



A qualitative exploration of factors influencing functional outcomes after road traffic orthopaedic injuries: perspectives from Rwandan victims and healthcare providers

JC Allen Ingabire¹, Aimee Stewart², Jean Baptiste Sagahutu³, Gerard Urimubenshi³, Georges Bucyibaruta⁴, Carine Uwakunda⁵, Claudine Uwera¹, JP Nganabashaka¹, Joel Nshumuyiki¹, Sonti Pilusa², David K. Tumusiime³

Correspondence: JC Allen Ingabire, ijea2000@gmail.com, +250788549975

Abstract

Background: The burden of road traffic injury-related deaths and disabilities is disproportionately high in low- and middle-income nations. Extremity injuries impair patients' quality of life in addition to the physical limitations that affect their ability to function at work and at school.

Aim: The study investigated the factors influencing functional outcomes following road traffic orthopaedic injuries victims (RTOI) in Rwanda.

Methods: Road Traffic Injuries victims treated at five Rwandan referral hospitals for orthopaedic injuries from January 1, 2019, to December 31, 2019, were interviewed in detail till data saturation. Interviews with emergency doctors, nurses, physiotherapists, and orthopaedic surgeons continued until saturation. Patients aged 18 years and older with various orthopaedic injuries and urban or rural locations were chosen. NVivo thematic analysis was used to evaluate in-depth interview data. To minimize biases and accurately reflect participants' experiences, independent coding, detailed methodological descriptions, triangulation, member checks, peer debriefing, and reflexive journaling ensured credibility, transferability, dependability, confirmability, and reflexivity.

Findings: Our study highlights the challenges faced by healthcare providers and RTOI victims in Rwanda, including insufficient resources, long waiting times, inadequate infrastructure, and a complex referral system. These issues impair therapeutic effectiveness and prolong hospitalizations, particularly for rural patients. Timely management of RTOIs, including access to physiotherapy, early medical procedures, and psychological follow-up, is crucial for enhancing functional outcomes. Training of emergency and trauma management personnel could involve establishing basic training programs, facilitating equipment availability, setting up trauma centres, and specialised nurses.

Conclusion: This study highlights the factors that influence the functional outcome of road traffic orthopaedic injuries survivors in Rwanda, as stated by the victims and healthcare providers. These injuries cause physical health issues, work disruptions, social isolation, financial pressure, and psychological suffering. Strategies to improve outcomes include patient satisfaction surveys, interdisciplinary teams, timely management, good rehabilitation services, and trauma training.

Cite as: JC Allen Ingabire, Aimee Stewart, G.Urimubenshi, JB Sagahutu, David K.Tumusiime et al. A qualitative exploration of factors influencing functional outcomes after road traffic orthopaedic injuries: perspectives from Rwandan victims and healthcare providers. *Impact Surgery*. 2024;1(4):124- . Doi: <https://doi.org/10.62463/surgery.82>

1. Department of Surgery, University Teaching Hospital of Kigali, University of Rwanda, Rwanda
2. Physiotherapy Department, University of the Witwatersrand, South Africa
3. Physiotherapy Department, University of Rwanda, Rwanda
4. Center for Equity in Global Surgery; University of Global Health Equity
5. Department of Surgery, Kibagabaga Level II Teaching Hospital, Rwanda



Background

Road Traffic Injuries (RTIs) have a huge and detrimental impact on individuals and society, causing long-term disability and imposing substantial economic and societal burdens globally (1–3). Each year, over 50 million individuals sustain injuries, and 1.2 million fatalities result from RTIs, resulting in lasting disability for 30% of survivors and rendering 14% unable to resume employment(4). The impact of this phenomenon is predominantly observed among adults of working age in nations with low and middle incomes(5–7). This has far-reaching implications for individuals, society, and the economy as a whole (8).

Severe physical impairment and psychological suffering can result in both short- and long-term problems for survivors of traffic accidents. Following an orthopaedic injury, a string of unfavourable incidents may occur, which may cause significant alterations to life circumstances and quality of life (QOL) for several months or years(9). In Sierra Leone, Rwanda, Nepal, and Uganda, over 38.5% of RTI victims experienced impairment; the most prevalent injuries were to the head and extremities (10). Injury severity and economic factors, particularly for the victims' families, have an impact on disability following RTIs in developing countries (1). In many developing countries, road traffic disabilities impact 1.2%–14% of victims, the majority of whom originate from low-income households (11,12).

In 2019, the Rwanda National Police documented a total of 4661 injuries and 700 deaths resulting from road accidents. For these injuries, half had orthopaedic problems, and 35.6% had lifetime injuries. Additionally, 36% of victims were unable to return to work. Age, gender, socioeconomic status, the severity of the injury, rehabilitation, and hospital length of stay affect the level of disability and social reintegration of the road traffic orthopaedic injuries in Rwanda (13,14).

A holistic biopsychosocial approach is proposed to understand recovery from mild to moderate RTI. Factors like general health, catastrophizing, pain, social support, and compensation influence recovery, with strong correlations found between pre-injury physical and mental health, pain duration, severity, and catastrophizing(15). The post-injury factors influencing functional outcomes from the perspective of road traffic orthopaedic victims and the healthcare personnel managing these injuries in developing countries have not received much attention in qualitative research up to this point(16,17). This qualitative study investigated the factors influencing functional outcomes following road traffic orthopaedic injuries victims (RTOI) in Rwanda.

Methodology

Study design and study settings

This research used a qualitative approach and included participants from five referral hospitals and three district hospitals in Rwanda. These hospitals provide emergency, orthopaedic, mental health, and rehabilitation treatments, and they also serve as teaching and referral institutes. The study, carried out from June 2 to August 31, 2022, specifically targeted Rwanda Military Hospital, King Faisal Hospital, and Centre Hospitalier Universitaire de Kigali in Kigali City. Additionally, Ruhengeri Hospital in the Northern Province and Centre Hospitalier Universitaire in the Southern Province were included in the study. In addition, interviews were carried out with physiotherapists from Gahini Hospital in the Eastern Province, Nemba Hospital in the Northern Province, and Kabgayi Hospital in the Southern Province.

Study population

Two years after the injury, we translated and transcribed interviews for RTOI victims aged 18 years and above who were treated for orthopaedic injuries at five referral hospitals in Rwanda from the 1st January 2019–31st December 2019 up to saturation. We also conducted interviews with medical professionals employed in the aforementioned hospitals of 18 years and above, consisting of emergency physicians, emergency nurses, physiotherapists, and orthopaedic surgeons, until we reached saturation. Patients who were above the age of eighteen and had a RTOI were included. To obtain a variety of viewpoints, we purposefully selected patients with varying types of injuries and from both urban and rural residences. At first, the research assistant in charge of collecting the quantitative data(13,14) identified possible subjects for the qualitative study. We excluded participants who were not orientated in time and space an unable to participate in depth interview

Data collection and instrument

In-depth interviews (IDIs) were used to collect information related to the study objective. IDIs were chosen because they are effective in getting respondents talking about their personal experiences, feelings, and opinions (18). In addition, respondents feel more relaxed and confident to express sincerely what they think about a given subject individually(19).

We developed two interview guides one targeted for the RTOI victims and the second for care providers. To comprehend the lived experience, the victims' interview guide included questions interview aimed to determine factors that have influenced the recovery and challenges during the management, and the essential elements related to the complications following RTOI in Rwanda.



The interview instructions were created in English, blindly translated into Kinyarwanda, and then back into English to guarantee accuracy and equivalency(20).

After approaching the RTOI victims and care providers to review study information, a local interviewer—who was fluent in both English and Kinyarwanda and had training in qualitative research methods—conducted individual interviews in either a private clinic room or a screened-off area of the ward. These semi-structured interviews were undertaken and recorded by the interviewers with RTOI survivors and care providers in Kinyarwanda then translated and transcribed the recordings into English. The interviews lasted 30 minutes on average (range: 20–60). Interviewers took field notes, summarizing their first impressions and recording nonverbal cues.

Data management

Data from the participants were transcribed verbatim by the research team, then translated into English for analysis. The thematic analysis aimed to inductively identify the themes and sub-themes of interest in the data and use them to interpret and make sense of research data(21). The researchers [IJA, NJ] firstly read the transcripts independently without any coding. NVivo software version 12 was used to code and organize the data. The codebook was created by each investigator; initial 'codes' were identified and assigned to a group of text'. An agreed codebook with finalized codes was used to code the rest of the transcripts. The second level of analysis included consensus by coders [IJA; NJ] on the higher-level codes, sub-themes and themes arising from the codes. Four themes emerged that were categorized in two broad domains namely health care access and quality and socioeconomic and support factors. The methods of analysis are articulated for each objective in Table 1. Trustworthiness was ensured through the following criteria:

Credibility: *Credibility refers to the degree to which your research can be deemed responsible and accurate. It safeguards against subjective experiences, emotions, and perspectives that may otherwise obscure the true nature of your research subject. Credibility establishes whether the research findings represent reasonable information drawn from the participants' original data and is a correct interpretation of the participants' original views(22). The credibility of our study was evaluated by considering the findings of two separate researchers who independently coded, analysed, and interpreted data on the factors that influence functional outcome following road traffic orthopaedic injuries (RTOIs) in Rwanda.*

Transferability: *Transferability refers to the degree to which the results of qualitative research can be transferred to other contexts or settings with another group of people(22). To fully comprehend the context of our research, we conducted a thorough and elaborate description of the research setting and participants. Furthermore, the description of the data collection process was evidently comprehensive.*

Dependability: *The stability of findings over time. It involves in-depth methodological description to allow study to be repeated (22). Consistent with the recommendations in the literature, we have included a comprehensive and detailed explanation of our methodology to ensure that our study can be replicated.*

Confirmability: *Confirmability ensures that the findings are shaped by the participants and the research context rather than the researcher's biases or perspectives(22). To ensure confirmability, the research involved a detailed audit trail, reflexive journaling, and triangulation. Researchers used multiple data sources and perspectives to validate findings. Member checks were performed to verify accurate representation of viewpoints. Peer debriefing sessions were conducted to obtain external assessment of the research process. The methodology and data analysis process were meticulously documented for scrutiny and replication by other researchers.*

Reflexivity: *Critical self-reflection involves examining one's own biases, preferences, and preconceptions as a researcher. It also involves considering the research relationship, including the relationship with the respondent and how it may influence the participant's answers to questions(22). Researchers recorded their thoughts, decisions, and methodological choices in reflexive journals. This practice allowed researchers to reflect on their biases, assumptions, and influences. The researchers used reflexive thinking to minimize their own biases in data collection and analysis. This critical self-awareness ensured that the research findings accurately reflected participants' experiences and perspectives.*

Ethical considerations

We obtained ethical approval to conduct our study from the University of Rwanda, College of Medicine, and Health Sciences Institutional Review Board (18/CMHS IRB/2022). The Rwanda National Research Committee operating in the Ministry of Health approved our study (NHRC/2022/PROT/014), and we collaborated with the Rwanda Biomedical Center (5535/RBC/2022) injury department. We obtained local ethical approvals from the five hospitals' ethics committees: CHUK(EC/



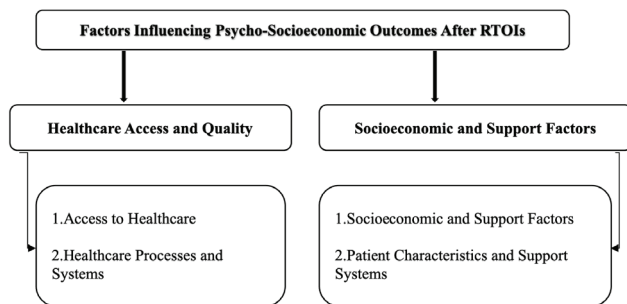
CHUK/051/2022), CHUB (REC/UTHB/089/2022), RH (313/RRH/DG/2022), KFH(EC/KFH/015/2022), RMH (RMH IRB/027/2022). We obtained written consent from all participants before the interview, after explaining the purpose of our study, and all the records and transcript were kept confidential.

Results

Participants characteristics

Eight adults, age group 18-30 years and fifteen adults aged 31 years and above (Table 1) participated in the IDIs until no new information was retrieved. Regarding the domain on Healthcare Access and Quality, two major themes emerged: Access to healthcare and healthcare processes and systems. for the second domain on socioeconomic and support factors, two themes were identified (socioeconomic and support factors and patient characteristics and support systems) as represented in the Figure 1.

Figure 1: Illustration of domains and themes that emerged from the data



Domain of healthcare access and quality

In the domain of Healthcare Access and Quality, both victims of road traffic orthopaedic injuries and healthcare providers have provided their insights on Access to Healthcare and Healthcare Processes and Systems.

Theme 1: Access to Healthcare. Access to healthcare is crucial for the functional outcomes following road traffic orthopaedic injuries. It affects the quality and timeliness

Table 1. Socio-demographics of the participants

Interviewees groups	18-30 years old	31 and above	Total =23
RTOI victims	5	6	11
Health care providers	3	9	12

of care, with geographic barriers often limiting access, especially in remote areas. The availability of trained professionals is essential, but limited equipment and infrastructure can hinder treatment. Efficient transfer and referral systems are also essential for coordinating patient care and ensuring timely delivery of necessary medical services.

Direct access to care: Access to care significantly impacts the functional outcomes of RTOI victims in Rwanda. Direct treatment leads to better outcomes, while delayed treatment results in poorer outcomes. Both healthcare providers and victims emphasize the importance of prompt medical services and timely intervention.

"In my experience, early intervention leads to better outcomes, while late intervention results in worse outcomes. Direct access to care is one factor that influences functional outcomes of RTOI victims" 46 years old female Emergency Nurse.

Both healthcare providers and RTOI victims value physiotherapy and psychological support for favourable functional outcomes. The availability of these services aids in rehabilitation, contributing significantly to timely function return post-RTOIs.

"As a RTOI, I find that having direct access to physiotherapy and psychological assistance was crucial for achieving good functional outcomes during my recovery process" 26 years old male RTOI victim.

Geographic barriers: In Rwanda, geographic access to healthcare is critical for functional status upon return to work, and access to treatment is influenced by demographic factors such as place of residence. Because there are few facilities and transportation choices available, rural people have difficulty getting medical services and specialists.

"I have encountered challenges in accessing care due to my geographical location, where the roads are very bad. This complicates my access to the district hospital and has limited my rehabilitation care, delaying my return to normal life" 39 years old male RTOI victim.



Urban residents benefit from easy access to healthcare providers, experts, and transportation, which speeds up treatment and improves health results. RTOI victims who are close to medical facilities—such as hospitals and transportation hubs—are more likely to get prompt medical attention, which improves their functional results.

“Patients in urban easily access care and experts as there are infrastructures like health care facilities, roads, means of transports, while those in rural have limited accessibility to care and experts” 33 years old Physiotherapist.

Availability of healthcare personnel: Healthcare experts' presence significantly impacts patient management and functional recovery, according to interviewed participants. Providers emphasize the need for an adequate workforce to handle RTOI cases. Insufficient healthcare providers lead to delays in accurate care provision, affecting both healthcare providers and RTOI victims.

“Availability of health care experts (must be adequate and accessible) for direct managements to ensure a favourable functional outcome after RTOI” 29 years old Physiotherapist.

Long appointment waiting times are often due to an imbalance between health personnel and patients, causing unscheduled postponements of necessary treatments and procedures, and worsening the situation due to the high number of patients seeking medical attention.

“There are long appointments related low number of health care personnel compared to volume of patients” 42 years old female Emergency Physician.

Limited equipment and infrastructure: Healthcare providers and RTOI victims face significant challenges due to inadequate infrastructure and equipment availability, affecting functional outcomes. Patients experience postponed access to care due to lack of necessary equipment and limited space for admission. Limited buildings, particularly theatres', and a few beds also delay prompt care delivery. The quality of treatment remains a concern, negatively impacting functional outcomes of RTOIs victims.

“The lack of sufficient infrastructure, such as buildings, means that certain patients may have delayed management, while others may experience delayed management as a result of the way the medical system is set up, such as when they need to be transferred” 30

years old male Emergency Physician.

The scarcity of materials, particularly bone fracture implants and physiotherapy resource, hinders therapeutic efficacy and hospitalization, sometimes leading to postponements of operations, thereby compromising the functional outcome of RTI victims.

“I have noticed that hospitals often struggle to manage bone fracture cases due to equipment issues, particularly with implants. This can hinder prompt injury management and lead to long hospital stays. Consequently, patients like me may face difficulties finding suitable admissions, experience postponed operations, and endure delays in recovery” 36 years old female RTOI victim.

Efficient transfer and referral systems: This study highlights the impact of the health facilities referral system on functional outcomes for RTI victims in Rwanda. Healthcare providers acknowledge delays and complex processes as barriers to accessing healthcare, particularly for rural patients, who may experience poor outcomes due to transfer issues from district to referral hospitals.

“System organisation like the way to get transfer from district to the referral hospitals limit standard to practice as most of the patient discharged early and others delay access to management which affect their functional outcome” 36 years old female Orthopaedic Surgeon.

RTOI victims recount the agonizing impact that ineffective referral systems had on their ability to get essential medical treatment. In some cases, there are hospital transfer delays, which result in longer treatment times and worse results.

“I was delayed for operation at one hospital (name omitted for ethical issues), after 2 months I decided to go to another hospital where I was operated” 29 years old male RTOI victim.

Most prevalent RTIs aspects in Rwanda: Both physical and psychological effects of RTIs are mostly treated in hospitals across Rwanda. RTIs in Rwanda often result in upper and lower limb injuries, brain and spine injuries, wound haemorrhage, and moderate or extensive pulmonary contusions, which are routinely managed at various Rwandan hospitals, according to interviewed participants.

“Typically, we treat head trauma, spinal injuries, injuries to the lower and upper limbs, as well as various traumas to the chest and abdomen” 43 years old male Orthopaedic Surgeon.



Healthcare providers reported depressive disorder, post-traumatic stress disorders (PTSD), and anxiety disorders from RTIs, particularly those leading to severe disabilities. Some patients may refuse essential clinical interventions, requiring mental health professionals. Depression, anxiety, and PTSD are symptoms of the psychological load, and some RTI victims may need holistic care from mental health departments.

"We often manage patients with depressive, PTSD, anxiety disorders, and lost self-esteem due to road traffic accidents, such as those with tetraplegia, hemiplegia, paraplegia, amputees, or other disabilities, affecting their families" 36 years old female Psychologist.

Theme 2: Healthcare Processes and Systems

Patient care pathways: Road traffic injuries (RTIs) have a dedicated channel in the Rwandan health system that enables proper treatment and referral. RTI patients are sent to medical facilities, evaluated by emergency teams, and, depending on the severity of their condition, either released or referred to specialists. The best prognosis depends on mental, psychological, and physical treatment.

"Our hospital admits patients through the emergency or outpatient departments, where medical doctors consult with patients to determine if they need special care. Patients are admitted only for road traffic injuries (RTIs) with mental health disorders or those requiring psychological support for medical procedures. Their discharge depends on the investigations conducted in our services" 50 years old male Clinical Psychologist.

Comprehensive care: Healthcare providers and RTOI survivors emphasize the importance of comprehensive treatment strategies for predicting functional outcomes. They call for an Interdisciplinary approach to managing road traffic injuries (RTIs), including not only surgical operations but also rehabilitation. They suggest that physiotherapy and psychotherapy should be combined to achieve optimal results.

"I think operation is not enough also the patients need physiotherapy and psychological support to restore physiological and physical functions" 35 years old male Orthopaedic surgeon.

Rehabilitation support, including physiotherapy and psychological assistance, leads to better functional outcomes in individuals. However, obstacles like early discharge, device removal delays, and insufficient rehabilitation can hinder recovery and result in enduring disability.

"They delay removing implant, when it was scheduled to remove implant, they failed and I still suffering with the implant" 42 years old male RTOI victim.

Interdisciplinary teamwork: An Interdisciplinary teamwork should be prioritised in Rwanda to manage RTOIs victims, enhancing care quality and promoting better functional outcomes. This team should include experts from surgery, mental health, rehabilitation, and social work, focusing on physical, psychological, and social aspects of recovery to minimise patient complaints and maximize overall wellbeing.

"Interdisciplinary team in management of RTOIs victims will play important role as it will improve communication between teams to achieve good functional outcome of RTOIs" 41 years old female Emergency Nurse.

Interdisciplinary teamwork can improve patient recovery by facilitating internal transfers, reducing treatment delays, and increasing interaction between healthcare providers, resulting in timely interventions and integrated care.

"Interdisciplinary team in management of RTOIs victims will reduce time taken writing internal transfers and improve quality of care delivered to the patients" 36 years old female Physiotherapist.

Timely management: The importance of prompt care in improving the functional result of RTOI victims is emphasized by study participants. Interviewees suggested that physical therapy be accessed as soon as possible after surgery, emphasizing the need to concentrate rehabilitation efforts on restoring function and movement.

"I can say that when you are suffering, no one else is concerned. I experienced delays in being operated on, and my hospital stay was prolonged, with constant excuses about no available theatre space. My wounds were only managed after they became infected. Upon discharge, it was a struggle to access both physiotherapy and mental support. Now, my quality of life is a living hell" 42 years old male RTOI victim.

Effective communication between healthcare professionals is crucial for treatment coordination, and prompt access to medical services is essential. Participants recommend reducing appointment times after discharge to ensure treatment continuity.

"Early access to physiotherapy and improve communication between health care providers can improve functional outcome post RTOI" 29 years old male Physiotherapist.



Training in emergency and trauma management:

The study suggests that enhancing healthcare workers' emergency and trauma care training can enhance the outcomes of RTOI victims, reduce hospital transfers, and improve patient care. It also emphasizes the government's role in acquiring necessary equipment for RTOI case management and suggests setting up trauma centres or specializing nursing staff.

"I suggest that basic training for healthcare providers in emergency and trauma can reduce delayed transfers from district hospitals and improve outcomes. I also suggest that the government should facilitate the availability of necessary equipment for dealing with RTI victims. Additionally, a trauma centre or specialized nurses could enhance the quality of care and functional outcomes for RTOI victims" 42 years old female Emergency Nurse.

Patient satisfaction survey:

Interviewed participants advocate for a patient satisfaction survey to improve the functional outcomes of RTIs. This survey will provide insights into unknowns, difficulties, and areas for improvement in healthcare practices. It should focus on patients' attitudes, healthcare providers' attitudes, and specialists' accessibility. By analysing patients' experiences and perceptions, the survey can identify areas for improvement in meeting patients' needs and improving functional recovery.

"I may suggest appointment for patient satisfaction to identify the gap, challenges and where to improve and this patient satisfaction must be based on patient attitudes, next keen attitudes and health care providers' attitudes together with direct access to experts" 51 years old female Clinical psychologist.

Road traffic orthopaedic injuries victims often highlight issues in healthcare providers' behaviour, leading to patients feeling neglected and delayed attention. Insufficient communication, empathy, and pain management contribute to psychological distress. Conducting a comprehensive patient survey can help improve care quality, responsiveness, and overall patient experience, ensuring timely, compassionate, and effective care.

"During my recovery from a road traffic accident, I often felt neglected by the healthcare providers. There were times when my pain was not adequately managed, and I had to wait for hours before receiving any attention. The lack of communication and empathy from the staff made an already challenging situation even more difficult. I believe a patient survey could highlight these issues and lead to much-needed improvements in patient care" 23 years old female RTOI victim.

Domain of socioeconomic and support factors

Participants have shared their ideas in socioeconomic and support factors domain, which has two themes: socioeconomic and support factors and patient characteristics and support systems.

Theme 1: Socioeconomic status

High Socio-economic status: Socio-economic status significantly impacts functional outcomes for RTIs victims, as it influences their ability to follow medical instructions and access rehabilitations. Higher socio-economic classes often have access to treatment costs and better outcomes, while those with lower socio-economic status may struggle with accessing care, treatment plans, and resources, negatively impacting functional recovery.

"Other factors, such as socioeconomic status, affect functional outcomes. Patients with a high socioeconomic status tend to obey medical instructions and have the means to cover the treatment process." 33-year-old male Physiotherapist.

Certain individuals who were interviewed shared instances in which their financial circumstances hindered them from receiving the intended medical attention, adhering to the recommended course of treatment, or covering the costs of essential interventions like physical therapy. These challenges are made more onerous by the lack of health insurance and financial assistance while an inpatient.

Table 2: Summary of the respondents for themes about healthcare access and quality

Category of Interviewee	Themes about healthcare access and quality	
	Access to Healthcare	Healthcare Processes and Systems
Health care providers	8	11
RTOI victims	10	9



“I never did physiotherapy; I early removed a cast by myself due to social economic issues (low income)” 27 years old male RTI Victim.

Insurance coverage: Patients with excellent insurance and better socioeconomic position get fast medical attention, according to healthcare providers. Access to medical care, diagnostics, and rehabilitation programs improves patients’ functional outcomes and enhances the chance of prompt interventions and successful recovery.

“Patients with high social economic standing and adequate insurance typically receive appropriate medical care more quickly than those without insurance or with insurance but lower social economic status” 35 years old male Orthopaedic surgeon.

Medical care from the health centre depends on insurance unless you can pay the entire medical bill. Otherwise, recovery from the injury is very challenging.

“It seems to be fun, but it’s real. At the time I had the accident, I was taken to the nearest health centre, but I lost my insurance at the scene, which caused a delay in receiving care for almost two days. My transfer to the hospital took about a week, which affected my recovery to the point that my leg had to be amputated” 56 years old male RTOI victim.

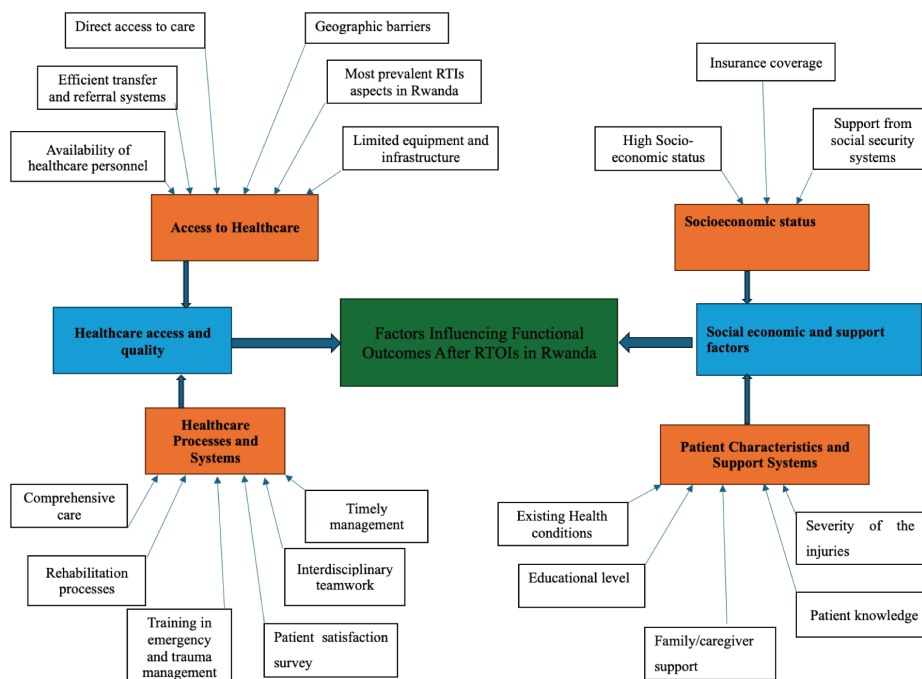
Support from social security systems: People who do not have adequate insurance coverage or those who face challenges due to low socioeconomic status often lack easy access to medical treatments and rehabilitation services. Additionally, difficulties in accessing disability compensation contribute to obstructing functional recovery and aggravating the functional outcomes of RTIs.

“The individual is still undergoing rehabilitation, has lifetime implants, and is working despite their disability caused by an accident. The Rwanda Social Security Board initially assessed their disability at zero percent, resulting in no disability compensation. They have since reclaimed their disability compensation but have not received any mental health follow-up” 32 years old female RTOI victim.

Theme 2: Patient Characteristics and Support Systems

Educational level: Healthcare providers report that educated patients understand the importance of early care, follow medical instructions, and make informed decisions about treatment and recovery. They are more likely to detect potential complications, seek care early, and actively participate in rehabilitation for improved functional outcomes.

Figure 2: Factors Influencing functional Outcomes after Road Traffic Orthopaedic Injuries in Rwanda





“Educated patients know the importance of early seek of care, listen to medical instructions. This positively impact their functional outcomes” 42 years old female Emergency Physician.

Family/caregiver support: Family support significantly impacts the functional outcome of individuals following road traffic orthopaedic injuries (RTOI). Lack of support during hospitalization can prolong healing and disrupt recovery. Family/caregivers provide practical help, emotional encouragement, and advocacy for best care during rehabilitation. Assistance with daily routines, medical appointments, and supportive settings improves recovery and functional outcome. Without support, RTOI patients struggle with treatment plans.

“After RTOI, I was hospitalized for a few days without assistance, which negatively impacted me and slowed down my rehabilitation” 49 years old male RTOI victim.

Existing Health conditions: Participants in interviews reported that underlying health issues like diabetes can exacerbate wound healing and prolong the healing process, increasing the risk of infection and complications in patients with such conditions.

“My diabetes made it difficult for my wounds to heal, which made me quite uncomfortable while I was in the hospital. Later, infections made matters worse and slowed down my recovery.” 65 years old male RTOI victim.

In addition to personality traits, human factors such as gender can also impact functional outcomes; this is particularly true for overweight women who require extra support for physical rehabilitation.

“Social factors like gender may limit effectiveness for example women uses to be overweight; this challenges physical support in rehabilitation process” 33 years old female Physiotherapist.

Patient knowledge: The study found that knowledge of care is crucial for optimizing functional outcomes. However, many RTI victims don't see the need for mental health services, compromising their chances of receiving comprehensive care and better results. This lack of awareness can lead to unfavourable recovery paths and prolonged suffering with poor outcomes.

“The rehabilitation process for RTOIs still lacks physical and psychological support due to patient ignorance and lack of understanding of its benefits, which can help patients regain normal function” 48 years old male Orthopaedic surgeon.

Severity of the injuries: The severity of injuries significantly impacts the functional outcome of post-RTIs in Rwanda. Patients with severe accidents without necessary operations may face prolonged recovery periods and compromised functionality. Socioeconomic constraints may also hinder full mobility and function recovery. Individuals requiring multiple operations may face prolonged and challenging rehabilitation.

“The severity of injuries, such as pelvic fractures and multi-trauma, can impact functional outcomes, leading to delayed management and poor outcomes such as disability or death due to the need for skilled personnel” 42 years old female Emergency Nurse.

Polytrauma patients are prone to worse outcomes compared to patients with simple injuries due to the need for interdisciplinary teamwork and delayed access to rehabilitation.

“I don't remember exactly what happened during the accident because I was in a coma and had multiple fractures. Upon arrival at the hospital, attention was given to my head trauma, and other injuries were addressed later, which contributed to the limited functionality of my left leg and right arm. Even at discharge, I was unable to reach the rehabilitation centre due to the many injuries I had”. 41 years old male RTOI.

Table 3: Summary of the respondents for themes about socioeconomic and support factors

Category of Interviewee	Themes about socioeconomic and support factors	
	Socioeconomic status	Patient Characteristics and Support Systems
Health care providers	10	9
RTOI victims	11	10



Discussion

According to this qualitative study, Rwandans who suffered orthopaedic injuries from traffic accidents on the road experienced significant physical morbidity, disruptions at work, changes in social activities, and feelings of dependency. These outcomes resulted in social isolation, financial loss for the individual and their household, and psychological distress. Reduced ability to earn a living or pursue career ambitions was caused by limited mobility, which also made it harder to carry out daily tasks. The effects of the injury on a patient's subjective quality of life in all domains—physical, social, economic, mental, and emotional—were felt. Due to their injuries, many victims had to drastically alter their way of living and quality of life.

A study of orthopaedic injuries in Uganda and lower limb injuries in Malawi, where the authors identified societal, economic, and health care system factors affecting injuries, supports our findings. Financial loss was frequent, which affected the families of the Malawian and Ugandan patients as well, as the majority were primary breadwinners with several dependents (23,24).

The Rwandan health system has a specific pathway for RTI victims, which involves appropriate treatment and referral. RTI victims are either brought to health facilities by ambulance or transferred from district hospitals. They are assessed by an emergency multidisciplinary team, who provide first aid and follow-up management. Based on the severity of the case, they are referred to other specialties, admitted for further management, or discharged if appropriate. Even though this system is well-structured, it causes delays for the patients(25). The most prevalent RTIs in Rwanda include upper and lower limb injuries, brain, and spine injuries(26). Anxiety disorders resulting from RTIs, depression, and post-traumatic stress disorder (PTSD) are among the mental health conditions that are frequently treated at different facilities, with limited access for all patients as highlighted by many participants in this study. Patients in South Africa with orthopaedic or traumatic brain injury have been documented to experience emotional anguish and mental health issues as well (27).

This study showed that RTOI functional outcomes in Rwanda are influenced by factors like access to healthcare, infrastructure, referral system, socio-economic status, family support, education, health insurance, management approaches, and severity of injuries. Direct healthcare, physiotherapy, and psychological support are crucial for better functional outcomes. Geographic access and the presence of healthcare experts also impact patient management and recovery. In their United States study, Haider et al. (2018) noted that nearly the same characteristics predicted a speedy recovery following an accident (28).

The challenges faced by healthcare providers and RTOI victims in Rwanda, including insufficient resources, long waiting times, inadequate infrastructure, and a complex referral system. These issues impair therapeutic effectiveness and prolong hospitalizations, particularly for rural patients, and contribute to poor outcomes. Combining our findings with those of Jumbam et al in Tanzania, we may obtain a picture of nearly identical difficulties faced by surgical emergency patients throughout East Africa(29). RTOI patients' functional outcomes are influenced by socioeconomic status, with higher-income individuals having better access to rehabilitation and medical advice. Gender and other human influences, especially for overweight women, can greatly affect functional outcomes throughout rehabilitation. Support from family, education, and timely medical intervention can also improve outcomes. Addressing these obstacles can improve RTOI patients' recovery.

The study's limitations include its inability to apply to other populations, which is skewed towards trauma patients from referral hospitals. Future research should examine the economic loss experienced by individuals with orthopaedic injuries from traffic accidents and its relation to their overall functional outcome. However, the findings contribute to the literature by highlighting the facets of people's lives impacted by orthopaedic injuries. The study employed qualitative methodologies to uncover and investigate various factors impacted by orthopaedic injuries, rather than presenting correlations between social and economic variables.

The study on road traffic orthopaedic injuries in Rwanda reveals challenges like insufficient resources, long waiting times, and complex referral systems. It emphasizes timely management, patient satisfaction surveys, interdisciplinary teams, and trauma training for improved outcomes.

We explored the factors that influence the functional outcomes following road traffic orthopaedic injuries in Rwanda, revealing significant challenges for victims and healthcare providers. The injuries cause physical health issues, work disruptions, social isolation, financial strain, and psychological distress. The Rwandan health system's structure has some challenges, leading to delays in care and burdening victims. Mental health conditions like anxiety disorders, depression, and post-traumatic stress disorder are also prevalent. The study suggests four strategies to improve functional outcomes: conducting a patient satisfaction survey, establishing interdisciplinary teams, ensuring timely management of orthopaedic RTIs, and training emergency and trauma



management personnel. These strategies align with global best practices in trauma care and emphasize patient-centered approaches, efficiency, and continuous professional development. Implementing these strategies could potentially improve the well-being and recovery of RTI victims in Rwanda.

Research funding

This research was supported by the Consortium for Advanced Research Training in Africa (CARTA). CARTA is jointly led by the African Population and Health Research Center and the University of the Witwatersrand and funded by the Carnegie Corporation of New York (Grant No. G-19-57145), Sida (Grant No:54100113), Uppsala Monitoring Center, Norwegian Agency for Development Cooperation (Norad), and by the Wellcome Trust [reference no. 107768/Z/15/Z] and the UK Foreign, Commonwealth & Development Office, supported by the Developing Excellence in Leadership, Training and Science in Africa (DELTA Africa) programme. The statements made and views expressed are solely the responsibility of the Fellow. This research was also funded by the University of Rwanda through the SIDA open grant 2021-2023.

Acknowledgement

We acknowledge everyone who supported and contributed to this study, especially the participants and research assistants from the five referral hospitals.

Data availability statement

Data supporting the study findings are available on request from the corresponding author [JAI]. The data are not publicly available due to ethical data transfer restrictions of IRB that could compromise the privacy of research participants.

Disclaimer

The views and opinions expressed in the submitted article are the author's own and not the official position of the affiliated institutions.

References

1. Gathecha GK, Ngaruiya C, Mwai W, et al. Prevalence and predictors of injuries in Kenya: findings from the national STEPs survey. *BMC Public Health*. 2018;18(S3).
2. Organização Mundial da Saúde. Global Status Report on Road. World Health Organization. 2018;20.
3. Gathecha GK, Ngaruiya C, Mwai W, et al. Prevalence and predictors of injuries in Kenya: findings from the national STEPs survey. *BMC Public Health*. 2018;18(S3).
4. Alemany R, Ayuso M, Guillén M. Impact of road traffic injuries on disability rates and long-term care costs in Spain. *Vol. 60, Accident Analysis and Prevention*. 2013. p. 95–102.
5. Mitchel Chatukuta, Nora Groce JSM and MK. Access to rehabilitation services for road traffic injury patients in Namibia.pdf. *Disabil Rehabil*. 2022;44(25):7985–92.
6. Taylor P, Odero W, Khayesi M, Heda PM. Injury Control and Safety Promotion Road traffic injuries in Kenya : Magnitude , causes and status of intervention Road traffic injuries in Kenya : Magnitude , causes and status. 2010:37–41.
7. Juillard C, Labinjo M, Kobusingye O, Hyder AA. Socioeconomic impact of road traffic injuries in west Africa: Exploratory data from Nigeria. *Injury Prevention*. 2010;16(6):389–92.
8. Üzümcüoğlu Y, Özkan T, Lajunen T, et al. Life quality and rehabilitation after a road traffic crash: A literature review. *Transp Res Part F Traffic Psychol Behav*. 2016;40:1–13.
9. Kohler RE, Tomlinson J, Eletima T. Quality of life after lower extremity trauma in Malawi. *Quality of Life Research*. 2017;26(4):1027–35.
10. Nabeel S, Canner JK, Nagarajan N, Kushner AL. Road traffic injuries : Cross-sectional cluster randomized countrywide population data from 4 low-income countries. *International Journal of Surgery*. 2018;52:237–42.
11. Lin T, Li N, Du W, Song X, Zheng X. Road traffic disability in China : prevalence and socio-demographic disparities. *J Public Health (Bangkok)*. 2013;35(4):541–7.
12. Hoang CL, Vu HM, Pham HQ, et al. Psychological distress of patients experiencing different types of road traffic injuries in vietnam. *Int J Environ Res Public Health*. 2020;17(10).
13. Allen Ingabire J, Stewart A, Sagahutu JB, et al. Prevalence and levels of disability post road traffic orthopaedic injuries in Rwanda. *Afr J Disabil [Internet]*. 2024 Jan 18;13. Available from: <http://www.ajod.org/index.php/AJOD/article/view/1251>
14. Allen Ingabire J, Stewart A, Uwakunda C, et al. Factors affecting social integration after road traffic orthopaedic injuries in Rwanda. *Frontiers in Rehabilitation Sciences [Internet]*. 2024 Jan 16;4. Available from: <https://www.frontiersin.org/articles/10.3389/fresc.2023.1287980/full>
15. Brown K, Cameron ID, Keay L, Nguyen H, Dillon L, Jagnoor J, et al. I ' ve got to be independent ' : views of older people on recovery following road traffic injury in New South Wales , Australia. *BMC Public Health*. 2020;1–13.



16. Locke HN, Randriamarotsiresy V, Chamberlain MA, O'Connor RJ. Delays to accessing healthcare and rehabilitation following trauma in Madagascar—a qualitative study. *Disabil Rehabil.* 2020;0(0):1–8.
17. Sousa KDM, Ivan W, Oliveira F De, et al. A qualitative study analyzing access to physical rehabilitation for traffic accident victims with severe disability in Brazil. *Disabil Rehabil.* 2016;8288(March).
18. Milena ZR, Stancu A. Qualitative research methods: A comparison between focus-group and in-depth interviews. Romania: University of Oradea, Economic Science Series. 2008;(May):17(4): 1279-1283.
19. Rodica Milena Z. Qualitative Research Methods: A Comparison Between Focus-Group And In-Depth Interview. *The Annals of the University of Oradea Economic Sciences.* 2008;4(1):1279–83.
20. Braun V, Clarke V. What can “thematic analysis” offer health and wellbeing researchers? Vol. 9, *International Journal of Qualitative Studies on Health and Well-being.* Co-Action Publishing; 2014.
21. Maguire M, Delahunt B. Doing a Thematic Analysis: A Practical, Step-by-Step Guide for Learning and Teaching Scholars. * [Internet]. 2017. Available from: <http://ojs.aishe.org/index.php/aishe-j/article/view/335>
22. Korstjens I, Moser A. Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing. *European Journal of General Practice.* 2018 Dec 4;24(1):120–4.
23. O'Hara NN, Mugarura R, Slobogean GP, Bouchard M. The orthopaedic trauma patient experience: A qualitative case study of orthopaedic trauma patients in Uganda. *PLoS One.* 2014 Oct 31;9(10).
24. Kohler RE, Tomlinson J, Chilunjika TE, Young S, Hosseinipour M, Lee CN. “Life is at a standstill” Quality of life after lower extremity trauma in Malawi. *Quality of Life Research.* 2017 Apr 1;26(4):1027–35.
25. Odland ML, Whitaker J, Nepogodiev D, et al. Identifying, Prioritizing and Visually Mapping Barriers to Injury Care in Rwanda: A Multi-disciplinary Stakeholder Exercise. *World J Surg.* 2020;44(9):2903–18.
26. Ingabire A, Petroze RT, Calland F, Okiria JC, Byiringiro JC. Profile and economic impact of motorcycle injuries treated at a university referral hospital in Kigali, Rwanda. *Rwanda Medical Journal.* 2015;72(4):5–11.
27. Maselesele VM, Idemudia ES. The role of social support in the relationship between mental health and posttraumatic stress disorder amongst orthopaedic patients. *Curationis.* 2013;36(1):E1–7.
28. Haider AH, Herrera-escobar ĀJP, Rafai ĀSS AI, et al. Factors Associated With Long-term Outcomes After Injury: Results of the Functional Outcomes and Recovery After Trauma Emergencies (FORTE) Multicenter Cohort Study. *Ann Surg.* 2020 Jun;271(6):1165-1173. doi: 10.1097/SLA.0000000000003101.
29. Jumbam DT, Menon G, Lama TN, et al. Surgical referrals in Northern Tanzania: A prospective assessment of rates, preventability, reasons and patterns. *BMC Health Serv Res.* 2020 Aug 8;20(1).