

Facilitators and barriers influencing the provision of prehospital care following road traffic accidents in Rwanda: A Descriptive qualitative study

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Abstract

Background

Prehospital care is essential for improving outcomes among road traffic injury victims. In low- and middle-income countries such as Rwanda, prehospital healthcare providers often face contextual barriers that may hinder timely and effective care, while certain facilitators may support service delivery. This study aimed to explore the facilitators and barriers influencing prehospital care delivery post road traffic accidents in Rwanda.

Methods

A descriptive qualitative study was conducted among 20 purposively selected prehospital healthcare providers from Service d'Aide Médicale d'Urgence, the Rwanda Red Cross, and Ruhengeri Level II Teaching Hospital, representing urban and rural settings in Rwanda. Data were collected through face-to-face in-depth interviews conducted between December 2025 and January 2026 using a semi-structured interview guide. Data were analyzed inductively using thematic analysis supported with ATLAS.ti version 24.

Results

Two overarching themes emerged: facilitators and barriers influencing the provision of prehospital care following road traffic accidents. Facilitators included provider experience and motivation, in-service training, digital communication and triage tools, police collaboration, adequate medical supplies, supportive leadership, and community assistance. Barriers included traffic congestion, staffing shortages, limited training opportunities, inadequate equipment, ambulance scarcity, insufficient hospital bed capacity, communication challenges, limited public awareness of emergency access, and weak coordination between ambulance services and hospitals.

Conclusion

Prehospital care provider motivation, training, leadership, communication systems, and collaboration with police and communities facilitate prehospital care delivery in Rwanda. However, workforce shortages, limited public awareness, inadequate resources, weak coordination, insufficient clinical protocols, and limited receiving facility capacity continue to hinder timely and quality care. Strengthening these areas may improve prehospital emergency care.

Background

Road traffic accidents (RTAs) are a major public health concern worldwide, contributing substantially to injuries, disabilities, and premature deaths. Globally, approximately 1.19 million people die in traffic accidents each year, with 92% of these deaths occurring in low- and middle-income countries (LMICs) [1]. Similarly, Rwanda continues to experience a growing burden of RTAs, with the number of reported crashes nearly doubled from 5,611 in 2018 to 10,334 in 2022 [2]. Furthermore, most of the patients transported by ambulances in Rwanda present trauma mostly related to RTA [3]. Appropriate prehospital care can prevent many RTA-related deaths and disabilities.

Prehospital care refers to emergency care provided outside healthcare facilities by trained prehospital healthcare providers or first responders, aimed at stabilizing patients and ensuring timely access to definitive care [4, 5]. Despite its substantial positive impact, many low- and middle-income countries (LMICs) experience challenges with the fundamentals of organized prehospital emergency care services [6]. The effectiveness of prehospital care often depends not only on its availability but also on the quality of services delivered.

In LMICs, particularly in sub-Saharan Africa, prehospital care systems are often underdeveloped, with a limited number of trained providers and inconsistent implementation of standardized protocols [7]. Variations in training, ambulances and equipment availability, and adherence to protocols have been shown to affect the quality of prehospital care delivered [8]. Understanding facilitators and barriers faced by prehospital healthcare providers is essential to guide targeted improvements.

Rwanda has made notable progress in strengthening prehospital care through structured services such as the Service d'Aide Médicale d'Urgence (SAMU) and the Rwanda Red Cross Society (RRCS), primarily in urban areas, and in rural areas, the closest hospital to the road traffic accident provides prehospital care [9]. These prehospital systems employ a range of prehospital healthcare providers, including nurses, non-physician anesthetists, and emergency care assistants [10]. While these developments demonstrate the country's commitment to improving prehospital care, questions remain regarding the facilitators and barriers influencing the provision of prehospital care across different settings.

Existing evidence examined prehospital care practices [5], and others have highlighted disparities between urban and rural emergency care systems, particularly in terms of resources, response times, and quality of care [11]. However, there remains limited evidence on the facilitators and barriers experienced by prehospital healthcare providers across both urban and rural contexts. Addressing this knowledge gap is important for informing policies and strategies aimed at strengthening prehospital care systems. This is in line with a recommendation from the World Bank which states that sustainable development goals' targets are unlikely to be met without strengthening emergency care systems globally [6]. Therefore, this study aimed to explore the facilitators and barriers influencing the provision of prehospital care to road traffic injury victims in Rwanda.

Methods

Design, study settings

A qualitative descriptive study was conducted using individual face-to-face interviews of prehospital healthcare providers in both urban and rural prehospital care settings in Rwanda. In urban areas, participants were recruited from SAMU, the primary public prehospital care provider mainly serving the capital city of Rwanda [9]. Additional participants were recruited from RRCS, which provides prehospital care in urban settings as a non-government organization (NGO) [12].

In rural areas, Ruhengeri Level II Teaching Hospital (RL2TH), located in the Northern Province of Rwanda, was selected to represent rural settings providing prehospital services. This setting was chosen because it is located in Musanze District, one of the most densely populated districts in Northern Province [2], and was reported as a mountainous area that limits ambulance accessibility [9]. The Fig. 1 below illustrates study settings on the map of Rwanda.

Study population, sampling strategy, and sample size

Participants were prehospital healthcare providers with at least six months of ambulance service experience. A purposive sample of twenty prehospital healthcare providers was selected. The sample size was determined by the principle of data saturation [13], with data collection discontinued when no new codes emerged from two consecutive interviews, indicating that sufficient depth and breadth of information had been obtained.

Data collection procedure

An interview guide was developed in English by qualitative research experts who were co-investigators in the study and translated into Kinyarwanda by the lead researcher (LR), who is fluent in both languages. A pilot study for the refinement of the interview guide was conducted before starting the main study [13]. Participants were asked open-ended questions on facilitators and barriers faced while providing prehospital care for road traffic accident victims. Interviews were conducted at participants' workplaces in Kinyarwanda at the end of 2025 and the beginning of 2026. Off-duty participants were eligible to participate to avoid any interruption of emergency calls and care delivery during the interview.

Interview duration ranged from 8 to 50 minutes. Most interviews lasted between 8 and 25 minutes, while two interviews lasted 29 and 50 minutes, respectively. All participants responded to the same semi-structured interview guide; however, differences in interview duration reflected variation in participants' experiences, level of detail provided, and the need for probing questions during interviews.

Interviews were audio-recorded with the permission of the participants and securely stored on the lead researcher's (LR) personal computer and password protected. The interviews were transcribed verbatim in Kinyarwanda and translated into English.

Data analysis and trustworthiness

Transcribed data were imported into ATLAS.ti version 24 and analyzed using inductive thematic analysis following the six phases described by Braun and Clarke [14]. Initial codes were generated from the data and subsequently grouped into related subthemes. Similar subthemes were then organized into broader categories, which were further synthesized into overarching themes.

Trustworthiness was ensured by adhering to the principles of credibility, dependability, confirmability, and transferability as outlined by Lincoln and Guba [15], alongside reflexivity.

Credibility was ensured through prolonged engagement with the data. Interviews were transcribed verbatim in Kinyarwanda and translated into English by the lead researcher (LR), who is fluent in Kinyarwanda, English, and French. To ensure translation fidelity and accuracy, audio recordings and transcripts were reviewed multiple times during transcription and translation, with careful attention to preserving contextual meaning and participants' original intent. Participant responses were also paraphrased during interviews to confirm understanding and accuracy of interpretation.

Dependability was enhanced through systematic data management procedures, including cross-checking interview transcripts against audio recordings and reviewing transcripts for accuracy and completeness before

analysis. Confirmability was ensured by maintaining an audit trail of the research process and using de-identified transcripts during analysis to ensure that findings remained grounded in participants' accounts rather than researcher assumptions.

Reflexivity was maintained throughout the study to acknowledge and minimize the potential influence of the researcher on data collection and analysis. The lead researcher has a professional background in nursing and an interest in emergency and prehospital care, which could have shaped the interpretation of participants' experiences. To reduce potential bias, the researcher used a semi-structured interview guide, encouraged participants to express their views freely, and avoided leading questions during interviews.

Results

The analysis generated two overarching themes: facilitators and barriers to prehospital care provision following road traffic accidents. These themes comprised eight categories and several subthemes reflecting participants' experiences across urban and rural settings.

Social demographic characteristics of participants

As summarized in Table 1, participants were predominantly nurses in both settings, with rural participants being exclusively nurses, while urban settings showed slight professional diversity. Urban participants also tended to have higher educational qualifications, including master's-level training, which was absent in rural areas. In terms of experience, urban providers demonstrated a broader range, including more senior prehospital healthcare providers. Notable differences were observed in access to in-service training, with urban providers reporting more frequent training opportunities compared to their rural counterparts.

Table 1
Sociodemographic characteristics of participants (N = 20)

Profession	Urban		Rural	
	Frequency	Percentage	Frequency	Percentage
Nurses	10	50%	7	35%
Non-Physician anesthetists	1	5%	0	0%
Emergency care assistant	2	10%	0	0%
Education level*				
Advanced diploma (A1)	6	30%	4	20%
Bachelors (A0)	3	15%	3	15%
Master's)	2	10%	0	0%
Years of experience				
1–5	6	30%	6	30%
6–10	2	10%	1	5%
> 10	5	25%	0	0%
Frequency of in-service training				
≥ 2times/year	11		1	
Once/year	1		5	
Once/2years	1		0	
Once/3years	0		1	

*Education level is only mentioned for nurses and non-physician anesthetists. Two emergency care assistants were trained by the Rwanda Red Cross for only one year, with candidates having different backgrounds, including participants whose highest education level was secondary school.

Table 2 provides an overview of the findings of the study. The facilitators and barriers that emerged from this study are summarized in the table below.

Table 2
Summary of themes, categories, and subcategories

Themes	Category	Subcategories
Facilitators to prehospital care provision	Community engagement and police support	1. Community awareness and support 2. Police support in accident reporting, scene safety
	Workforce competence and support systems	1. Knowledge, experience, teamwork and continuous training 2. Leadership support and staff motivation
	Resource availability and operational readiness	1. Adequate equipment and medical supplies 2. Expanded ambulance coverage
	Communication, coordination, and leadership	Digital communication and triage technologies
Barriers to prehospital care provision	Access to accident scene	1. Traffic congestion 2. Difficulties locating accident scenes 3. Safety concerns at accident scenes 4. Limited community engagement
	Workforce and professional practice barriers	1. Prehospital workforce shortages 2. Insufficient in-service training 3. Lack of standardized clinical protocols 4. Inadequate welfare and psychosocial support
	Infrastructure and equipment	1. Ambulance scarcity 2. Insufficient hospital bed capacity 3. Limited availability of essential equipment
	Challenges with coordination between prehospital services and hospitals	None

Theme 1: Facilitators to prehospital care provision

Category 1. Community engagement and police support

Participants identified community engagement and police support as important facilitators of prehospital care delivery. These facilitators included increased community awareness and support, as well as police involvement

in accident reporting, traffic management, and scene safety.

Community awareness and support

Although some rural participants reported that road users often failed to give way to ambulances, others perceived improvements in community awareness and compliance with ambulance right-of-way regulations. As one participant explained, *“Previously, other vehicles delayed giving way, but now drivers and pedestrians know the ambulance’s right of way”* (P3, Rural). Similarly, an urban participant highlighted government and police support, stating, *“The government set up specific ambulance lanes in Kigali city, and police officers actively clear paths for ambulances”* (P9, Urban).

Participants described community members as important contributors to prehospital care. One participant said, *“They help us lift a patient and bring them to the ambulance”* (Participant 4, urban). Some citizens in urban areas were able to provide basic first aid before ambulance arrival, *“Especially in severe accidents, some citizens know how to provide basic first aid, though sometimes they lack protective equipment”* (P2, Urban).

Police support in accident reporting, scene safety

Police officers were frequently recognized as first informants for road traffic accidents and key partners in emergency response. A rural participant stated, *“About 80% of accidents are reported to us by the police”* (P6, Rural). Similarly, urban participants affirmed, *“Most of the time, we are notified by police”* (Participant 10 urban).

Participants described the scene safety provided by police officers during the intervention. *“Another thing that helps me assist is being safe at the scene, having the police organize people and vehicles”* (P2, Rural), another said, *“Only when the area is safe, you can provide care”* (P2, Urban).

Category 2. Workforce competence and support systems

Participants identified workforce competence and organizational support as important facilitators of effective prehospital care delivery. These facilitators included knowledge, working experience, teamwork, continuous training, leadership support, and staff motivation.

Knowledge, working experience, teamwork, and continuous training

Participants across both settings identified formal education, field experience, and continuous training as important facilitators of effective prehospital care: *“Experience gained from previous cases allows me to assist patients effectively”* (P1, Urban). Another one said, *“School knowledge combined with field experience helps me manage injured patients”* (P3, Rural). In an urban area, participants added working as a team as a facilitator to timely prehospital care provision: *“We work as a team of three: one ambulance driver and either two nurses or one nurse and one non-physician anesthetist, depending on how our supervisors schedule the teams”* (P4, Urban).

Leadership support and staff motivation

Timely salaries motivate participants as they reported: *“Receiving the salary on time, because without it, things would not go well”* (P12, Urban); also having a team leader in urban enabled participants to provide prehospital care easily, as said by this participant, *“We work in shifts with a team leader available 24 hours, providing guidance and coordinated care”* (P7, Urban). A rural participant reported, *“Even if the patient cannot pay, we can still respond quickly”* (P4, Rural).

Category 3. Resource availability and increased ambulance coverage

Participants identified the availability of essential resources and improvements in ambulance coverage as important facilitators of prehospital care delivery. These facilitators included access to medical equipment and supplies required for patient stabilization, as well as the expansion of ambulance services to improve emergency response capacity.

Adequate equipment and medical supplies

Participants reported that the availability of essential medications and equipment, enabled them to stabilize patients in prehospital settings and during transport. A rural settings participant explained, *"We have medications, fluids, bandages, and compresses to stabilize patients before hospital arrival"* (P1, Rural). Similarly, an urban participant noted, *"All necessary equipment is available on time, enabling quality care on-site"* (P6, Urban).

Expanded ambulance coverage

Participants in urban settings reported that the increasing number of ambulance stations had improved service coverage and response capacity. As one urban participant observed, *"More ambulances have been added"* (P3, Urban).

Category 4: Communication and coordination

Participants identified communication technologies and coordination mechanisms as important facilitators of prehospital care delivery.

Digital communication and triage technologies

Communication technologies were described as important facilitators of emergency response and referral coordination. One participant stated, *"When we inform the hospital through a mobile phone call, they prepare in advance"* (P2, Rural). Urban participants emphasized GPS-enabled applications. *"The 912 app provides GPS, patient's location, and caller contact, which enables fast response"* (P2, Urban). The table below summarizes themes, categories, and sub-categories.

Theme 2: Barriers to prehospital care provision

Category 1. Access to accident scene

Participants identified several barriers related to accessing accident scenes and initiating timely prehospital care. These barriers included traffic congestion, difficulties locating accident scenes, safety concerns at accident scenes, and limited community engagement.

Traffic congestion

Traffic congestion was reported across both settings. An urban participant explained, *"You arrive late on the scene and become stressed because of traffic jams"* (P7, Urban), while a rural participant said: *"Many people do not understand when we are given the right of way"* (P5, Rural).

Difficulties locating accident scenes

Participants described difficulties locating accident scenes across both settings. An urban participant stated, *"Sometimes the problem is accurately identifying the exact location"* (P1, Urban), while a rural provider shared, *"The caller may not even be at the exact location, you end up going around searching"* (P2, Rural).

Safety concerns at accident scenes

Participants reported hostile crowds and unsafe environments. An urban provider noted, *"You cannot immediately provide care to a patient if the scene is not safe"* (P10, Urban). In a rural setting, participants said, *"When we reach the scene, there is no police or security personnel to assist, which can make us afraid and delays care"* (P4, Rural);

Limited community engagement

Limited public awareness of ambulance emergency numbers delayed activation of services, with some citizens contacting police first. An urban participant reported, *"People tend to call the police because they are more familiar with the police number"* (P5, Urban), and another noted that *"clinical care or prehospital treatment is not something we see police officers providing"* (P9, Urban). A rural participant noted, *"People may have gathered and create chaos instead of providing assistance"* (P3, Rural).

Category 2: Prehospital workforce barriers

Participants identified several workforce-related barriers that affected the delivery of prehospital care. These barriers included shortages of prehospital care personnel, limited opportunities for in-service training, lack of standardized clinical protocols, and inadequate welfare and psychosocial support for providers.

Prehospital workforce shortages

Rural participants described situations where limited staffing delayed response, as one participant noted, *"When I am picking another patient, it is just me and the driver; at that time a person waits while they should receive immediate care"* (P2, Rural). Urban participants similarly reported excessive workloads: *"The number of staff is still low; sometimes one works 60 hours per week or even more"* (P13, Urban).

Insufficient in-service training

Limited access to in-service training for both prehospital healthcare providers and ambulance drivers was reported, particularly in rural areas. One participant stated, *"In five years working on the ambulance, it is only in the past two months that we received training"* (P1, Rural). And another one added, *"About 90% of the drivers, have no training"* (P2, Rural). In urban settings, ambulance drivers' training was slightly reported: *"You may find yourself working only with a driver who does not have the knowledge or skills to assist you in providing emergency care."* (P13, Urban)

Lack standardized clinical protocols

This barrier was mostly reported in rural settings while slightly reported in urban settings. *"We do not have protocols to guide us while triaging patients at the scene and decide this patient should be taken here or there, which causes patients to be overloaded at only one emergency room."* (P2, Rural). In urban a participant shared: *"Another barrier is that, in prehospital, it is difficult for us to access protocols. If you go eight months without attending any training, you may find yourself becoming outdated in your practice."* (P5, Urban)

Inadequate welfare and psychosocial support

Repeated exposure to trauma and deaths, combined with limited psychosocial support, also created emotional burden *“because we see so many difficult things that require someone to sit down with you again and talk about them”* (P5, Urban). Additionally, participants described working prolonged hours without institutional arrangements for basic needs: *“A prehospital care provider may reach 3 p.m. still moving around in the ambulance responding to emergencies everywhere, without ever having had time to eat anything, the employer does not provide anything for someone doing work that can sometimes be very demanding”* (Participant 9, Urban).

Category 3: Infrastructure and equipment barriers

Participants identified several barriers related to infrastructure and equipment. These barriers included ambulance scarcity, insufficient hospital bed capacity, limited availability of essential equipment.

Ambulance scarcity

Ambulances often serve both emergency response and interfacility transport. A rural participant shared, *“The first barrier we have is that sometimes we are called while we are at a health center, as the ambulance we use is also used for interfacility patient transport, and four other ambulances may already be transporting patients to various hospitals in Kigali.”* (P3, Rural). A similar barrier in urban areas was reported: *“Sometimes a patient calls for an ambulance, but the closest one is already busy elsewhere, reaching the patient takes a long time.”* (Participant 5, Urban). Another urban participant added, *“Even though ambulance numbers increased compared to previous years, the population had also grown, and people now know about ambulance services. Still, they become insufficient compared to the need”* (P3, Urban).

Insufficient hospital bed capacity

Hospital bed shortages were reported frequently across both settings. An urban participant stated, *“When you reach a hospital without a bed and wait one or two hours, the patient suffers delays, and you experience stress seeing the patient lying in the ambulance”* (P2, Urban). Another participant added, *“If another emergency call comes in, we may still be unavailable to respond.”* (P13, Urban). Limited functionality of medicalized health centers was noted: *“Often, when you take a patient to a medicalized health center, they refuse to receive him, saying they cannot manage the case and that he should go to the hospital, which ended up making these hospitals overcrowded”* (P9,11, Urban). In a rural setting, participants reported, *“The absence of available beds forces continued patient care inside ambulances. This is worsened by a small emergency department that receives more patients than it can accommodate”* (P5, Rural).

Limited availability of essential equipment

Rural participants particularly reported lack of trauma immobilization equipment: *“There are no splints; you may take a piece of cardboard or sticks nearby”* (P7, Rural). Similarly, lack of sufficient equipment was slightly reported in urban settings: *“Sometimes we are dispatched without essential equipment such as defibrillators or airway management tools, especially when cases are numerous. This can limit our preparedness if a patient's condition deteriorates during transport.”* (P13, urban)

Category 4: Weak coordination between prehospital services and hospitals

This barrier was reported only in urban settings. An urban participant stated, *“When the patient arrives with ambulance staff, hospital providers often feel that what they have done is sufficient.”* (P5, Urban). Another one added, *“Because the main challenge is that we often do not have a place to transfer the patients.”* (P1, Urban)

Although several facilitators and barriers were shared across urban and rural settings, important contextual differences emerged. Table 3 below summarizes the similarities of facilitators and barriers across urban and rural settings and their implications for prehospital care.

Table 3

Comparison of facilitators and barriers and their implications for prehospital care provision across urban and rural settings

Facilitators/ Barriers	Urban setting	Rural setting	Implication for prehospital care
Facilitators influencing provision of prehospital care			
Police support and community engagement	Police assist with traffic management through dedicated ambulance lanes scene control, and emergency notification. some community members provide basic first aid before ambulance arrival.	Police frequently report accidents and help secure accident scenes.	Police support is a key facilitator of prehospital care across both settings. Participation of bystanders in provision of first aid before ambulance arrival may contribute to patients' stabilisation.
Leadership and staff support	Availability of multidisciplinary team, and trained ambulance drivers, team leaders provide guidance and coordination; staff motivation is supported through timely remuneration.	Leadership support was reported, and providers emphasized the ability to respond even if the patient cannot pay.	Organizational support contributes to workforce motivation and service delivery across both settings
Communication technologies	GPS-enabled emergency applications facilitate patient location, communication, and triage.	Mobile phone communication facilitates referral coordination and hospital preparedness.	Communication technologies enhance emergency response but differ in sophistication between settings.
Resource availability and operational readiness	Expanded ambulance coverage and equipment availability support emergency response.	Availability of medications, fluids, dressings, and supplies supports patient stabilization before hospital arrival.	Resource availability improves providers' ability to stabilize and transport patients safely.
Barriers influencing provision of prehospital care			
Traffic congestion	Heavy traffic volumes delay ambulance movement;	Road users often fail to give way to ambulances; no dedicated traffic management mechanisms were reported.	Delays in reaching accident scenes occur in both settings with high impact in rural areas as result of lack of traffic management mechanisms
Locating accident scenes	Difficulty identifying the precise location of accidents due to wrong orientation from the caller	Callers leave the scene after notifying ambulance services, making it difficult to locate the accident site; limited technological support was reported.	Difficulties locating accident scenes affect response times in both settings, but urban providers have greater access to technological solutions.

Facilitators/ Barriers	Urban setting	Rural setting	Implication for prehospital care
Facilitators influencing provision of prehospital care			
Scene safety	Hostile crowds and unsafe environments delayed patient care until police secured the scene.	Limited availability of police or security personnel may delay scene stabilization and care provision.	Unsafety scene resulted into delay in provision of prehospital care across both settings
Community engagement	Limited awareness of ambulance emergency numbers resulted in police being contacted before ambulance services;	Bystanders may gather at accident scenes and create chaos rather than assist responders;	Community engagement can either facilitate or hinder prehospital care depending on public awareness and preparedness.
Workforce shortages and staffing composition	High workloads and prolonged working hours were reported.	Lack of multidisciplinary team, limited staffing, often involving a single nurse and a driver, some of whom lacked formal emergency care training.	Workforce shortages affect both settings but are more structural in rural areas, while urban providers experience workload pressures due to service demand.
In-service training	Training needs were slightly reported	Limited opportunities for in-service training among both providers and drivers were frequently reported.	Differences in training opportunities may contribute to variations in provider preparedness and clinical practice.
Access to clinical protocols	Inaccessibility to updated protocols.	Absence of standardized protocols to guide triage and referral decisions was reported.	Limited access to protocols repeatedly reported mainly in rural settings may affect consistency and quality of prehospital care,
Welfare and psychosocial support	Emotional distress related to repeated exposure to trauma, prolonged working hours, and limited institutional support was reported.	Not explicitly reported by participants.	Psychosocial wellbeing may influence provider resilience, job satisfaction, and quality of care.
Ambulance availability	Ambulance demand often exceeds available resources despite increasing ambulance numbers.	Ambulances frequently serve both emergency response and interfacility transport of other cases.	Ambulance shortages contribute to delayed response or total absence of prehospital care provision across both settings which may lead to preventable complications or death.
Hospital bed capacity	Lack of available bed at receiving facility was reported to delay patient's handover.	Limited bed capacity and a small hospital emergency department contribute to delays in patient's handover.	Hospital overcrowding affects ambulance turnaround time and patients' deterioration while waiting for available beds in both settings.
Equipment and supplies	Occasional shortages of advanced emergency equipment during periods of high demand were reported.	Limited access to trauma equipment, including immobilization devices,	Resource limitations may compromise the quality and safety of prehospital care, particularly in rural settings.

Facilitators/ Barriers	Urban setting	Rural setting	Implication for prehospital care
Facilitators influencing provision of prehospital care			
		sometimes required improvisation.	
Coordination between prehospital and hospital.	Delay in admitting the patient from the ambulance.	Not specifically reported by participants.	Poor coordination may affect continuity of care and efficient patient handover.

Discussion

The study aimed to explore the facilitators and barriers influencing prehospital care delivery post road traffic accidents in Rwanda. Two main themes emerged as facilitators and barriers with eight categories and multiple subcategories.

Facilitators identified were related to community engagement and police support; workforce capacity and motivation; resource availability and operational readiness; and communication, coordination, and leadership as key facilitators of prehospital care provision in Rwanda across both settings. Bystander first aid was identified as an important facilitator of prehospital care, particularly in urban settings. The findings of this study are consistent with studies from other LMICs that evidenced that early assistance by laypersons can improve patient outcomes through timely lifesaving interventions before the arrival of professional responders [16–18], and its impact on patients outcomes was documented [19]. These findings suggest that strengthening community first-aid capacity may enhance early trauma care and complement formal emergency medical services, particularly in settings where ambulance response times may be prolonged.

Beyond community engagement, participants highlighted workforce-related factors are important facilitators of prehospital care. Experience, training, teamwork, supportive supervision, and intrinsic motivation as important facilitators of prehospital care. Consistent with previous research, experience supports rapid decision-making, teamwork enhances communication and patient safety, and supportive supervision strengthens provider performance through improved coordination, leadership support, and professional feedback [20–22]. These factors may contribute to more effective prehospital service delivery by enhancing provider confidence, promoting collaborative practice, and supporting timely clinical decision-making, particularly in resource-constrained emergency care settings.

In addition to workforce-related facilitators, adequate resources and operational readiness were perceived as critical for effective prehospital care delivery. Increased ambulance availability, essential medical supplies, and expanded prehospital service coverage were identified as important facilitators, particularly in urban settings. Previous studies have shown that adequate ambulance capacity was associated with shorter transport times and reduced mortality in LMICs [7]. These resources may facilitate timely access to emergency care, improve the continuity of prehospital interventions, and enhance the ability of providers to deliver appropriate care during patient transport.

Alongside workforce and resource-related facilitators, participants emphasized the role of communication and coordination systems in supporting prehospital care delivery. Digital referral and triage tools enhanced communication, clinical decision-making, and referral coordination in urban settings. Previous studies indicated

that digital technologies improve documentation, reduce errors, accelerate time-critical care, and strengthen EMS-to-hospital communication [23]. The use of these advanced tools may improve the efficiency and continuity of prehospital care by facilitating timely information sharing, supporting clinical decisions, and enabling better coordination between prehospital healthcare providers, bystanders, and receiving health facilities.

Despite these facilitators, participants reported several challenges that continued to hinder the provision of timely and quality prehospital care. These barriers were related to accident scene access, including traffic congestion, difficulties locating accident scenes, unsafe environments, and limited community engagement. Together, these barriers delayed access to injured patients and prolonged ambulance response times. These findings are consistent with previous studies conducted in Rwanda and other LMICs where traffic congestion, and accident scene location were reported as challenges and contributors to delayed hospital arrival [24–26].

Beyond the accident scene barrier reported in this study, participants identified limited community engagement as a barrier to timely emergency response. Despite several first-aid training initiatives in Rwanda [16], limited awareness of ambulance toll-free numbers and inadequate bystander first-aid provision have recently been reported [27]. Evidence from several LMICs suggests that structured lay first-responder training can reduce trauma-related mortality, while previous first-aid training and legal protection have been identified as important determinants of willingness to provide assistance during emergencies [19].

In addition to limited public awareness and engagement, participants reported that overcrowding at accident scenes created further operational challenges for prehospital healthcare providers. Similar challenges have been reported elsewhere, with recommendations emphasizing public education and greater involvement of police officers in scene management [28]. Such overcrowding may delay patient assessment, restrict access to victims, and interfere with the delivery of timely prehospital interventions.

In contrast to findings from other LMICs, where police officers actively participate in providing post-crash first aid [17, 29], such involvement was not reported by participants in the present study. Given that police officers are often among the first responders at road traffic accident scenes, their limited involvement in first aid provision may reduce opportunities for early lifesaving interventions.

Beyond accident scene challenges, participants described several workforce and professional practice barriers that affected the delivery of prehospital care. Prehospital workforce shortages emerged as a major challenge. Workforce shortages may delay emergency response, limit the ability to provide continuous patient monitoring during transport, and increase the risk of provider fatigue. Similar challenges were reported across LMICs, where shortages of trained emergency care personnel remain a significant obstacle to strengthening prehospital systems [7, 30, 31].

Workforce shortages were further compounded by limited opportunities for continuing professional development. Limited in-service training, particularly among rural prehospital healthcare providers and ambulance drivers, was reported as a barrier for providing prehospital care. Inadequate training may reduce the effectiveness of team-based care and limit the ability to perform lifesaving prehospital interventions. The findings of this study are not far from what was reported across other LMICs, where limited access to continuing professional development and emergency care training hinders provider competence and the quality of prehospital services [7, 31, 32]. Previous studies indicate that in rural settings, staff shortages and difficulties releasing personnel for training further constrain capacity building and recommend the development of distance education programs. [33, 34]

Evidence also suggests that short trauma training programs can improve patient outcomes and reduce trauma-related mortality [6].

The lack of standardized clinical protocols was an important barrier, particularly in rural settings, contributing to inconsistent triage and referral decisions and potential overcrowding of emergency departments. Previous studies similarly reported that the absence of clear clinical guidance compromises emergency care delivery, whereas standardized protocols improve triage, referral pathways, and coordination between prehospital and hospital services [7, 32].

Participants also described inadequate welfare and psychosocial support. Repeated exposure to traumatic injuries and death created significant emotional stress, while long working hours without adequate breaks or institutional support further increased the burden on providers. These challenges may ultimately affect workforce retention and the quality of care delivered to patients. Similar findings were reported among emergency medical service personnel in LMICs, where exposure to traumatic scenes, extended shifts, and lack of psychosocial support contributed to emotional exhaustion and burnout [30].

Several resource and infrastructure barriers reported across both settings hindered the provision of timely and effective prehospital care. Ambulance scarcity was a major barrier to prehospital care delivery, as ambulances often served both emergency response and interfacility transfer functions, limiting their availability for new emergencies across both settings. The same challenges have been reported in other LMICs, where inadequate ambulance coverage and limited fleet capacity constrain the effectiveness of emergency medical services [6, 27].

Insufficient hospital bed capacity was frequently reported as a major barrier across both settings. Patients often remained in ambulances for prolonged periods while awaiting admission or transport patients to very long distance, preventing ambulances from responding to new emergencies. Similar findings were previously reported, and a shortage of infrastructure including physical space, was a challenge in the handover of victims of road traffic accidents [36, 37].

Limited availability of essential equipment was another barrier identified by participants, particularly in rural settings and slightly in urban settings. The availability of appropriate equipment is fundamental to the delivery of quality prehospital care, as it enables providers to perform timely assessment, stabilization, and lifesaving interventions before hospital arrival. Similar shortages of emergency care equipment have been documented in several African countries, where inadequate supplies of immobilization devices and equipment maintenance, limit the capacity of providers to deliver evidence-based care [7, 38].

Weak coordination between prehospital services and hospitals delayed patient handover and affected continuity of care particularly in urban settings. Similar communication and handover challenges have been reported in other resource-constrained settings [39].

This study has several strengths. First, it included prehospital healthcare providers from both urban and rural settings, enabling the exploration of contextual similarities and differences in barriers and enablers to prehospital care delivery. Second, participants were drawn from multiple provider cadres involved in prehospital care, allowing for a broader understanding of experiences across different professional roles. Third, the use of qualitative interviews generated rich and detailed accounts of providers' experiences, yielding in-depth insights into factors influencing prehospital care for road traffic injury victims in Rwanda.

However, the findings should be interpreted in light of several limitations. The study was conducted in three institutions and may not capture the full range of experiences of prehospital healthcare providers across Rwanda. In addition, the findings were based on participants' self-reported experiences and perceptions, which may be subject to recall and social desirability bias. Participants may have underreported challenges or overemphasized positive aspects of service delivery. Finally, as with qualitative research, the findings are context-specific, and their transferability to other settings should be considered with caution. Nevertheless, the inclusion of diverse participants from both urban and rural contexts provides valuable insights into factors influencing prehospital care delivery in Rwanda.

Conclusion

This study identified several facilitators supporting prehospital care delivery in Rwanda, including, prehospital health care provider experience, supportive leadership, expanded ambulance services, and the use of digital referral and triage tools. However, barriers include difficult to access scene of accident, workforce shortage more pronounced in rural settings, and in-service training mostly in rural settings, a hospital bed shortage across both settings; limited community engagement and coordination between prehospital services and receiving health facilities continue to affect the delivery of timely prehospital care.

To improve prehospital care in Rwanda, efforts should focus on strengthening community awareness and first-aid capacity, expanding and retaining the prehospital workforce, and providing regular in-service training for healthcare providers and ambulance drivers. Standardized clinical protocols should be developed and implemented, while receiving facility capacity should be enhanced to reduce delays in patient handover. Strengthening coordination between prehospital services and hospitals, alongside scaling up effective digital referral and triage systems, may further improve the timeliness, quality, and continuity of emergency care across urban and rural settings.

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the principles of the Declaration of Helsinki.

Ethical approval

for this study was obtained from the University of Rwanda Institutional Review Board (Ref: 585/CMHS IRB/2025), with additional administrative permissions granted by the Rwanda Biomedical Centre/SAMU (Ref: 3949/RBC/2025) and Ruhengeri Level II Teaching Hospital (Ref: 918/RL2TH/DG/2025). No additional authorization was required from the Rwanda Red Cross Society, as approval from the University of Rwanda IRB was deemed sufficient. All participants were provided with detailed information about the study and gave written informed consent prior to participation. Participation was entirely voluntary, and participants were informed of their right to withdraw from the study at any time without any consequences.

Consent for publication

Competing interests

The authors declare no competing interests.

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Author Contribution

LR contributed to the conception and methodology of the study under the guidance of PM, GU, IC, and JCB. LR also contributed to data collection and data analysis with guidance from PM, GU, IC, and JCB. All authors (LR, PM, GU, IC, and JCB) critically reviewed the manuscript.

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Availability of data and materials

The data sets generated and analyzed during the current study are not publicly available due to ethical restrictions and the sensitive nature of the interview data, which may compromise participant confidentiality. Data may be made available from the corresponding author upon reasonable request.

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Figures

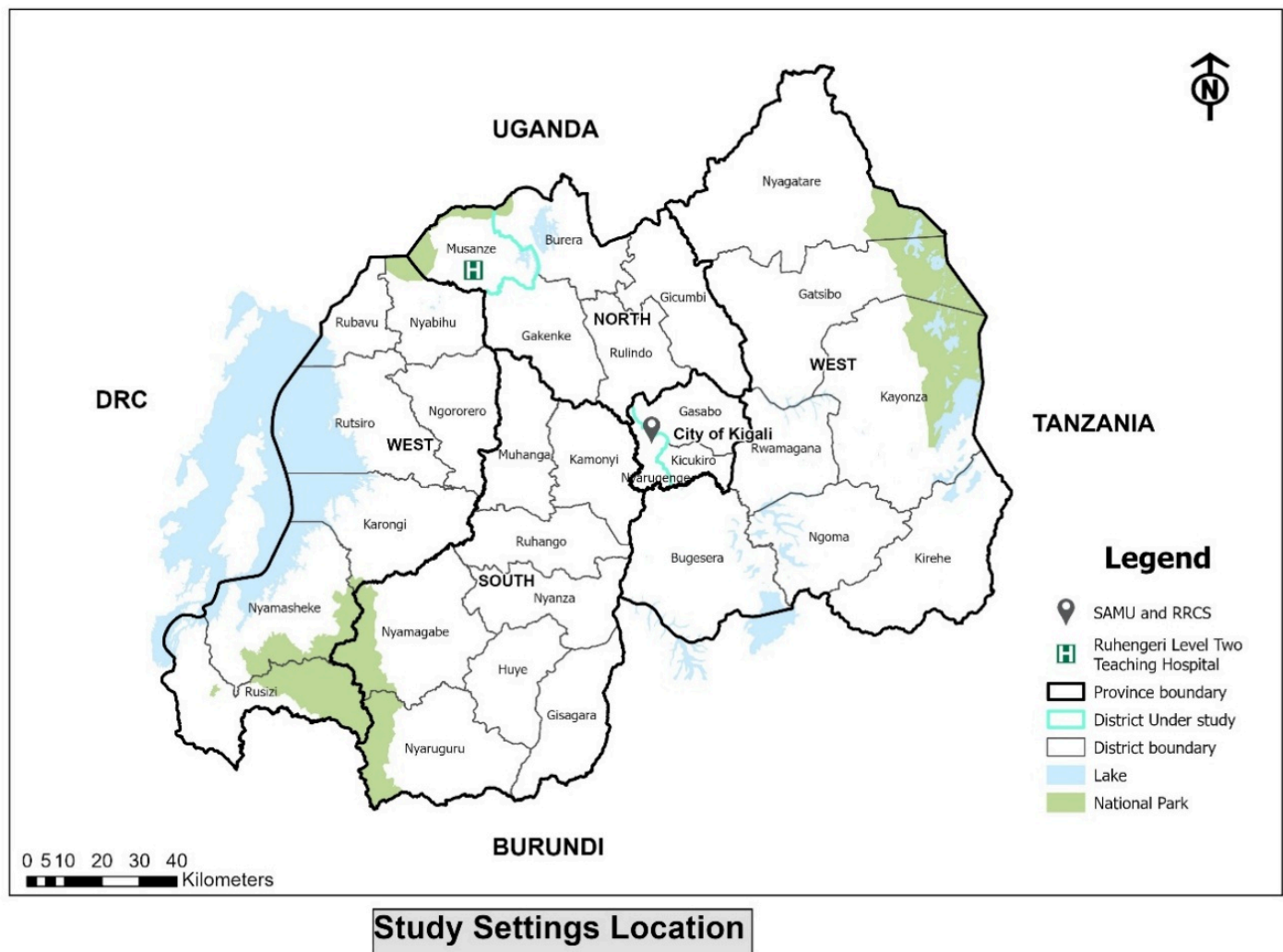


Figure 1

Map of study settings