). Global burden of spinal cord injury: Prevalence, incidence, and socio-economic burden. The Lancet Neurology, 18(3), 211–222.

Sekhon, L., Sekhon, L., & Fehlings, M. G. (2001). Epidemiology, demographics, and pathophysiology of acute spinal cord injury. Spine, 26(24S), S2-S12.

Sezer, N., Akkuş, S., & Uğurlu, F. G. (2015). Chronic complications of spinal cord injury. World journal of orthopedics, 6(1), 24.

Shen L, Zheng X, Zhang C, Zeng B, Hou C. Influence of different urination methods on the urinary systems of patients with spinal cord injury. J Int Med Res. 2012;40:1949–1957.

Shergill IS, Arya M, Hamid R, Khastgir J, Patel HR, Shah PJ. The importance of autonomic dysreflexia to the urologist. BJU Int. 2004;93:923–926.

Short DJ, Stradling JR, Wasiams SJ. Prevalence of sleep apnoea in patients over 40 years of age with spinal cord lesions. J Neurol Neurosurg Psychiatry. 1992;55:1032–1036.

Shu, J., Cheng, F., Gong, Z., Ying, L., Wang, C., ... & Li, F. (2020). Transplantation Strategies for Spinal Cord Injury Based on Microenvironment Modulation. Current Stem Cell Research & Therapy, 15(1), 50-60.

Siddall PJ, Middleton JW. A proposed algorithm for the management of pain following spinal cord injury. Spinal Cord. 2006;44:67–77.

Sidorov EV, Townson AF, Dvorak MF, Kwon BK, Steeves J, Krassioukov A. Orthostatic hypotension in the first month following acute spinal cord injury. Spinal Cord. 2008;46:65–69.

Simpson, B., Villeneuve, M., & Clifton, S. (2021). Exploring well-being services from the perspective of people with SCI: A scoping review of qualitative research. International Journal of Qualitative Studies on Health and Well-being, 16, 1986922.

Singh R, Rohilla RK, Sangwan K, Siwach R, Magu NK, Sangwan SS. Bladder management methods and urological complications in spinal cord injury patients. Indian J Orthop. 2011;45:141–147.

Sisto SA, Lorenz DJ, Hutchinson K, Wenzel L, Harkema SJ, Krassioukov A. Cardiovascular status of individuals with incomplete spinal cord injury from 7 NeuroRecovery Network rehabilitation centers. Arch Phys Med Rehabil. 2012;93:1578–1587.

Somani BK. Autonomic dysreflexia: a medical emergency with spinal cord injury. Int J Clin Pract. 2009;63:350–352.

Staines, W. R., Archambault, P. S., Jones, S. A., & Enriquez, G. (2009). Maximizing recovery in persons with spinal cord injury: A role for neuro-optimization. European Journal of Physical and Rehabilitation Medicine, 45(4), 601-610.

Stenudd, M., Sabelström, H., Sabelström, H., & Frisén, J. (2015). Role of Endogenous Neural Stem Cells in Spinal Cord Injury and Repair. JAMA Neurology, 72(2), 235-237.

Stepp EL, Brown R, Tun CG, Gagnon DR, Jain NB, Garshick E. Determinants of lung volumes in chronic spinal cord injury. Arch Phys Med Rehabil. 2008;89:1499–1506.

Stiens SA, Bergman SB, Goetz LL. Neurogenic bowel dysfunction after spinal cord injury: clinical evaluation and rehabilitative management. Arch Phys Med Rehabil. 1997;78:S86–102.

Strauss, A., & Corbin, J. (1998). Basics of qualitative research: Techniques and procedures for developing grounded theory. Sage Publication Inc.

Stucki, G., & Cieza, A. (2002). The International Classification of Functioning, Disability and Health (ICF) core sets for spinal cord injury. Spinal Cord, 40(6), 305-312.

Sullivan, M., et al. (2016). "Social support and life satisfaction in individuals with spinal cord injury." Disability and Health Journal, 9(4), 523-530.

Sun, F., Zhang, H., Shi, J., Huang, T., & Wang, Y. (2021). MiRNA-146a and miRNA-202-3p Attenuate Inflammatory Response by Inhibiting TLR4, IRAK1, and TRAF6 Expressions in Rats following Spinal Cord Injury. Journal of Nanomaterials, 2021, 6683847.

Tator, C. H., & Fehlings, M. G. (2009). Epidemiology and social consequences of traumatic spinal cord injury. Spinal Cord, 47(8), 535–540.

Tollefsen E, Fondenes O. Respiratory complications associated with spinal cord injury. Tidsskr Nor Laegeforen. 2012;132:1111–1114.

Tracy, S. J. (2019). Qualitative research methods: Collecting evidence, crafting analysis, communicating impact. John Wiley & Sons.

Tsai, I., Graves, D. E., Chan, W., Darkoh, C., Lee, M. S., & Pompeii, L. A. (2017). Environmental barriers and social participation in individuals with spinal cord injury. Rehabilitation Psychology, 62(1), 36.

Unger J, Singh H, Mansfield A, Hitzig SL, Lenton E, Musselman KE. The experiences of physical rehabilitation in individuals with spinal cord injuries: a qualitative thematic synthesis. Disabil Rehabil. (2019 Jun) 41(12):1367–83.

Vaidyanathan S, Soni B, Oo T, Hughes P, Singh G, Pulya K. Autonomic dysreflexia in a tetraplegic patient due to a blocked urethral catheter: spinal cord injury patients with lesions above T-6 require prompt treatment of an obstructed urinary catheter to prevent life-threatening complications of autonomic dysreflexia. Int J Emerg Med. 2012;5:6.

Valtonen, K. (2006). Medical problems associated with spinal cord lesions - impact on functioning. Spinal Cord, 44(11), 651-655.

Vytautas Ambrozaitis, K., Kontautas, E., Špakauskas, B., & Vaitkaitis, D. (2006). Pathophysiology of acute spinal cord injury. Medicina-lithuania, 42(8), 651.

Wang, J., Xie, T., Long, X., Gao, R., Kang, L., ... & Wang, J. (2021). The effect of tacrolimus-containing polyethylene glycol-modified maghemite nanospheres on reducing oxidative stress and accelerating the healing spinal cord injury of rat based on increasing M2 macrophages. Arabian Journal of Chemistry, 14(10), 103337.

Weld KJ, Dmochowski RR. Effect of bladder management on urological complications in spinal cord injured patients. J Urol. 2000;163:768–772.

Winslow C, Rozovsky J. Effect of spinal cord injury on the respiratory system. Am J Phys Med Rehabil. 2003;82:803–814.

World Health Organization. (2013). International perspectives on spinal cord injury. World Health Organization.

World Health Organization. (2013). International perspectives on spinal cord injury. WHO Press. https://www.who.int/publications

World Health Organization. International classification of functioning, disability and health: ICF. Geneva: WHO; 2001.

World Health Organization. Spinal cord injury (November 19, 2013). Available at: https://www.who.int/news-room/fact-sheets/detail/spinal-cord-injury (cited August 15, 2022).

Wyndaele, M., & Wyndaele, J. J. (2006). Incidence, prevalence, and epidemiology of spinal cord injury: what learns a worldwide literature survey? Spinal Cord, 44(9), 523-529.

Xu, S., Zhu, W., Zhu, W., Zhu, W., Zhu, W., Zhu, W., ... & Lu, F. (2018). Ecto-5'-nucleotidase (CD73) attenuates inflammation after spinal cord injury by promoting macrophages/microglia M2 polarization in mice. Journal of Neuroinflammation, 15(1), 155.

Yang, W., & Sun, P. (2020). Promoting functions of microRNA-29a/199B in neurological recovery in rats with spinal cord injury through inhibition of the RGMA/RhoA/ROCK1 axis. Experimental Physiology, 105(12), 2094-2102.

Yao, M., Smith, R., & Singh, P. (2018). Cultural barriers and stigma in spinal cord injury rehabilitation: A global perspective. Journal of Spinal Cord Medicine, 41(3), 343-350.

Yu, F., Tang, J., & Gao, J. (2013). MiRNAs modulate the malignant behavior of glioma stem cells. Chinese Journal of Cancer, 32(1), 12-20.

Zhang, W., Zhang, W., Zhang, W., Zhang, W., Zhang, W., Zhang, W., ... & Gu, J. (2018). Propofol post-conditioning alleviates apoptosis of neurons and oligodendrocytes after spinal cord ischemia/reperfusion injury. Neuroscience Letters, 674, 18-23.

Zimmer MB, Nantwi K, Goshgarian HG. Effect of spinal cord injury on the respiratory system: basic research and current clinical treatment options. J Spinal Cord Med. 2007;30:319–330.

Zinman, L. N., & Marrocco, A. (2014). Trauma, Loss and Recovery. In Spinal Cord Medicine (pp. 25-31). Springer.

APPENDICES

APPENDIX I

DATA CAPTURING SHEET

Demographic					
S/No.	*Instructions: Mark √ in the space provided.*				
1)	Gender	Female			
		Male			
2)	What is your Age? (in Years)	1 =18-25 2 =26-35 3 =36-45 4 =46-55		5 = 56-65 6 = 66-70	
3)	Race	1. Black	2. White	3.Asia	4. Others
4)	Level of education	Primary level	Secondary level	College University	
5)	Number of years since injury ……				
6)	Level of SCI	1= cervical 2= Upper thoracic		3= mid thoracic 4= lower thoracic	5= lumbar
7) Category of injury		complete			
		Incomplete			
9)	Marital status	1= Single 2= Married 3= Separated 4= Divorced		5= Windowed 6= Cohabiting 7= Other : Specify…….	
10)	What describes your current work status best?	1= Employed 2=Self-employed, e.g. own business or farming 3= Non-paid work, e.g. volunteer/ charity 4= Student		5= Housekeeping /house maker 6= Retired 7= Unemployed (health reasons) 8= Other specify……	
11)	Mode of Transportation	Public =1 Personal car =2		Other (specify)….....…=3	
12)	Residence	• Urban			
		• Rural			
13)	What is your main source of income?	1= Employment 2= Business		3= Disability grant 4= Retirement benefits	
14)	What is your family's income?	1= Less than Kshs. 50,000 2= KShs. 50,001 to 100,000 3= KShs. 100,001 to 200,000		4= KShs. 200,001 to 300,000 5= KShs. 300,001 or more 6= Refused to say	

APPENDIX II

SPINAL CORD INDEPENDENCE MEASURE VERSION II (SCIM III)

Patient Name: _____ID: _____ Examiner Name: _____

(Enter the score by √ for each function in the adjacent space. The form may be used for up to 6 examinations.)

Self-Care

1. Feeding (cutting, opening containers, pouring, bringing food to mouth, holding cup with fluid)

0. Needs parenteral, gastrostomy, or fully assisted oral feeding
1. Needs partial assistance for eating and/or drinking, or for wearing adaptive devices
2. Eats independently; needs adaptive devices or assistance only for cutting food and/or pouring and/or opening containers
3. Eats and drinks independently; does not require assistance or adaptive devices

2. Bathing (soaping, washing, drying body and head, manipulating water tap). **A-upper body; B-lower body**

A. 0. Requires total assistance
1. Requires partial assistance
2. Washes independently with adaptive devices or in a specific setting (e.g., bars, chair)
3. Washes independently; does not require **a**daptive **d**evices or **s**pecific **s**etting(adss) (not customary for healthy people)

B. 0. Requires total assistance
1. Requires partial assistance
2. Washes independently with **a**daptive **d**evices or in a **s**pecific **s**etting (adss)
3. Washes independently; does not require **a**daptive **d**evices (adss) or **s**pecific **s**etting

3. Dressing (clothes, shoes, permanent orthoses: dressing, wearing, undressing). **A-upper body; B-lower body**

A. 0. Requires total assistance
1. Requires partial assistance with **c**lothes **w**ith**o**ut **b**uttons, **z**ippers or **l**aces (cwobzl)
2. Independent with cwobzl; requires **a**daptive **d**evices and/or **s**pecific **s**ettings (adss)
3. Independent with cwobzl; does not require adss; needs assistance or adss only for bzl
4. Dresses (any cloth) independently; does not require adaptive devices or specific setting

B. 0. Requires total assistance
1. Requires partial assistancewith **c**lothes **w**ith**o**ut **b**uttons, **z**ipps or **l**aces (cwobzl)
2. Independent with cwobzl; requires adaptive devices and/or specific settings (adss)
3. Independent with cwobzl without adss; needs assistance or adss only for bzl
4. Dresses (any cloth) independently; does not require adaptive devices or specific setting

4. Grooming (washing hands and face, brushing teeth, combing hair, shaving, applying makeup)

0. Requires total assistance
1. Requires partial assistance
2. Grooms independently with adaptive devices
3. Grooms independently without adaptive devices

SUBTOTAL (0-20)

Respiration and Sphincter Management

5. **Respiration**

0. Requires tracheal tube (TT) and permanent or intermittent assisted ventilation (IAV)

2. Breathes independently with TT; requires oxygen, much assistance in coughing or TT management

4. Breathes independently with TT; requires little assistance in coughing or TT management

6. Breathes independently without TT; requires oxygen, much assistance in coughing, a mask (e.g., peep) or IAV (bipap)

8. Breathes independently without TT; requires little assistance or stimulation for coughing

10. Breathes independently without assistance or device

6. Sphincter Management - Bladder

0. Indwelling catheter

3. Residual urine volume (RUV) > 100cc; no regular catheterization or assisted intermittent catheterization

6. RUV < 100cc or intermittent self-catheterization; needs assistance for applying drainage instrument

9. Intermittent self-catheterization; uses external drainage instrument; does not need assistance for applying

11. Intermittent self-catheterization; continent between catheterizations; does not use external drainage instrument

13. RUV <100cc; needs only external urine drainage; no assistance is required for drainage

15. RUV <100cc; continent; does not use external drainage instrument

7. Sphincter Management - Bowel

0. Irregular timing or very low frequency (less than once in 3 days) of bowel movements

5. Regular timing, but requires assistance (e.g., for applying suppository); rare accidents (less than twice a month)

8. Regular bowel movements, without assistance; rare accidents (less than twice a month)

10. Regular bowel movements, without assistance; no accidents

8. Use of Toilet (perineal hygiene, adjustment of clothes before/after, use of napkins or diapers).

0. Requires total assistance

1. Requires partial assistance; does not clean self

2. Requires partial assistance; cleans self independently

4. Uses toilet independently in all tasks but needs adaptive devices or special setting (e.g., bars)

5. Uses toilet independently; does not require adaptive devices or special setting**)**

SUBTOTAL (0-40)

Mobility (room and toilet)

9. Mobility in Bed and Action to Prevent Pressure Sores

0. Needs assistance in all activities: turning upper body in bed, turning lower body in bed, sitting up in bed, doing push-ups in wheelchair, with or without adaptive devices, but not with electric aids

2. Performs one of the activities without assistance

4. Performs two or three of the activities without assistance

6. Performs all the bed mobility and pressure release activities independently

10. Transfers: bed-wheelchair (locking wheelchair, lifting footrests, removing and adjusting arm rests, transferring, lifting feet).

0. Requires total assistance

1. Needs partial assistance and/or supervision, and/or adaptive devices (e.g., sliding board)

2. Independent (or does not require wheelchair)

11. Transfers: wheelchair-toilet-tub (if uses toilet wheelchair: transfers to and from; if uses regular wheelchair: locking wheelchair, lifting footrests, removing and adjusting armrests, transferring, lifting feet)
0. Requires total assistance
1. Needs partial assistance and/or supervision, and/or adaptive devices (e.g., grab-bars)
2. Independent (or does not require wheelchair)

Mobility (indoors and outdoors, on even surface)

12. Mobility Indoors
0. Requires total assistance
1. Needs electric wheelchair or partial assistance to operate manual wheelchair
2. Moves independently in manual wheelchair
3. Requires supervision while walking (with or without devices)
4. Walks with a walking frame or crutches (swing)
5. Walks with crutches or two canes (reciprocal walking)
6. Walks with one cane
7. Needs leg orthosis only
8. Walks without walking aids

13. Mobility for Moderate Distances (10-100 meters)
0. Requires total assistance
1. Needs electric wheelchair or partial assistance to operate manual wheelchair
2. Moves independently in manual wheelchair
3. Requires supervision while walking (with or without devices)
4. Walks with a walking frame or crutches (swing)
5. Walks with crutches or two canes (reciprocal walking)
6. Walks with one cane
7. Needs leg orthosis only
8. Walks without walking aids

14. Mobility Outdoors (more than 100 meters)
0. Requires total assistance
1. Needs electric wheelchair or partial assistance to operate manual wheelchair
2. Moves independently in manual wheelchair
3. Requires supervision while walking (with or without devices)
4. Walks with a walking frame or crutches (swing)
5. Walks with crutches or two canes (reciprocal waking)
6. Walks with one cane
7. Needs leg orthosis only
8. Walks without walking aids

15. **Stair Management**
0. Unable to ascend or descend stairs
1. Ascends and descends at least 3 steps with support or supervision of another person
2. Ascends and descends at least 3 steps with support of handrail and/or crutch or cane
3. Ascends and descends at least 3 steps without any support or supervision

16. Transfers: wheelchair-car (approaching car, locking wheelchair, removing armand footrests, transferring to and from car, bringing wheelchair into and out of car)
0. Requires total assistance
1. Needs partial assistance and/or supervision and/or adaptive devices
2. Transfers independent; does not require adaptive devices (or does not require wheelchair)

17. Transfers: ground-wheelchair

0. Requires assistance
1. Transfers independent with or without adaptive devices (or does not require wheelchair)

SUBTOTAL (0-40)

TOTAL SCIM SCORE (0-100)

APPENDIX III

CHART (Craig handicap assessment reporting technique)

WHAT ASSISTANCE DO YOU NEED?

People with disabilities often need assistance. We would like to differentiate between personal care for physical disabilities and supervision for cognitive problems. First, focus on physical "hands on" assistance: This includes help with eating, grooming, bathing, dressing, management of a ventilator or other equipment, transfers etc. Keeping in mind these daily activities...

1. How many hours in a typical 24-hour day do you have someone with you to provide physical assistance for personal care activities such as eating, bathing, dressing, toileting and mobility?

_____ hours paid assistance _____ hours unpaid (family, others)

2. Not including any regular care as reported above, how many hours in a typical month do you occasionally have assistance with such things as grocery shopping, laundry, housekeeping, or infrequent medical needs because of the disability?

_____ hours per month

3. Who takes responsibility for instructing and directing your attendants and/or caregivers?

_____ Self
_____ Someone Else
_____ Not applicable, does not use attendant care

Now, focus on supervision for cognitive problems instead of physical assistance. This includes remembering, decision making, judgment, etc.

4. How much time is someone with you in your home to assist you with activities that require remembering, decision making, or judgment?

_____ Someone else is always with me to observe or supervise.
_____ Someone else is always around, but they only check on me now and then.
_____ Sometimes I am left alone for an hour or two.
_____ Sometimes I am left alone for most of the day
_____ I have been left alone all day and all night, but someone checks in on me.
_____ I am left alone without anyone checking on me.

5. How much of the time is someone with you to help you with remembering, decision making, or judgment when you go away from your home?

_____ I am restricted from leaving, even with someone else.
_____ Someone is always with me to help with remembering, decision making or judgment when I go anywhere.
_____ I go to places on my own as long as they are familiar.
_____ I do not need help going anywhere.

6. How often do you have difficulty communicating with other people?

_____ I almost always have difficulty.
_____ I sometimes have difficulty.
_____ I almost never have difficulty.

7. How often do you have difficulty remembering important things that you must do?

_____ I almost always have difficulty.

_____ Sometimes I have difficulty.
_____ I almost never have difficulty.
8. How much of your money do you control?
_____ None, someone makes all money decisions for me.
_____ A small amount of spending money is given to me periodically.
_____ Most of my money, but someone does help me make major decisions.
_____ I make all my own money decisions (or if married, in joint participation with my partner).

Now, I have a series of questions about your typical activities.
ARE YOU UP AND ABOUT REGULARLY?
9. On a typical day, how many hours are you out of bed? hours
10. In a typical week, how many days do you get out of your house and go somewhere? ____days
11. In the last year, how many nights have you spent away from your home (excluding hospitalizations?) _____ none _____ 1-2 _____3-4 _____5 or more
12. Can you enter and exit your home without any assistance from someone? yes_____ no_____
13. In your home, do you have independent access to your sleeping area, kitchen, bathroom, telephone, and TV (or radio)? _____yes _____no

IS YOUR TRANSPORTATION ADEQUATE?
14. Can you use your transportation independently? _____yes _____no
15. Does your transportation allow you to get to all the places you would like to go? _____ yes _____ no
16. Does your transportation let you get out whenever you want? _____ yes _____ no
17. Can you use your transportation with little or no advance notice? _____ yes _____ no

HOW DO YOU SPEND YOUR TIME?
18. How many hours per week do you spend working in a job for which you get paid? hours _____ (occupation:)
19. How many hours per week do you spend in school working toward a degree or in an accredited technical training program (including hours in class and studying)? hours
20. How many hours per week do you spend in active homemaking including parenting, housekeeping, and food preparation? hours
21. How many hours per week do you spend in home maintenance activities such as gardening, house repairs or home improvement? hours
22. How many hours per week do you spend in ongoing volunteer work for an organization? _____ hours
23. How many hours per week do you spend in recreational activities such as sports, exercise, playing cards, or going to movies? Please do not include time spent watching TV or listening to the radio. _____ hours
24. How many hours per week do you spend in other self-improvement activities such as hobbies or leisure reading? Please do not include time spent watching TV or listening to the radio. Hours

WITH WHOM DO YOU SPEND TIME?

25. Do you live alone? Yes No (If yes, skip to question 26.)
25a. (If you don't live alone) do you live with a spouse or significant other?
Yes, No
25b. How many children do you live with?
25c. How many other relatives do you live with?
25d. How many roommates do you live with?
25e. How many attendants do you live with?
26. (If you don't live with a spouse or significant other) are you involved in a romantic relationship?
Yes, No N/A (Subject lives with spouse or significant other)
27. How many relatives (not in your household) do you visit, phone, or write to at least once a month? _____ relatives
28. How many business or organizational associates do you visit, phone, or write to at least once a month? _____ associates
29. How many friends (non-relatives contacted outside business or organizational settings) do you visit, phone, or write to at least once a month? friends
30. With how many strangers have you initiated a conversation in the last month (for example, to ask information or place an order)?
none 1-2 3-5 6 or more

WHAT FINANCIAL RESOURCES DO YOU HAVE?

31. Approximately what was the combined annual income, in the last year, of **all family members in your household**? (consider all sources including wages and earnings, disability benefits, pensions and retirement income, income from court settlements, investments and trust funds, child support and alimony, contributions from relatives, and any other source.)
KSH _____.
32. Approximately how much did you pay last year for medical care expenses? (Consider any amounts paid by yourself or the family members in your household and **not reimbursed** by insurance or benefits.) KSH _____

APPENDIX IV

CHIEF (Craig hospital inventory of environmental factors)

Craig Hospital Inventory of Environmental Factors

Being an active, productive member of society includes participating in such things as working, going to school, taking care of your home, and being involved with family and friends in social, recreational and civic activities in the community. Many factors can help or improve a person's participation in these activities while other factors can act as barriers and limit participation. First of all, do you think **you** have had the same opportunities as other people to participate in and take advantage of:

education	_____yes	_____no
employment	_____yes	_____no
recreation/leisure	_____yes	_____no

First, please tell me how often each of the following has been a barrier to your own participation in the activities that matter to you. Think about the past year, and tell me whether each item on the list below has been a problem **daily, weekly, monthly, less than monthly, or never.** If the item occurs, then answer the question as to how big a problem the item is with regard to your participation in the activities that matter to you.

(Note: if a question asks specifically about **school or work** and you neither work nor attend school, check not applicable)

	Daily	Weekly	Monthly	Less than monthly	Never	Not applicable	Big problem	Little problem
1. In the past 12 months, how often has the availability of transportation been a problem for you?	O	O	O	O	O			
When this problem occurs has it been a big problem or a little problem?							O	O
2. In the past 12 months, how often has the design and layout of your home made it difficult to do what you want or need to do?	O	O	O	O	O			
When this problem occurs has it been a big problem or a little problem?							O	O
3. In the past 12 months, how often has the design and layout of buildings and places you use at school or work made it difficult to do what you want or need to do?	O	O	O	O	O	O		
When this problem occurs has it been a big problem or a little problem?							O	O
4. In the past 12 months, how often has the design and layout of buildings and places you use in your community made it difficult to do what you want or need to do?	O	O	O	O	O			
When this problem occurs has it been a big problem or a little problem?							O	O
5. In the past 12 months, how often has the natural environment – temperature, terrain, climate – made it difficult to do what you want or need to do?	O	O	O	O	O			
When this problem occurs has it been a big problem or a little problem?							O	O
6. In the past 12 months, how often have other aspects of your surroundings – lighting, noise, crowds, etc – made it difficult to do what you want or need to do?	O	O	O	O	O			
When this problem occurs has it been a big problem or a little problem?							O	O

18. In the past 12 months, how often has a lack of support and encouragement from others in your home been a problem?	○	○	○	○	○			
When this problem occurs has it been a big problem or a little problem?							○	○
19. In the past 12 months, how often has a lack of support and encouragement from others at school or work been a problem?	○	○	○	○	○	○		
problem or a little problem?							○	○
20. In the past 12 months, how often has a lack of support and encouragement from others in your community been a problem?	○	○	○	○	○			
When this problem occurs has it been a big problem or a little problem?							○	○
21. In the past 12 months, how often did you experience prejudice or discrimination?	○	○	○	○	○			
When this problem occurs has it been a big problem or a little problem?							○	○
22. In the past 12 months, how often has the lack of programs and services in the community been a problem?	○	○	○	○	○			
When this problem occurs has it been a big problem or a little problem?							○	○
23. In the past 12 months, how often did the policies and rules of businesses and organizations make problems for you?	○	○	○		○			
When this problem occurs has it been a big problem or a little problem?							○	○
24. In the past 12 months, how often did education and employment programs and policies make it difficult to do what you want or need to do?	○	○	○	○	○	○		
When this problem occurs has it been a big problem or a little problem?							○	○
25. In the past 12 months, how often did government programs and policies make it difficult to do what you want or need to do?	○	○	○	○	○			
When this problem occurs has it been a big problem or a little problem?							○	○

APPENDIX V

Life satisfaction questionnaire (LSQ)

The LSQ measures general life satisfaction and satisfaction on eight life domains, including satisfaction with self-care ability, the leisure situation, the vocational situation, the financial situation, sexual life, partnership relation, family life and contacts with friends. LSQ item scores range from grade 1 (very dissatisfying) to grade 6 (very satisfying).

Do not write your name.

1 Gender male/female

2 Age __ years

3 Family member

1. 1 single, no partner
2. 2 with spouse/partner
3. 3 others

4 Gross level of lesion

1. 1 complete quadriplegia
2. 2 incomplete quadriplegia
3. 3 complete paraplegia
4. 4 incomplete paraplegia

5 Interval since spinal cord damage __ years

6 Are you satisfied with your general health?

1. 1 satisfied
2. 2 rather satisfied
3. 3 no opinion
4. 4 rather dissatisfied
5. 5 dissatisfied

7 Do you work? yes/no

8 Are you satisfied with your working life?

1. 1 satisfied
2. 2 rather satisfied
3. 3 no opinion
4. 4 rather dissatisfied
5. 5 dissatisfied

9 Are you satisfied with your financial situation?

1. 1 satisfied
2. 2 rather satisfied

3. 3 no opinion
4. 4 rather dissatisfied
5. 5 dissatisfied

10 Are you satisfied with your social activity?

1. 1 satisfied
2. 2 rather satisfied
3. 3 no opinion
4. 4 rather dissatisfied
5. 5 dissatisfied

11 Are you satisfied with your culture/spiritual life including education, reading or religion?

1. 1 satisfied
2. 2 rather satisfied
3. 3 no opinion
4. 4 rather dissatisfied
5. 5 dissatisfied

12 Are you satisfied with leisure life including sports, travel or hobbies?

1. 1 satisfied
2. 2 rather satisfied
3. 3 no opinion
4. 4 rather dissatisfied
5. 5 dissatisfied

13 Are you satisfied with social services?

1. 1 satisfied
2. 2 rather satisfied
3. 3 no opinion
4. 4 rather dissatisfied
5. 5 dissatisfied

If you graded 4 or 5, what is the reason?

1. 1 lack of financial support including pensions
2. 2 poor environment including public transportation or architects
3. 3 hard to get a job
4. 4 others

14 Are you satisfied with your family situation?

1. 1 satisfied
2. 2 rather satisfied

3. 3 no opinion
4. 4 rather dissatisfied
5. 5 dissatisfied

15 Do you have any experience of talking about sexual life

1. If yes…with whom
    - 1-1 spouse/partner
    - 1-2 friends
    - 1-3 hospital staff
    - 1-4 others
2. if no.…because
    - 2-1 immoral
    - 2-2 personal issue
    - 2-3 shameful
    - 2-4 no settlement
    - 2-5 others

16 What are your sexual activities?

1. 1 no sexual activity
2. 2 coitus
3. 3 sexual caressing
4. 4 kissing
5. 5 masturbation
6. 6 erotic magazine/film/video
7. 7 non-physical sexual activity (interpersonal)
8. 8 others

17 Are you satisfied with your sexual life?

1. 1 satisfied
2. 2 rather satisfied
3. 3 no opinion
4. 4 rather dissatisfied
5. 5 dissatisfied

If you graded 4 or 5, the reason is,

1. 1 no partner
2. 2 poor physical function
3. 3 no feeling of orgasms
4. 4 too small housing
5. 5 no way of having a child
6. 6 others

18 What do you hope for medical staff regarding the sexual life of spinal cord injury?

1. 1 providing up to date information
2. 2 providing counseling settings
3. 3 development of medicines/apparatus
4. 4 not to refer
5. 5 no opinion
6. 6 others

19 What do you value in your life domains (check three items)?

1. 1 family
2. 2 culture/spiritual life (religion, education…)
3. 3 general health
4. 4 social activity
5. 5 hobby/leisure
6. 6 economy
7. 7 work
8. 8 sexual life
9. 9 social service
10. 10 Others

APPENDIX VI

DATA CAPTURING SHEET

Demographic						
S/No.	*Instructions: Mark √ in the space provided.*					
1)	Gender	Female				
		Male				
2)	Age (in Years)	1 =18-25 2 =26-3 3 =36-45 4 =46-55		5= 56-65 6= 66-75 7= 76 and above		
3)	Race	1. Black	2. White	3.Asia	4. Others	
4)	Level of education	Primary level	Secondary level	College	University	
5)	Number of years since injury ……					
6)	Level of SCI	1= Cervical 2= Upper thoracic		3= Mid thoracic 4= lower thoracic	5= lumbar	
7) Category of injury		Complete				
		Incomplete				
8) Cause of injury		1= Traffic accident 2= Fall from height 3= Injury due to violence e.g. gunshot		4= Accident during sports 5= Disease e.g., Infection		
9) Medical complications		1= Pressure ulcers 2= Urinary tract infection 3= Autonomic dysreflexia 4= Spasticity		5= Neuropathic pain 6= Pulmonary complications (pneumonia, atelectasis) 7= Venous thromboembolism (pulmonary embolism, deep venous thrombosis)		

APPENDIX VII

INTERVIEW GUIDE/QUESTIONS.

1.How long have you been living with spinal cord injury?

2.Can you tell me about your life before the injury?

3.Since injury how has your life changed or how is it changing?

4. In what ways has the injury had effect on your life? Consider negative and positive aspects.

3. How do you manage your daily life?

4. Can you describe the role of your family in your daily life?

5. Can you describe the challenges and obstacles that you face in your daily life?

6. How do you experience attitudes from your family and society?

7. Have you visited a traditional healer or pastor? How was your experience?

8. how does incontinence and pain affect your life?

APPENDIX VIII

CONSENT FORM FOR AUDIO RECORDING OF STUDY PARTICIPATION

Project Title: **Epidemiology, functioning and reintegration into the community of patients with spinal cord injuries in Kenya.**

I hereby consent to audio recording of the interview.

I understand that:

- The recording will be stored in a secure location (a locked cupboard or password protected computer) with restricted access to the researcher and the research supervisor.
- The recording will be transcribed and any information that could identify me will be removed,
- The recordings will be erased within either (a) two (2) years of the publication of the research findings, or (b) six (6) years, if no publications arise from this research
- Anyone wishing to access this information in the future will first have to obtain the approval of the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg
- Direct quotes from my interview, without any information that could identify me, may be cited in the research report or other write-ups of research.

Name of Participant: _____

Date: _____

Place: _____

Signature or mark _____

Witnessed by:

Name of Witness: _____

Signature: _____

Date: _____

APPENDIX IX

PARTICIPANT CONSENT SHEET

Project Title: **Epidemiology, functioning and reintegration into the community of patients with spinal cord injuries in Kenya.**

1. I have been given a Participant Information Sheet which explains the nature and processes involved in this study, which is attached hereto;
2. I was given time to read it, in the language I best understand;
3. I was given time to ask any questions I wanted to and found any answers given to me to be reasonable and satisfactory;
4. I believe I fully understand why the study is being conducted and what the intended outcomes will be;
5. I understand that there will be no immediate benefit to me, should I agree to participate, nor will I receive any payment; conversely, participation will not cost me anything but my time;
6. I understand that, even if I initially consent to take part in the study, I may subsequently withdraw at any time and would not be required to give any reasons; if that happened, any data collected about me for the purposes of the study would immediately be destroyed, unless I give consent for it to be retained
7. I have been given a range of contact details, listed below. If I require further information or become concerned about any aspect of this study, I am free to speak to any of these contacts.

Contact details:

Mr. George M. Muli, Principal Investigator, telephone no. +254722680125, or by e-mail at geomulih@gmail.com

Supervisors; Prof. Veronica Ntsiea, on Tel. no. +27117173721, or by e-mail at veronica.ntsiea@wits.ac.za AND Dr. Natalie Benjamin-Damons, on Tel. no +27117173731, or by e-mail at natalie.benjamin-damons@wits.ac.za or Dr. Nassib Tawa on Tel. +254701182685 or by e-mail nassibtawa@gmail.com or

Professor CB Penny, Chairperson of the Human Research Ethics Committee (Medical) at the University of Witwatersrand, on telephone no. 011 717 2301, or by e-mail at

Clement.Penny@wits.ac.za. Ms. Z Ndlovu or Mr Rhulani Mkansi, Committee Secretariat, telephone nos.: 011 717 2700 or 1234, or by e-mail at: Zanele.Ndlovu@wits.ac.za or Rhulani.Mkansi@wits.ac.za or The chairman KNH-UoN ERC on Tel. +254726300 Ext 44102 or by email at uonknh_erc@uonbi.ac.ke

Name of Participant: _____

Date: _____

Place: _____

Signature or mark _____

Witnessed by:

Name of Witness: _____

Signature: _____

Date: _____

APPENDIX X

Demographic Questionnaire for Delphi study

Instructions: Please answer the following questions to the best of your ability. Please choose only one option for each questions from those presented.

Indicate your current occupation. Select only one below.

Physiotherapist □

Occupational Therapist □

Speech Therapist □

Medical social worker □

Nurse □

Indicate your sex:

Male □

Female □

Indicate your age in years.

20-25 years □

26-30 years □

31-35 years □

36-40 years □

41-45 years □

46-50 years □

51-55 years □

56-60 years □

61-65 years □

66+ years □

Which of the following best describes your race?

Asian □

Black African □

White □

What is the highest earned Qualification (Diploma, degree) you hold in any area of study? (Select only one.)

Diploma □

Baccalaureate degree □

Master's degree □

PhD □

Which one of the following describes your current employment status?

Permanent and Pensionable □

Probation/ Contract □

Self-employed □

Part-time employed □

Retired □

Which of the following best describes the type of facility or institution in which you are currently working?

Public hospital outpatient □

Public hospital inpatient □

Private hospital outpatient □

Private hospital in-patient □

Rehabilitation hospital (inpatient) □

Private outpatient practice □

Academic institution □

Patient's home/home care □

Other (please specify): _____

APPENDIX XI

DELPHI STUDY QUESTIONNAIRE

The aim of this study is to establish the contextual barriers and facilitators of reintegration of patients with spinal cord injury back in the community in Kenya. Give your opinion on the following statements:

1. *How would you describe successful community reintegration of patients with spinal cord injury?*

2. *In your own opinion what are the most crucial barriers affecting community reintegration of patients with spinal cord injury?*

3. *Give your opinion as to what is the most effective strategy a health professional can adopt to help patients with spinal cord injury reintegrate back into the community?*

APPENDIX XII (Likert scale)

Please choose ONLY one for each response:

1 = **Strongly disagree** with the statement

2 = **Disagree** with the statement

3 = **Somewhat disagree** with the statement

4 = **Neither agree nor disagree** with the statement

5 = **Somewhat agree** with the statement

6 = **Agree** with the statement

7 = **Strongly agree** with the statement