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From Safety Knowledge to Everyday Practice: A Qualitative Exploration of Factors Influencing Personal Protective Equipment Use and Motorcycle Safety Practices Among Commercial Motorcycle Riders in Cameroon

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Abstract

Background:

Commercial motorcycle riders are at substantial risk of road traffic injuries, yet the use of personal protective equipment (PPE) remains inconsistent in many low- and middle-income settings. Quantitative evidence from the Limbe and Tiko Health Districts of Cameroon has documented gaps in PPE uptake, knowledge, and attitudes, but provides limited insight into the contextual factors underlying everyday safety practices. This study explored individual, interpersonal, organizational, and structural factors influencing PPE use and broader motorcycle safety practices among commercial motorcycle riders in Limbe Health District, Cameroon.

Methods:

A qualitative descriptive study was conducted as part of a formative needs assessment for a theory-driven health education intervention. Data were collected through four focus group discussions (FGDs) involving 46 commercial motorcycle riders and seven in-depth interviews (IDIs) with key informants, including experienced riders, motorcycle union leaders, a Ministry of Transport representative, a healthcare worker, and a road safety police officer. Participants were purposively selected based on their experience or involvement in motorcycle transport, regulation, healthcare, or road safety. FGDs and IDIs were conducted using semi-structured guides, audio-recorded with permission, transcribed verbatim, and translated into standard English where necessary. Data were analyzed thematically through repeated reading, coding, categorization, and development and refinement of themes.

Results:

Five interrelated themes emerged. First, participants generally recognized the protective value of PPE, with personal experiences of motorcycle crashes reinforcing perceptions of its benefits. Second, practical barriers—including cost, discomfort, damaged equipment, work-related pressures, and forgetfulness—could prevent consistent PPE use despite this recognition. Third, gaps in formal training, licensing, regulation, and enforcement were perceived to constrain safety practices. Fourth, participants viewed motorcycle safety as extending beyond PPE to include motorcycle maintenance, functional lighting and signalling systems, speed, overloading, and passenger protection, with responsibility shared across riders, passengers, unions, authorities, law enforcement, healthcare workers, and the wider road environment. Fifth, participants emphasized the importance of repeated, accessible, and context-sensitive safety education delivered through complementary channels, including face-to-face engagement, union meetings, radio, SMS, WhatsApp, and other communication platforms.

Conclusions:

Commercial motorcycle riders' safety practices were shaped by interacting individual, practical, organizational, regulatory, and environmental factors. Recognizing the protective value of PPE was not sufficient to ensure consistent use. Interventions should therefore combine repeated and context-sensitive health education with measures addressing affordability, comfort, training, organizational coordination, motorcycle safety, passenger protection, and consistent enforcement of road safety regulations.

INTRODUCTION

Road traffic injuries (RTIs) are a major public health problem worldwide, with a disproportionate burden in low- and middle-income countries (LMICs). Motorcycle users are particularly vulnerable because motorcycles provide limited physical protection during crashes, while risky riding behaviours, inadequate safety equipment, poor road conditions, and weak enforcement of road safety regulations can further increase injury risk. Evidence from African LMICs indicates that helmet use among motorcyclists remains low and that motorcycle users continue to experience substantial morbidity, severe injuries, hospitalization, and death following road traffic crashes[1].

Cameroon has experienced a substantial burden of motorcycle-related injuries, particularly in settings where commercial motorcycles are an important means of transportation. Motorcycle-related crashes affect both riders and passengers, with injuries commonly involving the head and extremities. A study of motorcycle crash victims in Douala reported that helmet use was almost nonexistent and identified substantial injury burden among both riders and passengers[1]. More recent evidence from the Limbe and Tiko Health Districts similarly demonstrates low uptake of personal protective equipment (PPE) among commercial motorcycle riders. In a community-based study of 499 riders, only 28.6% reported helmet use, while the use of gloves and protective eyewear was even lower. Direct observation also found that most riders were not wearing helmets[2].

PPE, including helmets, gloves, protective footwear, protective clothing, and eye protection, can reduce the risk and severity of injuries sustained during motorcycle crashes. However, the availability of effective protective equipment does not necessarily result in consistent use. A systematic review of studies from African LMICs found wide variation in helmet use and demonstrated a substantial protective effect of helmet use against serious head injuries[3]. Thus, improving motorcycle safety requires more than communicating the protective benefits of PPE; it also requires understanding the circumstances that shape whether riders are able and willing to incorporate protective practices into their everyday work.

Recent quantitative research in the Limbe and Tiko Health Districts provides evidence of this complexity. Although 66.1% of commercial motorcycle riders demonstrated good PPE knowledge, only 45.9% had positive attitudes toward PPE use. Valid motorcycle licensing and previous PPE training were associated with better knowledge and more positive attitudes, whereas internal displacement was associated with less favourable outcomes[4]. Another study conducted in the same population found that PPE uptake

remained low despite riders' reported awareness of safety practices, suggesting that knowledge alone may not adequately explain protective behaviour[2]. These findings highlight the need to understand the experiences and contextual factors underlying the gap between knowing about safety and consistently practising it.

Qualitative research can provide this deeper understanding by examining how individuals interpret risk, negotiate competing priorities, experience practical barriers, and respond to social and institutional influences. Previous qualitative research among motorcyclists has identified barriers such as discomfort, economic constraints, perceptions of helmet quality, psychological factors, and non-adherence to safety regulations, while education, motivation, social participation, and effective enforcement may facilitate helmet use[5]. However, safety behaviour among commercial motorcycle riders is not determined solely at the individual level. Motorcycle unions, transport authorities, law enforcement agencies, healthcare workers, passengers, and other road users may influence how safety rules are understood, communicated, monitored, and enforced.

This broader perspective is particularly relevant in Cameroon, where commercial motorcycle riding provides an important livelihood and transportation service while operating within a complex regulatory and social environment. Existing evidence from the Limbe and Tiko Health Districts has documented the prevalence of PPE use and identified quantitative determinants of knowledge, attitudes, and uptake[4]. However, these quantitative findings provide limited insight into why riders do or do not translate safety knowledge into everyday protective practices, how riders experience barriers such as cost, discomfort and availability, how social and organizational structures influence behaviour, and how stakeholders perceive the roles of education and enforcement.

Understanding these processes is particularly important for designing health education and road-safety interventions that are acceptable, feasible, and responsive to the local context. The formative qualitative assessment conducted in preparation for a theory-driven health education intervention provided an opportunity to explore these issues from the perspectives of commercial motorcycle riders and relevant stakeholders, including motorcycle union leaders, transport authorities, road-safety police officers, and healthcare workers.

Therefore, this study explored the individual, interpersonal, organizational, and structural factors influencing the use of PPE and other motorcycle safety practices among commercial motorcycle riders in Limbe Health District, Cameroon. Specifically, the study aimed to: (1) explore riders' perceptions and experiences regarding PPE and motorcycle safety practices; (2) identify individual, social, organizational, economic, and regulatory barriers and facilitators influencing protective practices; and (3) explore stakeholders' perspectives on strategies for improving sustained use of PPE and other motorcycle safety practices among commercial motorcycle riders.

MATERIALS AND METHODS

Study design and setting

This study employed a qualitative descriptive design as part of a formative needs assessment conducted to explore factors influencing personal protective equipment (PPE) use and broader road safety practices among commercial motorcycle riders in the Limbe Health District, Southwest Region of Cameroon. The qualitative component sought to understand riders' experiences, perceptions, barriers, facilitators, and views regarding PPE use, motorcycle safety, training, regulation, and potential strategies for improving safety practices.

The study was conducted in the Limbe Health District, an urban and peri-urban setting where commercial motorcycles are an important means of transportation. The qualitative assessment complemented quantitative findings from the broader study by providing contextual explanations for observed safety practices and identifying factors that could be addressed through a health education intervention.

Participants and sampling

Participants were purposively selected to obtain perspectives from commercial motorcycle riders and stakeholders with direct experience of motorcycle transport, road safety, healthcare, regulation, or enforcement. The qualitative dataset comprised four focus group discussions (FGDs) involving 46 commercial motorcycle riders and seven in-depth interviews (IDIs) with key informants.

The four FGDs included 12, 12, 12, and 10 participants, respectively. The seven IDI participants comprised two experienced commercial motorcycle riders, two motorcycle union leaders, a representative of the Ministry of Transport, a healthcare worker from the emergency unit of the Regional Hospital Limbe, and a road safety police officer involved in accident management.

The two experienced riders interviewed as key informants were purposively selected from among FGD participants who had demonstrated comparatively good knowledge of motorcycle safety practices. The other key informants were purposively selected based on their professional roles and involvement in motorcycle transportation, regulation, healthcare, or road safety enforcement. Participants were recruited through motorcycle unions or associations, community leaders, and relevant local authorities.

Data collection

Data were collected using semi-structured FGD and IDI guides developed to explore participants' experiences and perceptions of motorcycle safety and PPE use. The guides included open-ended questions and probing questions addressing PPE use, experiences with motorcycle crashes, barriers and facilitators to PPE use, availability and affordability of protective equipment, motorcycle maintenance, training and licensing, enforcement of safety regulations, and potential strategies for improving safety practices.

The principal investigator moderated the FGDs and conducted the IDIs, while a trained research assistant assisted with note-taking during data collection. FGDs were conducted in neutral and accessible community locations and lasted approximately 60–90 minutes. IDIs lasted approximately 30–60 minutes. Discussions and interviews were conducted in English or Pidgin, according to participants' preference.

Focus group discussions

Four FGDs were conducted with commercial motorcycle riders. The groups consisted of 12, 12, 12, and 10 participants, respectively, providing a total of 46 FGD participants. The discussions explored shared experiences and perceptions concerning PPE use and broader motorcycle safety practices.

In-depth interviews

Seven IDIs were conducted with key informants to obtain more detailed perspectives from individuals with specific experience or responsibilities related to motorcycle transportation and road safety. These included two experienced commercial motorcycle riders, two motorcycle union leaders, a representative of the Ministry of Transport, a healthcare worker from the emergency unit of the Regional Hospital Limbe, and a road safety police officer responsible for accident management.

Data collection instruments

The FGD and IDI guides consisted primarily of open-ended questions with probes to encourage participants to elaborate on their experiences and perspectives. Questions explored knowledge and perceptions of PPE, experiences of motorcycle crashes and injuries, factors influencing PPE use, availability and affordability of protective equipment, motorcycle maintenance, passenger safety, training and licensing, enforcement of road safety regulations, and recommendations for improving motorcycle safety.

Data recording and transcription

With participants' permission, FGDs and IDIs were audio-recorded. Field notes were also taken during the sessions to document contextual information and relevant observations. Audio recordings were transcribed verbatim. Where discussions were conducted in Pidgin, the transcripts were translated into standard English for analysis. Identifying information was removed from the transcripts to protect participants' confidentiality.

Data analysis

The qualitative data were analyzed thematically. The researchers first familiarized themselves with the FGD and IDI data through repeated reading of the transcripts. Relevant segments of the data were identified and assigned descriptive codes reflecting participants' experiences, perceptions, barriers, facilitators, and views concerning motorcycle safety and PPE use. Related codes were grouped into broader categories, from which candidate themes and subthemes were developed.

The emerging themes were reviewed and refined to ensure that they adequately represented the content of the data and the study objectives. The analysis also considered similarities and differences in perspectives across the different stakeholder groups. Rather than summarizing responses question by question, the analysis focused on identifying patterns that explained factors influencing PPE use and broader motorcycle safety practices. Individual experiences were considered alongside practical, organizational, regulatory, and environmental factors that shaped safety behaviour.

Illustrative quotations were selected from the interview data to represent participants' perspectives. Where quotations originated from discussions conducted in Pidgin, they were translated into standard English while retaining the intended meaning. The final themes were interpreted in relation to the study objectives and relevant behavioural determinants and were used to inform the content and delivery strategies of the health education intervention.

Reflexivity

The research team recognized that their professional and academic backgrounds and familiarity with the study setting could potentially influence data collection and interpretation. To minimize this influence, semi-structured questions were used to provide consistency while allowing participants to introduce issues that they considered important. Participants were encouraged to express their views freely, including perspectives that differed from those of the researchers. Interpretation of the findings was grounded in participants' accounts, with attention to convergence and divergence across stakeholder perspectives.

RESULTS

Participant characteristics and overview of qualitative findings

The qualitative dataset comprised four focus group discussions (FGDs) with commercial motorcycle riders and seven in-depth interviews (IDIs) with key informants. The four FGDs included a total of 46 commercial motorcycle riders, with 12 participants in each of the first three FGDs and 10 participants in the fourth. All FGD participants were male and ranged in age from 21 to 46 years. The age ranges were 21–43, 21–42, 22–46, and 21–44 years in the first, second, third, and fourth FGDs, respectively. Overall, nine participants had no formal education, 14 had primary education, 13 had secondary education, and 10 had tertiary education.

The seven IDI participants comprised two experienced commercial motorcycle riders, two motorcycle union leaders, a representative of the Ministry of Transport, a road safety police officer, and a healthcare worker. The analysis identified five interrelated themes: (1) experiential recognition of the protective value of PPE; (2) practical barriers to consistent PPE use; (3) gaps in training, regulation and enforcement; (4) motorcycle safety as a broader and shared responsibility; and (5) the need for repeated, accessible and context-sensitive safety education. Across the accounts, participants generally recognized the importance of protective practices, but described consistent safety behaviour as being influenced by material constraints, comfort, work demands, training, organizational structures, enforcement, and the wider road-safety environment.

Theme 1: Experiential recognition of the protective value of PPE

Participants generally demonstrated a clear understanding of the purpose of personal protective equipment (PPE), particularly helmets, gloves, protective shoes, thick pullovers, and long trousers. Helmets were primarily associated with protection of the head, while gloves, shoes, and protective clothing were perceived as reducing injuries to the hands, feet, legs, and other exposed body parts. Participants also described motorcycle components such as mirrors, trafficators, and lights as important elements of safety because they helped riders monitor surrounding traffic and communicate their movements to other road users.

Importantly, knowledge about PPE was not presented only as abstract information. Riders frequently linked the perceived value of protective equipment to their own experiences of motorcycle crashes. Participants described previous accidents in which helmets, gloves, long trousers, thick clothing, or strong shoes were perceived to have prevented or reduced injuries. These experiences appeared to provide concrete and personally meaningful evidence of the protective value of PPE.

The experienced riders similarly described PPE as protective even when its use was inconvenient. One experienced rider reported that a helmet caused discomfort and neck pain but continued to wear it because the perceived consequences of riding without it were greater:

I still just put it on because it's for my safety.

The same participant described a previous crash in which protective clothing, a helmet, and good shoes were perceived to have protected him from serious injury, while the passengers sustained substantial leg injuries.

These accounts suggest that participants did not simply lack knowledge about PPE. Rather, many had developed an experiential understanding that protective equipment could reduce the consequences of crashes. However, recognition of this protective value did not necessarily translate into consistent use in everyday riding.

Theme 2: Practical barriers created a gap between recognizing PPE benefits and using PPE consistently

Despite recognizing the protective value of PPE, participants described several practical barriers that could interfere with consistent use. The most frequently described constraints related to cost, discomfort, equipment damage, work-related inconvenience, and forgetfulness.

Financial constraints were particularly important. Participants described situations in which damaged or worn PPE could not immediately be replaced because replacement costs were difficult to meet. Financial limitations were also linked to other motorcycle-related safety expenses.

Physical discomfort was another important consideration. Helmets were specifically described as uncomfortable, while an experienced rider reported neck pain associated with helmet use. Nevertheless, the participant continued to wear the helmet because its perceived protective benefit outweighed the discomfort. Another experienced rider similarly described helmet discomfort but regarded protective clothing and appropriate shoes as advantageous because they provided protection against cold and injury.

The data also indicated that everyday work routines could interfere with safety practices. Participants described being in a hurry before starting work and sometimes forgetting protective equipment. Participants suggested that reminders before leaving for work could prompt riders who had forgotten their helmets or other protective equipment to use them. Other participants similarly suggested that messages would be particularly useful when riders were rushing to begin work.

The findings therefore point to a distinction between acceptance of the principle of PPE use and the practical ability or willingness to maintain that behaviour consistently. Even riders who considered PPE beneficial had to negotiate discomfort, affordability, equipment availability, and the demands of commercial riding.

Theme 3: Gaps in training, regulation and enforcement constrained safety practices

Participants identified weaknesses in formal training and regulatory implementation as important influences on motorcycle safety. Some riders were perceived to enter commercial motorcycle riding without adequate formal training, while union leaders described efforts to encourage riders to obtain the appropriate motorcycle driving licence and improve their knowledge of road safety.

One union leader explained that the union had encouraged riders to acquire a Category A driving licence so that they could obtain greater knowledge of road use, although some riders had not followed through with registration. The union also described having a control team responsible for monitoring practices such as excessive speed and overloading.

However, the accounts also revealed a gap between the existence of safety rules and their consistent implementation. The Ministry of Transport representative stated that helmet use was compulsory and that enforcement mechanisms existed, while also acknowledging that some riders continued to refuse compliance. The union perspective similarly suggested that enforcement could be difficult when institutional responsibilities overlapped. One union leader explained that union members had previously been brought to the union office for disciplinary action when they were found without helmets, wearing inappropriate footwear, or riding motorcycles with missing tail lights or side mirrors. However, changes in the relationship with the municipal council meant that the union no longer had the same disciplinary role, creating uncertainty about how non-compliant riders should be sanctioned.

This was complemented by the perspective of the road safety police officer, who described motorcycle safety as involving both personal safety and general road safety. The officer emphasized that safety extended beyond wearing a helmet to include motorcycle visibility, functional lights, and the broader road environment. The officer also raised the need for infrastructure that could better separate motorcycles from other road users.

Thus, participants did not portray poor safety practices simply as individual unwillingness to comply. Instead, their accounts pointed to interacting gaps in rider training, organizational regulation, enforcement authority, and the broader road environment.

Theme 4: Motorcycle safety extended beyond PPE and was viewed as a shared responsibility

Although PPE was central to the discussions, participants consistently broadened the meaning of motorcycle safety beyond individual protective equipment. They emphasized the importance of maintaining the motorcycle itself, protecting passengers, avoiding overloading and excessive speed, and ensuring that motorcycle lighting and signalling systems remained functional.

Riders described rear-view mirrors, trafficators, brake lights, and tail lights as essential safety components. Participants noted that some riders removed these components, potentially compromising their ability to see other road users or communicate their intentions. Participants also recommended that motorcycles should be maintained in their original condition, including functional trafficators, tail lights, and other safety-related components.

The experienced rider provided a more detailed account of routine motorcycle maintenance, describing regular checks of the braking system, mirrors, tail lights, and engine. Passenger safety was also emphasized. The rider described taking steps to obtain passenger insurance and regarded passenger protection as an important component of responsible riding, although such practices were not considered common among all riders.

The experiences of the riders also demonstrated that motorcycle safety involved both rider and passenger vulnerability. One experienced rider described an accident in which he escaped serious injury

while the passengers sustained substantial injuries, leading him to emphasize that passengers should also receive appropriate protection. The Ministry of Transport representative similarly acknowledged that passengers are exposed to the same crash environment as riders and considered passenger helmet use important, although the participant was uncertain about the existence of a specific policy addressing passengers.

The healthcare perspective further broadened the safety picture. The healthcare worker described seeing a range of motorcycle-related injuries, including fractures, bruises, muscle contusions, and serious head trauma, and identified speeding, overloading, appropriate clothing, helmet use, and other road-safety behaviours as relevant prevention messages. However, the healthcare worker described the facility's role as primarily reactive: education generally occurred after an injured rider had already received treatment rather than through routine community-based prevention activities.

Together, these accounts positioned motorcycle safety as a shared responsibility involving riders, passengers, unions, transport authorities, law enforcement, healthcare workers, and the wider road environment, rather than solely an individual decision about whether to wear a helmet.

Theme 5: Participants emphasized repeated, accessible and context-sensitive safety education

Across the participant groups, there was strong support for continued education and sensitization, although views differed regarding the most effective delivery channels. Participants repeatedly emphasized that a single educational encounter was unlikely to be sufficient and proposed repeated reminders through several communication channels.

Among riders, suggested approaches included face-to-face meetings, radio, SMS, WhatsApp, and other media. Some participants recommended regular messages because riders could forget PPE before leaving for work, while others emphasized that messages should be appropriately timed and should not be delivered in a harsh or confrontational manner. Participants proposed frequencies ranging from weekly to several times per week, reflecting a preference for repeated cues rather than a one-time intervention.

The union leaders described existing opportunities for peer-based education. One union leader reported regular meetings where riders shared information and advised one another about safety practices. This suggests that motorcycle unions and rider groups could provide established social settings through which safety messages could be reinforced.

However, stakeholder perspectives differed regarding the relative usefulness of mobile-phone messaging and face-to-face education. The healthcare worker considered direct, face-to-face engagement preferable because riders might not have the time or inclination to read lengthy SMS messages. The participant recommended taking education directly to riders and repeatedly discussing the importance of road safety. At the same time, the healthcare worker supported frequent

reinforcement and suggested that messages could include information on the consequences of unsafe practices and the benefits of PPE.

The healthcare worker also suggested that messages could be adapted to local communication preferences, including local languages and voice messages delivered through platforms such as WhatsApp. Frequent exposure was considered useful because repeated information could reinforce awareness.

The Ministry of Transport perspective similarly supported collaboration between government agencies, law enforcement, and other organizations in promoting motorcycle safety. The Ministry representative reported collaboration with security institutions, police, and non-governmental organizations, indicating that motorcycle safety education was viewed as requiring engagement beyond a single institution.

Overall, participants described effective safety education as needing to be repeated, practical, accessible, and adapted to riders' everyday circumstances. Rather than relying exclusively on written messages or enforcement, they favoured a combination of direct engagement, peer and organizational reinforcement, mobile communication, and broader public messaging.

Integrative summary of findings

Across the five themes, the findings indicate that participants generally recognized the protective value of PPE and could describe specific benefits based on both knowledge and personal experience. However, consistent safety practice was influenced by a wider set of conditions. Financial limitations, discomfort, damaged equipment, work pressures, and forgetfulness could make consistent PPE use difficult, while gaps in formal training, fragmented organizational responsibilities, and limitations in enforcement affected the wider safety environment. Participants also viewed motorcycle safety as extending beyond PPE to include motorcycle maintenance, visibility, passenger protection, speed, and overloading.

Importantly, the different stakeholder groups contributed complementary perspectives. Riders emphasized lived experience and the practical realities of daily riding; union leaders highlighted peer influence, organization, and disciplinary challenges; transport and police stakeholders emphasized regulation, enforcement, and the broader road environment; and the healthcare perspective highlighted the consequences of unsafe practices and the predominantly reactive nature of injury prevention. These perspectives converged on the need for sustained and context-sensitive safety education supported by broader organizational and regulatory measures.

DISCUSSION

This qualitative study explored factors influencing PPE use and broader road safety practices among commercial motorcycle riders and relevant stakeholders in the Limbe Health District of Cameroon. The findings indicate that participants generally recognized the protective value of PPE and could describe its benefits from both knowledge and personal experience. However, recognition of these benefits did

not consistently translate into everyday protective behaviour. PPE use was shaped by practical constraints such as cost and discomfort, as well as by work demands, training, organizational structures, enforcement and the wider road-safety environment. Participants therefore described motorcycle safety as a multidimensional issue that extends beyond individual behaviour and requires sustained education alongside supportive organizational, regulatory and environmental measures.

Knowledge and experience do not necessarily translate into consistent protective behaviour

A central finding was the distinction between knowing that PPE is protective and consistently using it during everyday riding. Participants were able to identify several forms of PPE and described specific protective functions. Experiences of previous crashes appeared to reinforce these perceptions, with experienced riders describing situations in which helmets and protective clothing were perceived to have reduced the severity of injuries. This suggests that, for some riders, personal experience may serve as an important source of risk awareness and behavioural motivation.

However, the presence of knowledge and experience did not necessarily result in consistent protective behaviour. This finding is consistent with recent quantitative evidence from the same broader study setting, where many commercial motorcycle riders demonstrated knowledge of PPE but fewer demonstrated positive attitudes towards its use. In that study, 64.1% of riders knew that PPE should be worn on every ride, while only 45.9% demonstrated positive attitudes towards PPE[4]. The present qualitative findings provide additional context for this apparent knowledge–behaviour gap by showing that riders may understand the value of PPE while simultaneously experiencing circumstances that make consistent use difficult.

Similar findings have been reported elsewhere in Africa. A qualitative study among commercial motorcycle drivers in Ibadan, Nigeria, found that risk-taking could become normalized as part of the occupation and that economic and occupational pressures influenced safety behaviour. The authors emphasized the importance of addressing the broader structures within which riders operate rather than focusing exclusively on individual behaviour[6]. Thus, improving knowledge remains important, but knowledge alone may be insufficient where protective behaviour competes with economic pressures, occupational routines and established social norms.

Practical barriers can undermine PPE use even when its benefits are recognized

Participants described cost, discomfort, damaged equipment, rushing and forgetfulness as practical barriers to consistent PPE use. These findings are important because they shift attention from the assumption that non-use necessarily reflects ignorance or disregard for safety. A rider may accept that a helmet, protective clothing or appropriate footwear is beneficial while still finding it difficult to use or replace such equipment consistently.

The role of affordability is particularly relevant in commercial motorcycle transport, where protective equipment represents an additional cost for workers whose income depends on daily riding. Recent evidence from Limbe and Tiko found that economic and other contextual factors were associated with PPE uptake among commercial motorcyclists, while qualitative evidence from Cameroon has also identified the cost of providing a separate helmet for passengers as a barrier[2]. The WHO similarly identifies the availability and affordability of safe, quality helmets as important barriers to helmet uptake in low- and middle-income settings[7, 8].

Discomfort was another important barrier identified by participants. Riders described heat, physical discomfort and inconvenience associated with some protective equipment. These concerns are supported by broader evidence indicating that protective motorcycle clothing can create problems in hot conditions, including overheating and discomfort[9]. This is particularly relevant in tropical settings such as Cameroon, where equipment designed without adequate consideration of local climatic conditions may be less acceptable for routine use.

The findings therefore suggest that interventions should not frame PPE use solely as a matter of individual responsibility. Improving access to affordable and appropriate protective equipment, ensuring availability of suitable equipment, and addressing comfort and usability may be necessary complements to education.

Training, regulation and enforcement shape the safety environment

Participants also emphasized gaps in formal training, licensing, regulation and enforcement. Union leaders described riders who entered commercial motorcycle riding without adequate formal training or licensing, while transport and police stakeholders emphasized the importance of regulation and enforcement. These findings are consistent with qualitative evidence from Nigeria, where inadequate structures surrounding training, licensing and enforcement were identified as important constraints on road safety[10].

The findings are also relevant to recent evidence from Cameroon. In a 2026 study among commercial motorcycle riders in Limbe and Tiko, possession of a motorcycle licence and previous PPE training were associated with better knowledge and attitudes towards PPE[4]. This provides quantitative support for the qualitative participants' emphasis on training and licensing as components of safer riding.

Importantly, participants did not describe enforcement as a simple matter of punishing individual riders. Their accounts suggested that responsibilities were distributed across unions, municipal authorities, transport authorities and law enforcement, sometimes creating uncertainty about who should regulate or discipline riders. This organizational dimension is important because enforcement may be less effective when institutional responsibilities are fragmented or inconsistently applied.

The WHO emphasizes that road safety laws are unlikely to achieve their intended effect when enforcement is weak or perceived to be inconsistent. It also recommends combining enforcement with education rather than relying on either approach alone[11]. The present findings therefore support a complementary approach in which safety education is accompanied by consistent and clearly coordinated regulatory enforcement.

Motorcycle safety extends beyond PPE to a broader system of risk

Another important finding was that participants did not view motorcycle safety as synonymous with PPE use. They discussed motorcycle maintenance, functional headlights and rear lights, trafficators, mirrors, speed, overloading and passenger protection. This broader understanding is consistent with a systems perspective of road safety, in which injuries result from interactions among road users, vehicles, infrastructure, regulation and the wider transport environment.

The emphasis on motorcycle maintenance and visibility is particularly relevant because functional lights, trafficators and other motorcycle components influence both the rider's ability to operate safely and the ability of other road users to detect motorcycles. Recent formative research in the same setting similarly identified rider visibility and functional motorcycle lighting as important behavioural and contextual determinants of motorcycle safety[12].

Passenger safety was also prominent in participants' accounts. Experienced riders described challenges related to passenger helmets, while transport and healthcare stakeholders emphasized the vulnerability of passengers. This is important because commercial motorcycle safety interventions can become overly rider-centred even though passengers are also exposed to crash-related injury. Recent qualitative research in Cameroon has similarly documented financial and practical concerns surrounding passenger helmet provision[13].

The findings therefore support a broader road-safety approach in which responsibility is shared among riders, passengers, motorcycle unions, transport authorities, law enforcement, healthcare services and other actors. This is consistent with the WHO's Safe System approach, which emphasizes that road safety requires coordinated action across multiple sectors rather than reliance on individual road users alone[14].

Repeated and context-sensitive education may be more appropriate than one-time sensitization

Participants strongly emphasized continuous education and suggested several communication channels, including face-to-face meetings, radio, SMS, WhatsApp, social media and voice messages. They also emphasized repetition, appropriate timing and communication approaches that were supportive rather than confrontational. These findings suggest that the effectiveness of safety education

may depend not only on what is communicated but also on how, when and how often messages are delivered.

The preference for repeated and accessible communication is particularly relevant to commercial motorcycle riders because their work is mobile and often organized around motorcycle parks, union structures and informal peer networks. Regular union meetings and group forums may therefore provide practical opportunities for reinforcing safety messages. At the same time, mobile communication platforms may provide a means of maintaining contact with riders beyond face-to-face sessions.

The findings also support the principle that education should be adapted to the circumstances of the target population. Participants suggested local-language communication, voice messages and different media channels, reflecting differences in literacy, accessibility and communication preferences. This is consistent with the broader evidence that helmet promotion is most effective when education is incorporated into a wider package that includes appropriate legislation, enforcement, access to quality equipment and contextually appropriate communication[7].

Importantly, the findings should not be interpreted as suggesting that education alone will resolve the barriers identified. The qualitative accounts indicate that education can improve awareness and reinforce motivation, but structural barriers such as equipment cost, discomfort, inadequate training, organizational fragmentation and inconsistent enforcement require complementary responses.

Implications for intervention development

The findings have direct implications for interventions aimed at improving PPE and motorcycle safety practices among commercial motorcycle riders. First, intervention messages should move beyond simply telling riders that PPE is important. They should address the specific reasons why riders may fail to use PPE consistently, including discomfort, cost, forgetfulness and work-related pressures. Messages can also draw on real-life experiences of crashes to strengthen perceptions of vulnerability and the benefits of protective behaviour.

Second, interventions should address both individual and environmental determinants of behaviour. The findings suggest the need for education to be reinforced through motorcycle unions, transport authorities and law enforcement, with clear and consistent expectations regarding safety practices. Third, intervention delivery should use multiple complementary communication channels, including face-to-face engagement and mobile-phone-based communication, while considering local language, literacy and the daily routines of riders.

These implications are particularly relevant because the qualitative findings formed part of the formative work used to develop the subsequent health education intervention. The intervention was designed using the Health Belief Model and Intervention Mapping and incorporated face-to-face sensitization together with mobile-phone educational messaging[15]. This later quantitative finding is consistent with the central qualitative observation that improving knowledge and attitudes does not necessarily eliminate practical and structural barriers to consistent use of multiple forms of PPE.

Strengths and limitations

This study has several strengths. The inclusion of multiple stakeholder groups provided perspectives from commercial motorcycle riders as well as individuals involved in motorcycle organization, regulation, enforcement, and healthcare. The combination of FGDs and IDIs enabled the study to capture both shared experiences among riders and more specialized perspectives from key informants. In addition, the qualitative approach provided contextual insights into barriers and facilitators that may not have been captured through quantitative measures of PPE knowledge, attitudes, or use alone. The inclusion of perspectives from different stakeholder groups also enabled the findings to be considered from complementary individual, organizational, and regulatory perspectives.

Several limitations should also be considered. First, the study was conducted in the Limbe Health District and the findings should therefore be interpreted within its specific social, economic, and regulatory context. Although the findings may be relevant to other commercial motorcycle settings with similar characteristics, they may not be directly transferable to all settings in Cameroon. Second, participants' accounts may have been influenced by social desirability, particularly when discussing compliance with safety regulations and protective practices. Third, the study focused on participants' reported experiences and perceptions and therefore cannot establish the extent to which the reported barriers and facilitators directly translated into observed safety behaviours. Finally, the qualitative findings were generated within the context of a broader formative assessment conducted to inform a health education intervention; consequently, they should be interpreted primarily as contextual and explanatory findings rather than as estimates of the prevalence or magnitude of specific barriers or behaviours.

CONCLUSION

This qualitative study demonstrates that commercial motorcycle riders' PPE practices are influenced by more than knowledge of the protective value of safety equipment. Participants generally recognized the importance of PPE, and personal experiences of crashes reinforced this understanding, but consistent protective behaviour was affected by cost, discomfort, work demands, training, organizational structures, enforcement and the wider road environment. Participants consequently viewed motorcycle safety as a shared responsibility extending beyond PPE to motorcycle maintenance, visibility, passenger protection, speed and overloading. The findings support the use of repeated, accessible and context-sensitive safety education, but also indicate that educational interventions should be complemented by improved access to appropriate protective equipment, effective training, coordinated organizational responsibilities and consistent enforcement of road safety regulations.

Declarations

Ethical considerations and consent to participate

Ethical approval for this study was obtained from the Institutional Review Board of the Faculty of Health Sciences, University of Buea, Buea, Cameroon (Reference Number: 2024/2490-03/UB/SG/IRB/FHS). Administrative authorizations were also obtained from the Department of Public Health, University of Buea, the South-West Regional Delegation of Public Health, and the District Health Services of Limbe and Tiko before commencement of the study.

Participation was entirely voluntary. Written informed consent was obtained from all participants before data collection. For participants with limited literacy, the consent information was explained verbally in Pidgin English to ensure adequate understanding before consent was obtained.

Confidentiality and anonymity were maintained throughout the research process. Participants were assigned unique identification codes, and electronic data were stored in password-protected databases accessible only to members of the research team. Participants were informed of their right to withdraw from the study at any time without consequences.

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

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

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Patient and Public Involvement Statement

Patients and the public were not involved in the design, conduct, reporting, or dissemination of this research. However, key stakeholders such as motorcycle union leaders and local health officers were consulted during the planning and data collection phases.

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