HIGH VOLUME TRANSPORT APPLIED RESEARCH

UWE Bristol University of the West of England

नेपाल इन्जरी अनुसन्धान केन्द्र
Nepal Injury Research Centre

Safer motorcycle taxis as part of Nepal's public transport system

Final Report

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Policy and regulation development for motorcycle taxi safety in Nepal

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Abstract

The study sought to understand the nature and operation of motorcycle taxi (MCT) operations in Nepal and identify potential changes in policy and regulation that could improve safety for riders and passengers. A mixed methods approach was used which included an analysis of secondary data from crash reports, a structured literature review on the MCT systems in low- and middle-income countries (LMIC) and collected qualitative data from key informant interviews and focus group discussions with stakeholders.

Of the 1.5 million motorcycles in the Kathmandu Valley about 190,000 are used as MCTs. There is a lack of routine disaggregation of motorcycle crash data by the police which leads to an under reporting of MCT crashes, injuries and deaths in Nepal. Taken with the lack of reporting of MCT crashes in the media the net result is that the public are ill-informed of the risks associated with using MCTs.

Mitigating the risks of MCT crashes and injuries could be summarised from the literature as knowing and following the traffic rules, correct helmet use, limiting total ride time and distance, owning a suitable motorcycle, undertaking rider safety training and then practising safe riding behaviour. However, much less evidence is available from evaluations of interventions or policy changes to make MCT systems safer.

The interviews and focus groups raised additional risk factors such as safety issues raised by passengers and riders under the influence of alcohol and/or drugs, and riders distracted by mobile phones; personal safety concerns of MCT particularly female passengers; the need for changes in legislation to ensure that all riders and passengers are insured in the case of a crash; the (poor) quality of the road environment as a factor for causing crashes.

Evidence from the project will be helpful in finalising the regulations outlined in the draft two-wheeler directive that was prepared by the Ministry of Physical Infrastructure and Transport (MoPIT) in 2023. Stakeholders agreed a set of recommendations for operators and regulators to consider.

Keywords	Motorcycle taxi, public transport, road safety, ride-hailing app, regulation
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Abbreviations/Acronyms

CEI	Community engagement and involvement
DoTM	Department of Transport Management
DTG	DT Global
FCDO	Foreign, Commonwealth & Development Office
HVT	High Volume Transport
ISPF	International Science Partnerships Fund
KMC	Kathmandu Medical College
KSI	Killed and seriously injured
LMIC	Low- and middle-income countries
MCT	Motorcycle taxis (two-wheeled motorcycles or scooters)
MCTPAG	Motorcycle taxi passenger advisory group
MoPIT	Ministry of Physical Infrastructure and Transport (Nepal)
NHRC	Nepal Health Research Council
NIHR	National Institute of Health Research
NIRC	Nepal Injury Research Centre
ODA	(UK Government) Overseas Development Aid
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RA	Research Associate
SafeTrip Nepal	A 'safe Systems' Approach for Enabling Traffic Injury Prevention in Nepal
SRA	Senior Research Associate
TRID	Transport Research International Documentation (database)
TUCL	Tribhuvan University Central Library
UWE	University of the West of England

Executive Summary

Background: Globally, 30% of road traffic deaths involve motorcycles rising to 43% in South-East Asia, where motorcycles are often used as taxis. Road transport provides the main mode of mobility in Nepal, and in Kathmandu valley motorcycles constitute 79.1% of the total vehicle fleet. Nepal does not have any national legislation authorising the development of a motorcycle taxi (MCT) system, but MCT ride-hailing app services started in 2017 in response to consumer demand. A draft two-wheeler directive was prepared by the Ministry of Physical Infrastructure and Transport (MoPIT) in 2023, which has been translated from Nepali into English and reviewed by the project team.

Aim: To understand the place of MCTs in the public transport ecosystem in Nepal and methods of enhancing their safety.

Methods: The objectives of the study were to (i) understand the nature and operation of the MCT system in Nepal, (ii) illustrate the safety and personal security risks of its use, (iii) identify potential changes in policy and regulation that could improve safety for riders and passengers, and (iv) synthesise knowledge and understanding with outputs from the NIHR funded SafeTrip Nepal programme on improving the safety of bus transport, to get a fuller picture of the public transport ecosystem. The objectives were addressed using a mixed methods approach. We conducted an analysis of secondary data from the police and media crash reports, a structured literature review on the motorcycle taxi systems in low- and middle-income countries and collected qualitative data from key informant interviews and focus group discussions with stakeholders.

Findings: Our findings suggest that of the 1.5 million motorcycles in the Kathmandu Valley about 190,000 (12.7%) are used as MCTs. The official published Traffic Police statistics on vehicle crashes do not classify MCTs separately from other motorcycles and scooters, but they do have records of 25 MCT crashes in 23/24, resulting in 34 injuries and 3 deaths. However, if the crash rate of all registered motorcycles was extrapolated to all MCTs it would equate to 973 MCT crashes in 23/24, resulting in 1,324 injuries and 117 deaths. A three-year review of The Himalayan Times found no reports of MCT crashes. Although 102 two-wheeler crashes were reported it is likely that the journalists were unaware whether they were MCTs or not and they may not prioritise these crashes because the numbers injured or killed in each crash are small compared with those that involve other types of vehicles such as buses.

Our structured literature revealed that there is little evidence of the current development of safer MCT systems in low- and middle-income countries. The good practice that did emerge included promoting helmet use. Several of the studies help us to understand the risk factors for crashes and injuries in MCT riders. Mitigating the risks could be summarised as knowing and following the traffic rules, correct helmet use, limiting total ride time and distance, owning a suitable motorcycle, undertaking rider safety training and then practising safe riding behaviour. However, much less evidence is available from evaluations of interventions or policy change to make MCT systems safer.

The interviews and focus groups raised additional risk factors such as safety issues raised by passengers and riders under the influence of alcohol and/or drugs, and riders distracted by mobile phones; personal safety concerns of MCT passengers; the need for changes in legislation to ensure that all riders and passengers are insured in the case of a crash; the (poor) quality of the road environment as a factor for causing crashes.

Conclusion: The lack of routine disaggregation of motorcycle crash data collected by the police and the figures quoted above indicate the magnitude of under reporting of MCT crashes, injuries and deaths in Nepal. Taken with the lack of reporting of MCT crashes in the media the net result is that the public are ill-informed of the risks associated with using MCTs.

The literature shows that there is limited evidence to support the development of safer motorcycle taxi system in LMICs. SafeBoda, an operator from East Africa provides examples of good motorcycle taxi practice, including promoting helmet use. Mitigating the risk factors for crashes and injuries requires that motorcycle taxi riders know and follow the traffic rules, use helmets correctly, limit total ride time and distance, own a suitable motorcycle, undertake rider safety training and practise safe riding behaviour. Little evidence is available from evaluations of interventions or policy change to make motorcycle taxi system safer.

Summary of major project outcomes:

A summary of the major outcomes which are presented in Table 1 overleaf.

Table 1: Summary of major project outcomes

Project objectives	Findings/outputs	Outcomes
1/ To understand the nature and operation of the motorcycle taxi (MCT) system in Nepal	Process maps were developed which helped identify challenges in the current way MCTs operate in Nepal.	Stakeholders identified and prioritised proposed actions to address these that have been shared with operators and regulators [see Table 15/Table 16]
2/ To illustrate the safety and personal security risks of its use	MCT crash data was collated from the Nepal Police and the media revealing under-reporting, so the public are unaware of the risks associated with riding MCTs. The project brought ride-hailing operators together for the first time, despite them being competitors. It also brought together other stakeholders.	Nepal Police in Kathmandu now more systematically record MCT crashes for each fiscal year which will raise visibility of the issue. Operators discussed possible collaborations on issues linked to rider and passenger safety (both road and personal safety). [see Section 6.1] Strengthening of an informal motorcycle taxi riders' peer support group, using WhatsApp to help each rider ride more safely and to provide mutual support when issues arise. Creating a MCT Passenger Advisory Group that has the potential to grow into a passenger peer support group. Operators, riders and passengers speaking with a common voice makes a compelling case for urgent action to be taken by national regulators to formalise the sector.
3/ To identify potential changes in policy and regulation that could improve safety for riders and passengers	Evidence from the literature and perspectives collected from stakeholders identified risk factors and mitigating actions including the mandatory use of helmets for pillion passengers, work hour limitations, visible identification of MCT riders, discouraging riding under the influence of alcohol/drugs or while distracted by phones, ensuring that all riders/passengers are insured in the case of a crash and improving the road environment for MCTs.	The project outputs have been shared with the regulators and the project outputs and recommendations will be helpful in finalising the regulations outlined in the draft two-wheeler directive that was prepared by the Ministry of Physical Infrastructure and Transport (MoPIT) in 2023. [see Section 6.1]
4/ To synthesise knowledge and understanding with outputs from the NIHR funded SafeTrip Nepal programme to get a fuller picture of the public transport ecosystem.	Recommendations for stakeholder action have been developed.	The recommendations to improve MCT safety will be published as part of a Safer Public Transport Guide for Nepal which will be produce as part of the NIHR funded project: "A Safe System Approach for enabling safer public bus transportation in Nepal".

1. Introduction

This report presents the outputs of this project and describes:

1. Data on road traffic crashes involving motorcycle taxis (MCT) in Nepal, that resulted in people being killed or seriously injured (KSIs),
2. Evidence of good practice for the management of motorcycle taxis from other low- and middle-income countries (LMICs), especially in Southeast Asia and Africa, with the potential to be applied in Nepal, and
3. Learning from our key informant interviews, focus group discussions, stakeholder engagement workshop and dissemination event.

The methods used for collecting crash data from the Nepali Traffic Police in Kathmandu and from media reports is described in section two. The search strategy used in the structured literature review, along with the criteria for including a study in the review are also included in section two. The crash data and findings from the key informant interviews and focus group discussions are described in section three and gaps in the data are identified. Section four syntheses and discusses the evidence from each of the data sources and highlights the good practice from other LMICs that have been found in the literature. Conclusions and next steps are presented in section five and finally recommendations are provided in section six.

Throughout the document 'motorcycle taxi' is used to describe two-wheeled motorcycles or scooters, usually powered by internal combustion engines, but could refer to electric vehicles, used to transport fare-paying passengers, generally facilitated via a ride-hailing or rideshare application (app) on a mobile phone. The person who takes a fare paying passenger on their motorcycle, is referred to throughout as the (motorcycle taxi) rider - some of the literature refers to motorcycle taxi drivers - and their passengers as pillion passengers or more simply, passengers.

1.1 Background

Globally, nearly 30% of all road traffic deaths involve powered two- and three-wheeled vehicles (WHO, 2022), and the proportion is 46% in South-East Asia (WHO, 2023). In Nepal, 71.5% of motorised traffic consists of motorcycles (Department of Transport Management Nepal, 2019). In the Kathmandu Valley the proportion of two- and three-wheelers in the vehicle fleet that is 79.1% (Aryal, Ichihashi and Kaneko, 2022).

Increasingly over the last five years in Nepal, motorcycles are being used as taxis both informally and through ride-hail applications for mobile phones. Motorcycle taxis (MCT) have not been a government priority to date and this project has raised awareness of this emerging mode of public transport. MCTs are mostly available in Kathmandu Valley, and this is the only part of the country where the ride-hail apps are widely used, but expansion into other Nepali cities began in 2024. MCT services elsewhere in the country have until 2024 been mostly ad hoc services and informally provided without the use of rideshare apps. There are 1.5 million motorcycles officially registered in the Kathmandu Valley Transportation Management Office, 190,000 of which according to operator Pathao are motorcycle taxis (The Kathmandu Post, 2024).

The main law regulating transport in Nepal is the Motor Vehicles and Transport Management Act 1993 and the accompanying motor vehicle and transport management rules to implement the act were last updated in 2010. These documents provide detailed policies about the use of buses and other forms of road transport for carrying paying passengers, but they do not include policies about two-wheeled motorcycles as taxis. Article 8 specifically says that no private motor vehicle shall be used as a transport service which suggests that private two-wheelers cannot be use as a taxi, and as the motorcycle taxis that operate in the Kathmandu valley are private motor vehicles, they are currently in breach of the federal law. However, at a provincial level the Bagmati Province Vehicle and Transport Management Act, 2018 says that private motor vehicles can provide a transport service provided proper registration and insurance are in place. Based on this clause, ride-hailing apps are used to provide motorcycle taxis services in the Kathmandu Valley after registering at the Department of Industry. To clarify the standard operating procedures that motorcycle taxis should follow in Nepal, in 2023, the Ministry of Physical Infrastructure and Transport (MoPIT) drafted national guidelines on two-wheeler taxis.

The number of services offered in Nepal has risen as ride-hail apps such as Pathao, InDrive, Tootle Ayo, and JumJum have proliferated. Policy makers have been slow to formalise these motorcycle taxi ride-share apps (Gurung, 2019) as illustrated by the pace of regulation changes outlined above. Many MCT

riders sometimes offer services without using the apps, which means that there is no record of their journey and there is no insurance to cover them should they have a collision.

Although there is a legal requirement for both riders and passengers to wear helmets in Nepal (Vehicle and Transportation Management Act, 1993), observations suggest that fewer than 1% of pillion passengers wear a helmet, and that enforcement and fines are only applied to the rider, reflected in a 98% compliance rate by riders (Siebert, et al 2021), but minimal compliance by pillion passengers. This poses evident risks to motorcycle taxi passengers if their ride is involved in a road traffic crash.

Other factors that may increase the risk of injury for motorcycle taxi passengers include the riders speeding, applying poor lane discipline or taking alcohol or drugs. The likelihood of speeding may be exacerbated by the pressure to pick up more passengers and thereby generate more income. Other factors that may increase the risks of being involved in a crash include overloading (transporting more than one pillion passenger or excessive luggage), riders with no formal training, and sometimes with no driving license or insurance (ESCAP, 2016).

Despite their popularity as a mode of transport users rate them poorly compared with other public transport options, particularly due to perceived safety risks, with research showing that public transport users would prefer access to light or heavy rail systems, in countries such as Nepal (Aryal, Ichihashi and Kaneko, 2022).

Women often need to use public transport as there is lower vehicle ownership and access to private vehicles among women (Hamal and Huijsmans, 2021). Women account for 40% of Tootle users (South Asia Time, 2019). Transport is often not inclusive of women, children, and other vulnerable groups. A World Bank (2014) survey reported high frequencies of harassment of women when using public transport. Women are moving more towards motorcycle taxis to avoid crowded buses where inappropriate touching is a risk. Motorcycle taxi ride-hailing apps may give options to request a female rider. There are risks where the rider is male, and there are reports of women being attacked by their rider. Disabled people may also choose motorcycle taxis due to the challenges of boarding buses.

2. Methodology

This section describes the methodology employed in this project in order to achieve the project aims and objectives as described below.

The project aim was to understand the place of motorcycle taxis in the public transport ecosystem and methods of enhancing their safety. The project had four objectives:

1. To understand the nature and operation of the motorcycle taxi system in Nepal,
2. To illustrate the safety and personal security risks of its use,
3. To identify potential changes in policy and regulation that could improve safety for riders and passengers, and
4. To synthesise knowledge and understanding with outputs from the NIHR funded SafeTrip Nepal[1] programme on improving the safety of bus transport, to get a fuller picture of the public transport ecosystem.

Section 2.1 outlines the community engagement and involvement approach that has supported the project's development. The processes followed for collecting crash data from the Nepali Traffic Police in Kathmandu including collecting crash data from media sources is described in Section 2.2.

The search terms and data bases used in the structured literature review, along with the criteria adopted for including a study in the review are included in Section 2.3.

Section 2.4 describes the methods adopted for the key informant interviews, Section 2.5 describes the focus groups and Section 2.6 describes the qualitative data analysis used for both.

Section 2.7 describes the process mapping, both the current state of the motorcycle taxi system in Nepal and a desired future and Section 2.8 the co-creation workshop where these maps were discussed and further developed.

Sections 2.9 and 2.10 describe the measures taken to address data management and ethical considerations. Dissemination of the study's findings are addressed in Section 2.11.

2.1 Community engagement and involvement

A series of community engagement and involvement (CEI) events with passengers of motorcycle taxis has helped inform our approach. The group was recruited to represent the diversity of passengers and included women, men older and younger participants, two of whom were visually impaired. We sought the views of the CEI participants regarding how to recruit participants to the focus groups, suitable venues and gained feedback on the content of our proposed topic guides. We sought their views on which stakeholders to engage for the key informant interviews and the issues that should be covered during the interviews.

The first motorcycle taxi passenger advisory group (MCTPAG) was conducted on 21st November 2023 and followed by another meeting on 28th November 2023 with the remaining members who had missed the first meeting. The experiences of the motorcycle taxi passengers covered a wide range of topics spanning safe riding manners, rider orientation, pillion passenger safety, helmet use, passenger personal safety especially for girls, facilitating online payment, vehicle maintenance and offline rides.

A face-to-face meeting was held on 7th June 2024 with 5 passengers. The MCTPAG provided useful advice for proposed follow-on surveys with riders and passengers during the project's planned extended to March 2025 using UWE's International Science Partnerships Fund (ISPF) Institutional Support Grant (ODA). They advised that we should administer surveys through the operators' platforms with incentives (e.g. prize draw), surveys should be in two languages (Nepali and English), survey questions should mainly be closed and none of them compulsory. The MCTPAG members offered to help reach out to other passengers to promote a survey. The group also made recommendations for disseminating our research findings.

[1] A 'safe Systems' Approach for Enabling Traffic Injury Prevention in Nepal is another project hosted by the Nepal Injury Research Centre, funded by the National Institute of Health Research: https://nirc.org.np/#/research

They suggested that we consider using creative methods such as using the arts, endorsements from celebrities and perhaps we should prepare a video of our research recommendations and share them on a YouTube channel.

2.2 Collating data on crashes involving motorcycle taxis

The aim of this component of the study was to collate existing data on crashes, injuries and deaths associated with motorcycle taxi use to identify common factors associated with these outcomes. We sought data from two sources: the Nepal Traffic Police in Kathmandu and media reports of road traffic crashes involving motorcycle taxis.

To collect and analyse crash data from the Nepal Traffic Police we initially visited the Police Headquarters in Kathmandu. We obtained permission to access routinely collected crash data from the Traffic Police operating in Kathmandu Valley. They provided us with de-identified data on all motorcycle crashes categorised as taxis in their database over three fiscal years from 2021/22 to 2023/24. We used descriptive statistics to calculate frequencies and rates.

To compare and potentially to validate the data available from the traffic police, we collected data on MCT crashes from the media source. This also was intended to provide context to the police records for these crashes. The most widely read English-language newspaper in Nepal, the Himalayan Times, was selected because of its wide readership and a searchable online archive. The newspaper was scanned through libraries of Kathmandu Medical College (KMC) and Tribhuvan University to identify media reports of MCT crashes that had been published. We searched the same period as the available traffic police data, i.e. July 2021 to July 2024.

To collate data from media reports, information relating to the date, title, page number of the news that appeared, location of the crash and the circumstances of the crash, were extracted and entered in a data extraction form.

2.3 Structured literature review

The aim of the literature review was to collate and synthesise published evidence relating to risk factors for crashes, injuries and deaths involving motorcycle taxis in low- and middle-income countries (LMICs) and see if they are relevant to consider in Nepal, and whether there are interventions, polices or regulations that have been used in LMICs that may be appropriate to consider for Nepal.

The inclusion criteria for our review were:

Population: articles that described people using, running, or regulating motorcycle taxi systems in low- and middle-income countries.

Exposure: articles that focused on 2-wheeler motorcycle taxis (or other terms for MCTs, if the country or author choose to use a different name), i.e. a system where a passenger pays a 2-wheeler motorcycle rider to take them on a journey on the back of their motorcycle, including (but not restricted to) through the use of ride-sharing app services.

Outcomes: articles that report risk factors for crashes, injuries or deaths associated with MCT journeys in a country of interest, or it contains information on how a MCT system is managed in a country of interest (including regulations/standards/laws).

We applied the following search strategy to three databases. Terms used: ("motorcycle taxi*" OR "ride-hail*" OR "ride shar*" OR boda* OR indrive OR pathao) AND (injur* OR death* OR "risk factor*" OR regulat* OR legislat* OR causalt*).

The databases searched along with the date range of the search are listed Table 2 below. No date restrictions were applied to any of the databases.

Table 2: Databases used in the literature review

Database	Date range of search
SafetyLit (www.safetylit.org)	All dates to 1/12/23
PubMed (https://pubmed.ncbi.nlm.nih.gov/)	All dates to 1/12/23
Transport Research International Documentation [TRID] (www.trid.trb.org)	All dates to 1/12/23

The titles and abstracts of the hits resulting from the searches in each database were screened independently by two researchers and disagreements were resolved by discussion. Duplicates were excluded. Citations remaining after title and abstract screening were reviewed in full text to determine that an article met all the inclusion criteria and was therefore eligible to be included in the review.

A summary of the selection identification is described using a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[2] flowchart shown in Figure 1. A total of 412 articles were identified by the searches with 76 from SafetyLit, 81 from PubMed and 255 from Transport Research International Documentation (TRID). After removing duplicate records (n = 47), the remaining 365 articles were screened independently by two researchers, leaving 25 articles included in the review (see Appendix A).

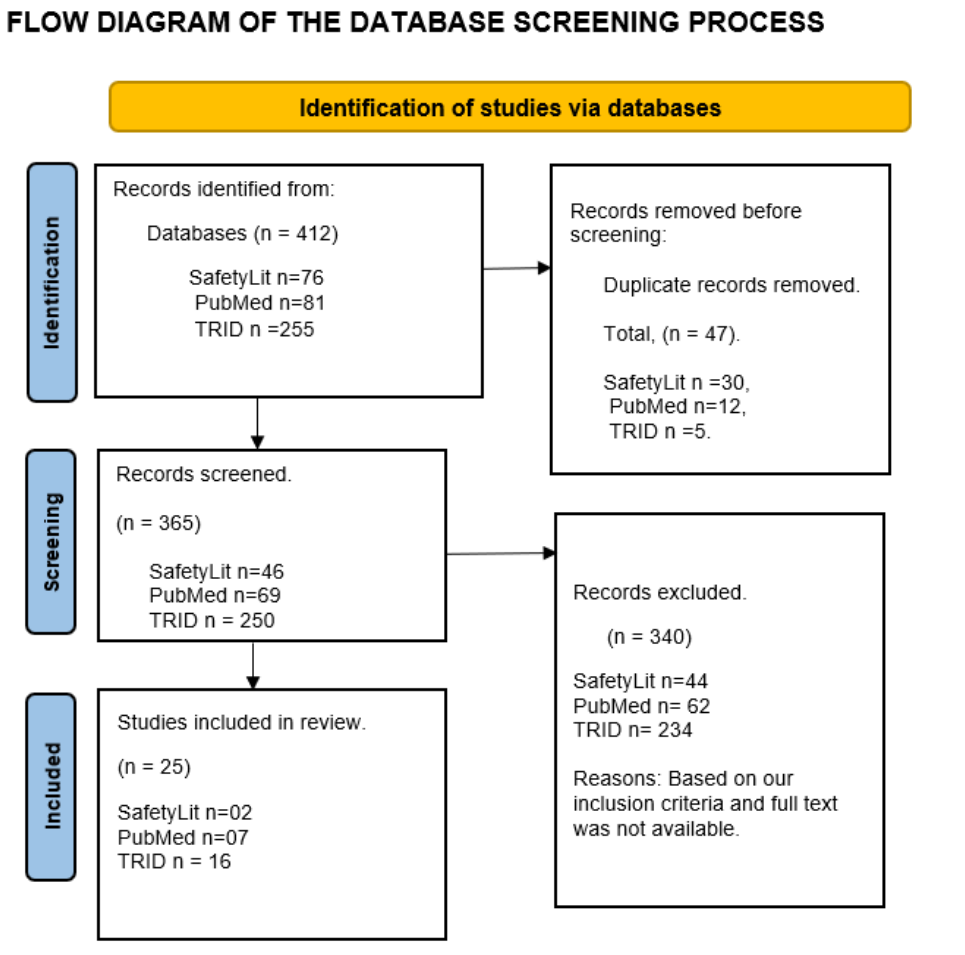

Figure 1: Flow diagram of the database screening process

Information from included studies were extracted into a data extraction spreadsheet in Excel. The data was analysed to:

1. Identify risk factors associated with motorcycle taxi riders, journeys, operations or leading to crashes and injuries,

[2] A PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart is a way of reporting how researchers arrive at the final number of results included in a study.

2. Identify reported interventions to improve safety in motorcycle taxi operations and whether these were evaluated, and
3. To establish if any of the papers described policy or regulatory changes to improve motorcycle taxi safety and whether these were evaluated.

2.4 Key informant interviews

We interviewed 15 key informants who have knowledge of the motorcycle taxi system from a variety of perspectives (including regulators, ride-hail app providers, operators and the traffic police). Potential participants were identified through existing contacts and networks and following the advice of our CEI contributors.

Potential participants were provided with information on the study and given the chance to ask questions before deciding if they wished to take part. Those who were recruited were asked to sign a consent form (Appendix B). Interviews were audio-recorded with permission and were facilitated by the two Nepali researchers using a topic guide (Appendix C).

2.5 Focus groups

Four focus groups were conducted with motorcycle taxi users (two groups including disabled people, a range of ages, and men and women) and riders (two groups, including male and female riders with different operating companies) separately. Information was provided to potential participants and the opportunity provided to ask questions before committing to take part.

Those who agreed to take part were asked to sign a consent form for their data to be used anonymously (see Appendix D). With permission, focus groups were audio-recorded. Whether or not consent was granted for audio recording, detailed notes were taken during the focus group discussions. The discussion in the focus group was in Nepali and facilitated by one of the two Nepali researchers working on the project using a topic guide (see Appendix E) to ensure that key topics were covered, and open prompt questions were used to encourage discussion and involvement of all participants.

2.6 Qualitative data analysis

Transcripts from the key informant interviews and focus group discussions were coded (descriptions of the salient points in the transcripts) and analysed thematically (Braun and Clarke, 2021) to identify issues that influence safety within the public transport system. These issues have been presented as linked themes.

2.7 Process mapping

Data obtained from the MCTPAG, key informants and the focus group discussions were synthesised to build process maps describing the motorcycle taxi service system as it currently exists. An improved motorcycle taxi system desired by stakeholders was then imaged at a co-creation workshop as illustrated in Figure 2.

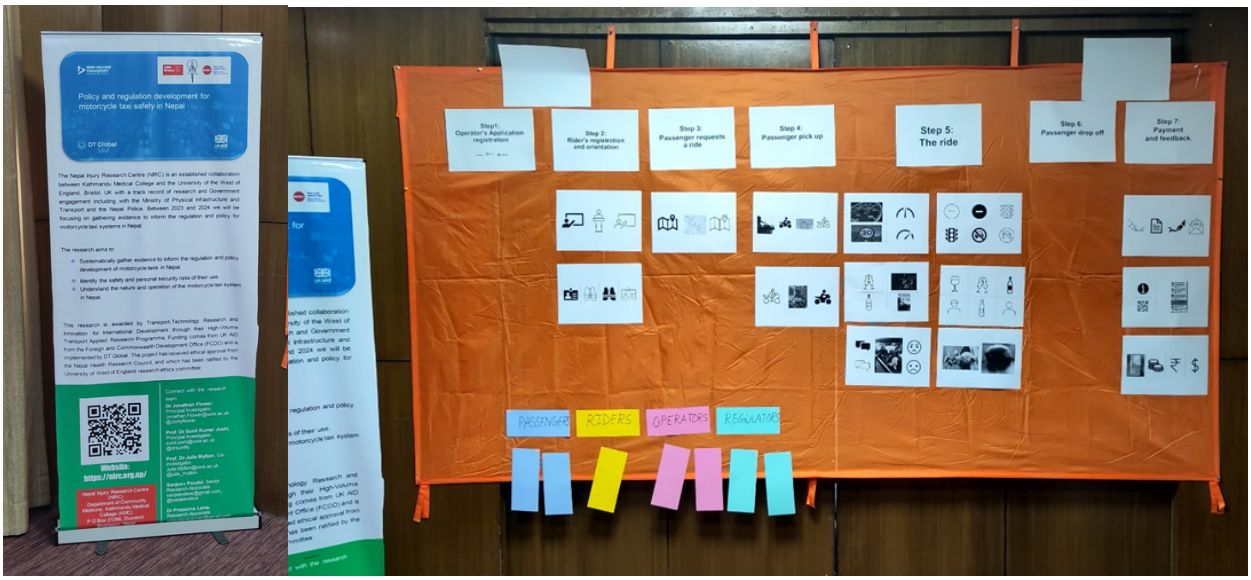

Figure 2: Work in progress on a desired motorcycle taxi system for Nepal

2.8 Co-creation workshop

The co-creation workshop was held on 9th May 2024 with 15 stakeholders and some of the participants are pictured in Figure 3 along with the facilitation team. It was the first time that the three main ride-hail operators had met. One of the operators represents about 190,000 motorcycle taxi riders and 10,000 four-wheel taxi drivers.

They recognised that they are commercial competitors, but at the workshop realised the advantages of collaborating on issues that could improve the environment in which they work, help to formalise the status of motorcycle taxi operations and improve the safety for passengers, riders and other road users. At the workshop we made it clear that we were seeking solutions to address the current safety and well-being challenges faced by passengers and riders while also ensuring that the motorcycle taxi sector could remain commercially viable.

Figure 3: Participants at the co-creation workshop

The workshop was facilitated in such a way that the voices of all stakeholders were heard and respected. This was a fine balancing act considering both local culture and the potential imbalance of power between the actors in the room. However, feedback from participants suggest that we managed to achieve this. At each stage the passengers spoke first followed by the riders, operators and finally the regulators, including the police. The workshop was an interactive process that involved three main stages:

1. Stakeholders presenting and then responding to questions and comments, in turn, the current challenges to passenger and rider safety and well-being,
2. A similar process to present potential solutions to the challenges that had arisen that had been generated in the Key Informant Interviews and Focus Group Discussions,
3. Solutions were then sorted by the participants onto a matrix (see Section 3.5) indicating whether each proposal would have high medium of low impact for passengers or riders and whether they would require short-term (less than a year), medium-term (1-5 years) or long-term (more than five years) to implement. Finally, participants ranked the proposals in terms of the top three that they thought should be implemented.

Following the workshop, follow-up meetings were held with three stakeholders to clarify and consolidate the outputs of the workshop. Meetings were held with the biggest operator (Pathao), the Traffic Police and MoPIT (regulator). This was useful for resolving potential issues and strengthening support from the key players. Some of the initial impact and opportunities that arose included in Section 3.5.

2.9 Data management

A data management plan was produced to describe how data will be collected, stored, analysed and reported to ensure anonymity of the participants. The plan describes how long data will be stored for after the project and the process for data destruction.

Audio-recordings from focus groups and interviews were downloaded onto password protected computers and transcribed and translated into English. Data were stored on secure server at the NIRC. Unique identifiers were used to replace the names of participants to protect anonymity. Once transcripts were checked against the recording, the audio file was destroyed from the recorder.

2.10 Ethical considerations

Ethical approval for this study was granted by the Nepal Health Research Council (NHRC approval reference no. 606, included in Appendix F) and ratified by the University of the West of England's College of Arts, Technology and the Environment ethics committee (reference no. CHSS.23.11.059). All participants in the study provide informed consent (see Appendices C and D).

2.11 Dissemination

A dissemination event was held to share the project findings on 23rd August 2024, with decision makers with the authority to influence change within the motorcycle taxi system. It was hosted by the NIRC and the National Road Safety Council in the Road Boards Hall, a government building belonging to the Department of Roads. This event brought together passengers, riders, ride-hailing app operators, government agencies, a national cricketing celebrity, media, academia, private sectors, and the Nepal police[3] to share the research findings and discuss next steps.

The participants, shown in Figure 4 agreed a set of recommendations which can be seen in Section 6, in a declaration on how to improve two-wheeler taxi operations in Nepal.

[3] Stakeholders included MCTPAG members, a female rider who has created a network of motorcycle taxi riders, representatives of Tootle, Pathao Nepal, inDrive, the Ministry of Physical Infrastructure and Transport, Department of Transport and Management, Department of Roads, Roads Board Nepal, National Road Safety Council, UNDP Nepal, National Trauma Centre, NASA foundation, Rotary Club, Nepal Insurance Authority, KPI Helmets, British Embassy, Sajha Yatayat, Nepal Police, Traffic FM 95.5 MHz, World Health Organization, and the Annapurna Post.

Figure 4: Participants at the final dissemination point

In addition Dr Prasanna Lama presented two papers at the Safety 2024 conference (www.worldsafety2024.com) in Delhi 2-4 September 2024, entitled:

1. Understanding and managing injury risks associated with motorcycle taxi systems in lower- and middle-income countries: a systematic review, and
2. Evidence to inform the regulation and policy development of motorcycle taxi services in Nepal: a secondary data analysis.

The abstracts have been published in a supplement of BMJ - Injury Prevention (Poudel, et al 2024a; Poudel, et al, 2024b).

3. Results

The results are presented under five main sub-sections, Section 3.1 presents the crash data from both police and media sources. Then Section 3.2 presents (i) risk factors associated with motorcycle taxi crashes, injuries and deaths, (ii) non-regulatory interventions to improve motorcycle taxi safety, and (iii) regulatory interventions to improve motorcycle taxi safety, that emerge from the literature review.

Section 3.3 summarises the findings from the key informant interviews and focus group discussions. The current and desired process maps of motorcycle taxi operations in Nepal are presented in Section 3.4. Finally, Section 3.5 outlines some of the initial impact and opportunities that arose from the co-creation workshop.

3.1 Motorcycle taxi crash data

The crash data from the Traffic Police records are presented in Section 3.1.1 and then the gaps are discussed in Section 4. Data from media reports are described in section 3.1.2 and again the gaps in that source are discussed in Section 4.

3.1.1 Traffic police crash data

The number of motorcycle taxi crashes, injuries and deaths captured in the Nepal Traffic Police database are presented in Table 3.

Table 3: Motorcycle taxi crashes reported by the Traffic Police in Kathmandu

Nepali Fiscal Year	UK Year	Number of motorcycle taxi crashes recorded	Number of injuries recorded	Number of deaths recorded
2078/79	July 2021-July 2022	41	55	2
2079/80	July 2022-July 2023	21	26	0
2080/81	July 2023 to July 2024	25	34	3
Total		87	115	5

(Note: The Nepali calendar differs from the UK calendar; the Nepali fiscal year runs from mid-July to mid-July).

The official published Traffic Police statistics on vehicle crashes do not classify motorcycle taxis separately from other motorcycles and scooters. However, by working with the staff at the Traffic Police headquarters we were able to receive an extract from the database that included cases where the rider of the motorcycle was identified as a motorcycle taxi rider. The Nepal Traffic Police have only been recording motorcycle taxis separately since the 2021/22 (2078/79) fiscal year. These are the data provided in Table 2 above.

Since the Nepal Traffic Police began recording motorcycle taxi crashes, they have reported 87 crash events resulting in 115 people being injured and five fatalities.

According to the Transportation Management Office (Motorcycle), Gurjudhara, Bagmati Province, there are 1.5 million motorcycles registered in the Kathmandu valley in 2024 as shown in Table 4. In contrast to the limited police reports on motorcycle taxis seen above, this table shows the far more extensive records on all motorcycle crashes generally.

Table 4: Traffic Police reports of all motorcycle crashes in Kathmandu Valley, 2021-2024

Nepali Fiscal Year	UK Year	Number of motorcycle (m/c) crashes recorded	Registered m/cs in Kathmandu valley	% of m/c involved in crashes
2078/79	July 2021-July 2022	8,364	1,330,254	0.63
2079/80	July 2022-July 2023	8,341	1,436,760	0.58
2080/81	July 2023 to July 2024	7,684	1,500,000	0.51

The last column in Table 4 describes the percentage of motorcycles involved in a crash.

3.1.2 Crash data from media reports

Media reports of motorcycle taxi crashes were sought from 'The Himalayan Times' from July 2021 to July 2024. During this period no media reports on motorcycle taxi crashes were identified. However, 102 crashes involving motorcycles were reported over the same period, but without reference as to whether they were private trips or operating as a taxi.

3.2 Structured literature review

Following the process described in Section 2, 25 articles (listed in B) were reviewed that reported motorcycle taxi systems in three regions: sub-Saharan Africa (n=16, from Ghana, Benin, Uganda, Tanzania, Kenya and Rwanda), Southeast Asia (n=6, from Vietnam and China) and Latin America (n=3, from Brazil and Columbia). 20 of the articles reported cross-sectional studies, two reported case control studies and the remaining three reported a literature review, secondary data analysis and a quasi-experimental study respectively.

15 of the papers identified risk factors associated with motorcycle taxi riders leading to crashes and injuries. Four of the papers reported interventions associated with motorcycle taxi operations. None of the papers described policy or regulatory changes to improve motorcycle taxi operations that were formally evaluated. These are described in turn.

3.2.1 Risk factors associated with motorcycle taxi crashes, injuries and deaths

15 of the papers reported 13 different studies exploring the association between risk factors for road traffic crashes and injuries in motorcycle taxi riders. Of these 13 studies, 11 were cross sectional surveys and two were case control studies. 11 studies reported statistically significant associations for crashes and injuries in motorcycle taxi riders.

Table 5 summarises the published results where authors have reported statistically significant association with crashes and injuries in motorcycle taxi riders. The numbers in parenthesis indicate where more than one paper reported the same factor.

Table 5: Author reported risk factors with statistically significant association with motorcycle taxi crashes and injuries

Risk factors for crashes	Risk factors for crash injuries
• Not following traffic rules (3) • Helmet absent or inconsistently used • Less driving experience • Driving >50km per day • Using mobile phone while riding (2) • Having a rented motorcycle • Poor self-reported driving • Carrying >1 passenger • Smoking while driving • Being overweight or obese	• Poor knowledge of traffic rules • Not following traffic rules • Not wearing or poor fitting helmet (3) • Less driving experience (2) • Riding >14hrs per day • Using mobile phone while riding • Sharing or co-owning a motorcycle • No rider training • Lower engine capacity • Not changed motorcycle in last year • Ever been stopped by police

In can be seen in the table that several of the rider factors that are risk factors for crashes are also a risk factor for injuries such as not following the traffic rules.

3.2.2 Non-regulatory interventions to improve motorcycle taxi safety

Four of the 25 studies reviewed, reported non-regulatory interventions to improve motorcycle taxi safety. SafeBoda is an East African operator that started in Uganda, that promotes the safety of its service. SafeBoda riders are more likely to wear a helmet and are less likely to report a crash than similar regular motorcycle taxi riders. Muni *et al* (2018) established that after adjusting for confounding factors, SafeBoda riders are 1.22 times more likely to wear a helmet than regular motorcycle taxi riders (95% CI: 1.14-1.31, p<0.001).

Their riders are also 39% less likely to be involved in a crash (RR: 0.61, 95% CI: 0.37-0.97, p=0.04) than regular motorcycle taxi riders after adjusting for age, possession of a driver's license, and education (Muni et al., 2019). In a quasi-experimental study in Benin, West Africa, it was shown that following seven sessions of safety awareness training, motorcycle taxi riders demonstrated safer knowledge, attitudes and practice (KAP) scores compared to riders in a control city (Dos Santos et al., 2022).

3.2.3 Regulatory interventions to improve motorcycle taxi safety

None of the included studies described policy or regulatory changes that were formally evaluated.

We did find one paper where interview and survey evidence collected from motorcycle taxi users, riders and regulators in Ghana directly informed a proposal to legalise and regulate motorcycle taxis in rural areas (Afukaar et al., 2019). We did not identify a publication reporting on whether this proposed regulation change had been promulgated.

3.3 Key informant interviews and focus group discussions

The stakeholders that had a major stake withing the ecosystem of the motorcycle taxi operations were identified through the help of a stakeholder mapping exercise. We based the selection of the stakeholders on the safe system approach. The 15 major stakeholders that we interviewed for the key informant interviews were from the Ministry of Physical Infrastructure and Transport, the Department of Transport and Management, the Nepal Police, ride-hailing app operators, doctors from the national trauma centre and an electric vehicle two-wheeler company working on low emissions mobility in Nepal. These are summarised in Table 6.

Table 6: Stakeholders that took part in the key informant interviews

Provenance of stakeholders	Number of participants
Regulators and the Nepal Police	7
Operators (ride-hailing app providers)	5
Road Safety Expert	1
National Trauma Centre	1
Electric Scooter Company	1
Total	15

We then brought together 40 participants in total, 20 passengers and 20 riders in four focus group discussions.

From the key informant interviews and focus group discussions, the codes and subthemes that emerged from the qualitative data analysis were clustered under seven themes relating to the safety of riders and passengers. The seven themes are listed in Table 7.

Table 7: Themes emerging from the qualitative data analysis

	Themes
1	Passenger behaviour issues
2	Barriers to the use of helmets by MCT passengers
3	Personal safety concerns of MCT passengers
4	Rider behaviour issues
5	Better use of technology to improve the safety of MCTs
6	Legislative changes to support safer MCT operations
7	Quality of the road environment

The emergent codes and, subthemes can be seen in Tables 8-14.

Table 8: Emergent passenger behaviour codes from the qualitative data

Theme	Subthemes	Description of codes
Passenger behaviour issues	Use of alcohol	Passengers are under the influence of alcohol
	Speeding	Passengers encourage riders to exceed the speed limit
	Overloading	Passengers board MCT with excess luggage or multiple passengers including children

The quotes below come from focus group participants illustrating the various passenger behaviour issues.

"Sometimes it is also passengers who ask riders to ride fast while in hurry" FGD passenger

"In the past, if I must travel anywhere with luggage, I had to use a taxi. Now motorcycle taxis have been introduced, the price is lower, it is easy to take a ride, and the rider comes to my home" FGD passenger

"Sometimes I must carry more than one passenger on the motorcycle, for example a mother with her child, wo could be as tall as the mother. Sometimes they come with luggage or small carry-on bags as well" FGD rider

Table 9: Emergent codes on helmet use from the qualitative data

Theme	Subthemes	Description of codes
Barriers to the use of helmets by MCT passengers	Reluctance to carry helmets	Passengers are not keen to carry a helmet and pass the responsibility to the riders.
	Helmet size and fit	Helmet size can differ from the passenger's head size
	Lack of solidarity	Solidarity is lacking among the stakeholders for the implementation of helmet use by pillion passengers

The quotes below come from focus group participants illustrating issues linked to helmet use.

"Carrying an extra helmet for passenger use is a good idea but has pragmatic issues for passengers associated with it. Where to store the helmet? If there is a crash and helmets are worn by passenger and rider, it is safer" FGD passenger

"The operators cannot know the appropriate size of the helmet; I would like to challenge the idea of riders carrying an extra helmet with them as there might be an issue with the size of the helmet" FGD passenger

Table 10: Emergent personal safety codes from the qualitative data

Theme	Subthemes	Description of codes
Personal safety concerns of MCT passengers	Unwarranted contacts with passengers	Unsolicited contacts with female passengers
	Inappropriate conversations	Inappropriate conversations initiated by the riders
	Unmatched riders and vehicle	Rider's license plates and the personal details (*on the app*) do not match
	Slow response to passengers' feedback	Slow response time by the operators regarding the complaints about riders
	Offline riders	Riders not affiliated to a ride sharing company make unrequested approaches
	Vehicle condition	Poor vehicle condition
	Unfriendly riders	Rider is late, unfriendly or rude

The quotes below come from focus group participants illustrating issues linked to personal safety.

"The riders made an unsolicited contact with me, weeks after using the motorcycle taxi in the Kathmandu Valley. I felt annoyed and blocked the number", FGD passenger

"As soon as the rider knew I belonged to the rainbow (LGBTIQ+) community, the rider started inappropriate conversations with me. I did not hear from the app company even though I had lodged a complaint regarding the matter" FGD passenger

Table 11: mergent rider behaviour codes from the qualitative data

Theme	Subthemes	Description of codes
Rider behaviour issues	Speeding	Young riders exceed the speed limits
	Distracted riding	Riders are distracted while navigating using maps on their mobile phones
	Use of alcohol	Riders are under the influence of alcohol while riding

The quotes below come from focus group participants illustrating issues linked to rider behaviour.

"I see lots of distracted riders as they try to navigate with maps on their mobile phones" FGD passenger

"Once I was in hurry, and I took a MCT, but later realised that the rider was drunk. The rider did not do anything to me. I reached my destination properly, but he was a little drunk.' Visually impaired FGD passenger

Table 12: Emergent codes on using technology to improve safety from the qualitative data

Theme	Sub themes	Description of codes
Better use of technology to improve the safety of MCTs	Training and orientation	Mandatory (*online*) training and orientation about the traffic rules, law, hospitality and the road safety
	Speed monitoring	Speeding flagging by making speed checks through the app
	Security concerns associated with helmet use	Security concerns related to helmet use by MCT passengers (*prompted by the historic use of motorcycles in shootings carried out by pillion riders*)
	Lack of coordination	Lack of coordination across government agencies

The quote below comes from a key informant interview illustrating the use of technology to promote safety.

"We have launched a speed flagger feature in the app, that flags when the riders are above the speed limit which uses the app system; the passenger app alerts passengers so that they know when the rider is speeding" interview with an operator"

Table 13: Emergent code on potential legislative changes from the qualitative data

Theme	Sub theme	Description of code
Legislative changes to support safer MCT operations	Insurance claims following crashes	The passenger or rider cannot make an insurance claim if one of them is under the influence of alcohol in the event of a crash (NB applies only to 2-wheeler taxis)

The quote below comes from a key informant interview illustrating the potential use of legislative changes to promote safety.

"In the motorcycle insurance policy, a clause dictates that in terms of two-wheelers (taxis), if either the rider or passenger is under the influence of alcohol and/or drugs, in the case of a crash the insurance claim will be denied" interview with an insurance authority representative

Table 14: Emergent road environment codes from the qualitative data

Theme	Sub themes	Description of codes
Quality of the road environment	Early warning to riders	No early warning to riders about road conditions
	Unlit traffic signs and markings	No road lighting on roads at night
	Road quality	Uneven road surface, for example potholes

The quote below comes from a key informant interview illustrating road quality issues.

"There are lot of uneven surfaces in the roads, some are small, and some are big enough to lead to injuries and even fatalities. There is little warning of road works so that riders are unaware of it. I have witnessed that motorcyclists tend to skip around potholes in the road and nearly hit another vehicle" interview with a road safety expert

3.4 Process mapping

One of the outputs of the key informant interviews and focus group discussions was understanding how motorcycle operations currently operate in Nepal. This was captured in the process map shown in Figure 5. The co-creation workshop reviewed the current state of motorcycle taxis in Nepal and proposed changes and a desired future which is illustrated in the process map shown in Figure 6.

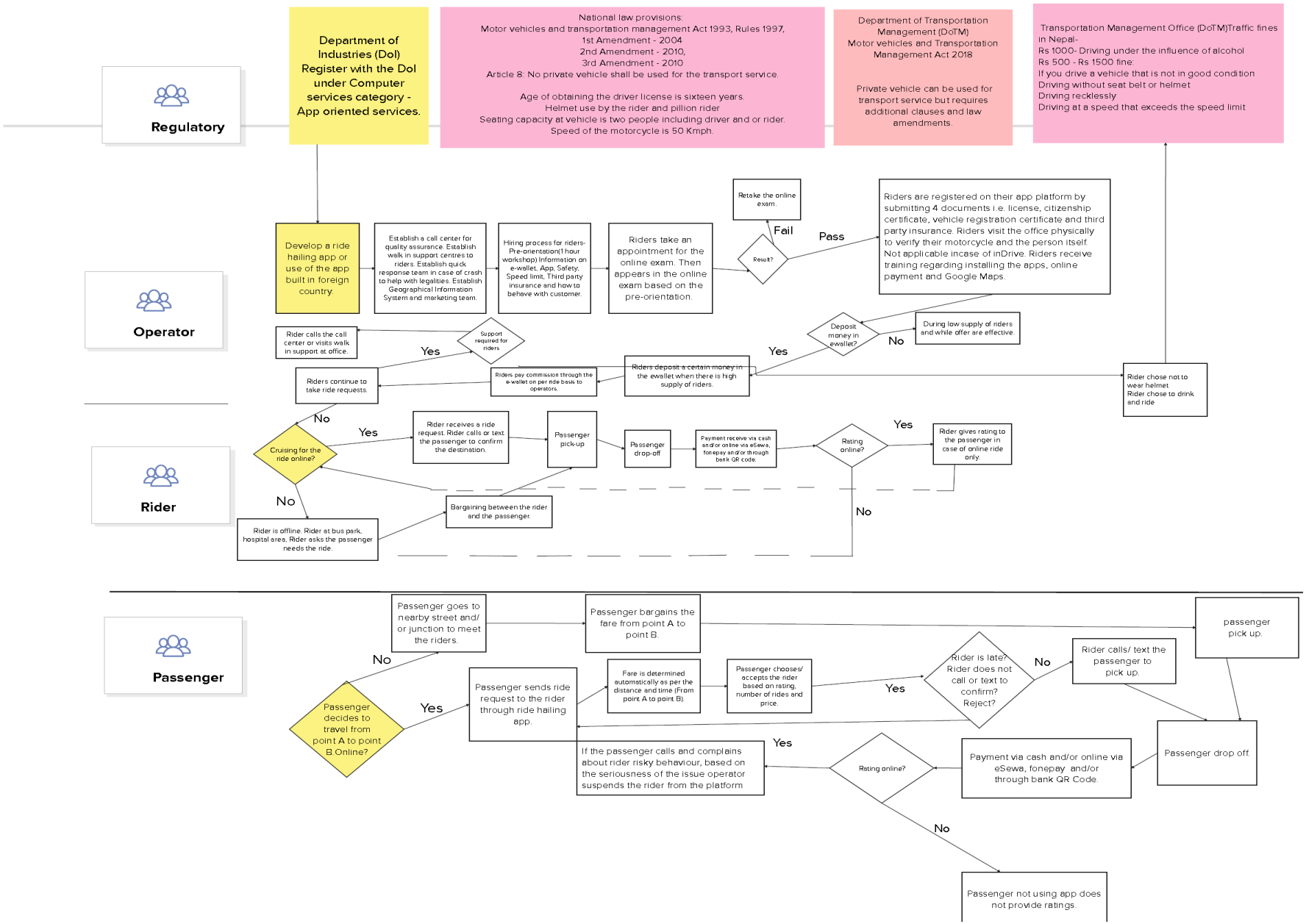

Figure 5: Process map showing the current state of MCT operations

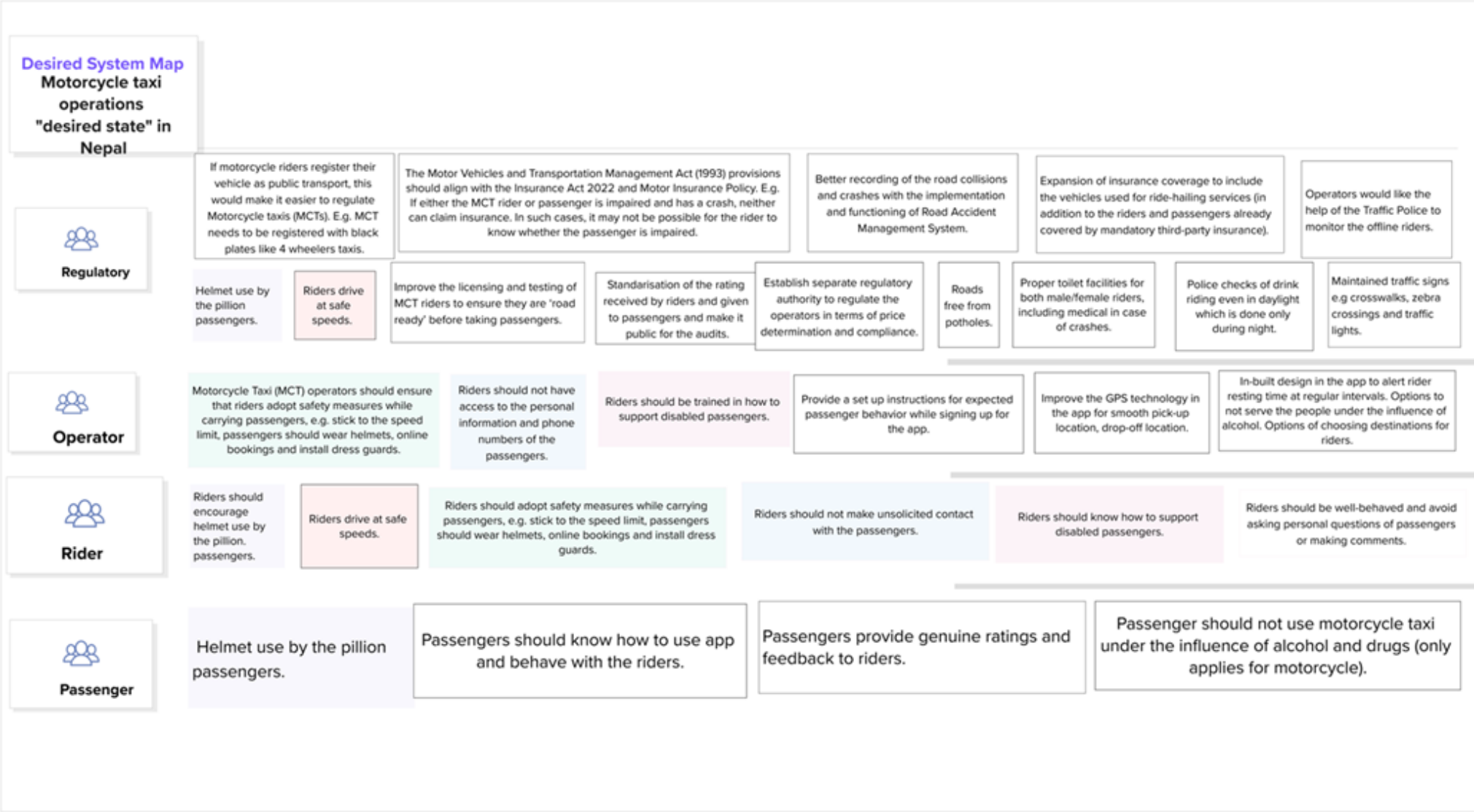

Figure 6: Process map showing a desired future for motorcycle operations in Nepal

3.5 Co-creation workshop

A simplified process map as used in the co-creation workshop is shown in Figure 7 and was used to discuss challenges and solutions identified in the focus group discussions and key informant interviews.

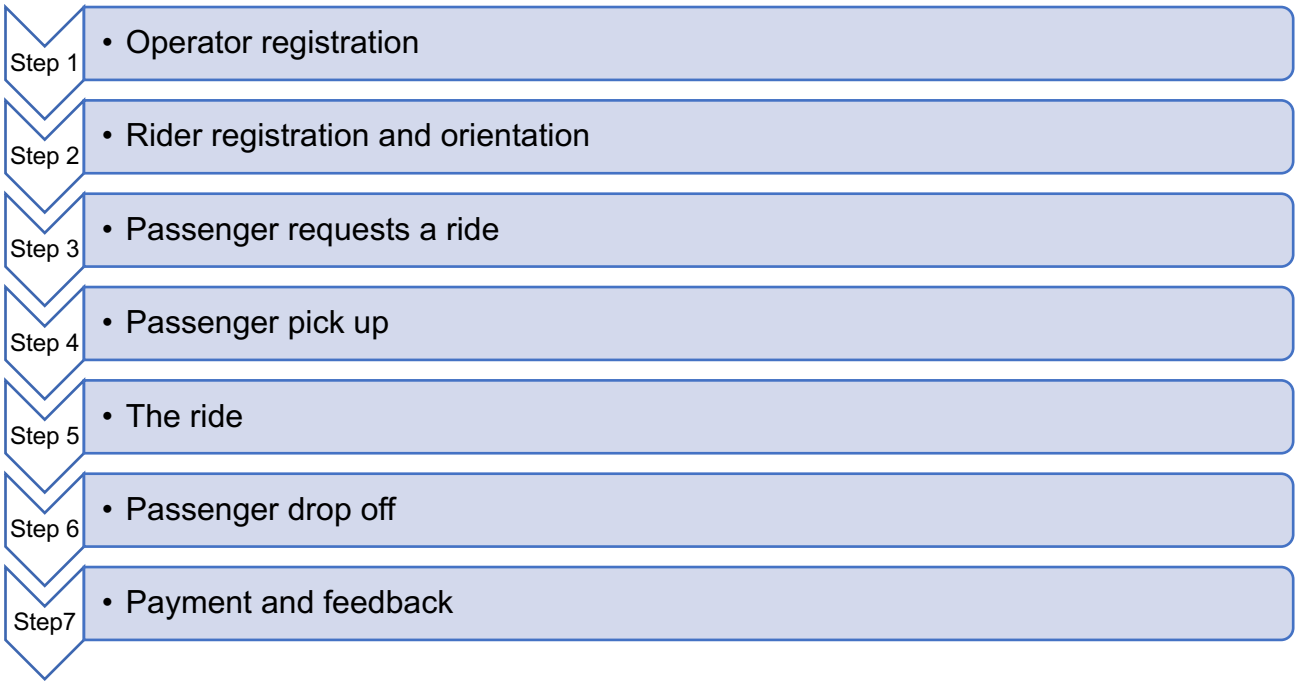

Figure 7: Simplified process map of motorcycle taxi operations

Solutions to address challenges identified for the steps above were discussed and prioritised by the stakeholder participants at the co-creation workshop. Collectively the group clustered the solutions as high medium or low impact (in terms of passenger and rider safety and well-being, while recognising that operations need to remain commercially viable for operators), although none were classified as low impact.

They then arranged them in terms of the time that would be required to implement, short-term (less than a year), medium-term (one to five years) and long-term (greater than five years, although none fell into this category). The short-term proposals can be seen in Table 15.

Table 15: Short-term proposals (less than a year)

Impact	Step	Proposal	Action	Ranking*	Comment
High	5	Random speed checks at various locations	Regulator and operators	1 (13)	Across the board support, especially highly rated by regulators and passengers
High	2	Inclusion training for riders	Operators	2 (8)	Rated highly by riders
High	7	In app mask passenger personal information	Operators	3 (6)	Rated highly by operators, but no evident rider support
High	4	Passengers able to report when riders don't match m/c registration and riders must keep their details up to date	Operators	4 (6)	Rated by all riders, with some support from passengers and operators

High	5	Random daylight breath tests of riders, (e.g. during festivals)	Regulator	4 (6)	Moderate support, but no evident support from regulators
High	4	The operator provides an app option for riders to reject intoxicated passengers	Operators	6 (5)	Rated highly by an operator, but no evident support from passengers
High	2	Riders are oriented not to initiate inappropriate conversations with passengers	Operators	6 (5)	Rated highly by passengers, but no evident support from riders
Med.	7	Use social media to communicate grievance stories	Operators	8 (1)	Highly rated by a passenger, with no other evident support

* The number in parenthesis represents the number of workshop participants that ranked this solution

The medium-term solutions can be seen in Table 16.

Table 16: Medium-term proposals (1-5 years)

Impact	Step	Proposal	Action	Ranking*	Comment
High	5	Riders carry an extra helmet (scooters have storage, but m/cs would need adaptation)	Operators and regulators	1 (7)	Moderate support, including all riders and passengers, but no evident support from operators
Med.	3	Accurate pick-up and drop-off locations on app mapping	Operators	2 (3)	Rated moderately by operators and regulators only
Med.	5	Traffic signs well maintained and clearly visible at all times	Regulator	3 (2)	Only evident support came from regulators who rated in highly
High	2	Uniform, identity card or some other form of identification for riders	Regulator	disputed	Although this seems like a positive step for riders, passengers and the police, operators are reluctant due to potential unintended consequences such as riders benefiting from the operators' name and then offering 'off-line' rides

* The number in parenthesis represents the number of workshop participants that ranked this solution

Following the workshop, follow-up meetings were held with three stakeholders to clarify and consolidate the outputs of the workshop. Meetings were held with the biggest operator (Pathao), the Traffic Police and MoPIT (regulator). This was useful for resolving potential issues and strengthening support from the key players. Some of the initial impact and opportunities that arose included:

- One of the passengers was visually impaired and she shared several practical accessibility and safety issues, such as some vehicles with exposed silencers that could burn passengers (particularly if they could not see). The next day we met with Pathao who had already held a staff meeting to discuss accessibility issues that needed to be changed based on the feedback from

the workshop. They also confirmed that they had a list of vehicles (motorbikes and scooters) and based on design criteria they had identified vehicles that would not be accepted as taxis. They confirmed that they would ensure that any with exposed silencers would be put on the exclusion list.

- Helmets was a big discussion point as the riders wear them and are checked by the police, but the pillion passengers do not wear them and are not checked by the police. MoPIT (Ministry of Physical Infrastructure and Transport) confirmed that they have a phased plan for everyone to wear helmets (which is already a legal requirement, but not enforced). Over the last year they have worked with the police and army so that pillion passengers on these official bikes all wear helmets. Next, they are planning to extend this to civil servants and will not allow motorcycles carrying passengers into the gated ministry compounds if they are not wearing helmets. The project has proposed that motorcycle taxis should be next, before extending to the public. One challenge is that although scooters have storage for a helmet under the seat, motorcycles do not. A proposed solution is the fitting of a box to vehicles, but operators were concerned that this would result in fines for adapting the bikes (which is not permitted). However, in our follow up meeting with the police they agreed that we could liaise with them on a suitable design which operators could fit. Police would then not stop and fine riders with these boxes as they would see its contribution to helmet wearing as a safety enhancement.
- MoPIT have drafted regulations (aka a 'directive') on motorcycle taxi operations. There is opportunity for the project to inform the final draft of the directive. The Ministry has two options for completion, either to wait until the Transport Act is rewritten (which could be a lengthy process) or to release it independently if there was a suitable groundswell of pressure to do so from passengers, riders and operators. This project hopes to help create that groundswell by bringing these stakeholders together. At the last meeting of the Motorcycle Taxi Passenger Advisory group meeting, we discussed the possibility of forming a passenger peer-support group that could get formal recognition and meet regularly (annually) with the operators and the Ministry.
- An informal co-worker group already exists with riders, but the project could help to formalise this and facilitate a platform with the operators and regulators. One of the female riders at the workshop was an active advocate for improving the experience of being a motorcycle taxi rider. She had already started a WhatsApp group with riders to inform other riders how to use each of the operator ride share Apps and to provide a peer support network when issues arise. Following the workshop this rider contacted one of the operators that did not have female riders. Her intervention has changed this and opened employment opportunities for female riders with another operator.

4. Discussion

This section summaries the gaps in the crash data relating to motorcycle taxis in Nepal. Section 4.1 refers to the police data and section 4.2 to data from media sources. In section 4.3 the good practice emerging from the literature is summarised and then the implications for motorcycle taxi operations in Nepal are drawn out in section 4.4. Section 4.5 considers the findings from the qualitative data collection. Further reflection is provided in section 4.6 and the project limitations are outlined in section 4.7.

4.1 Police data

There were 1.5 million motorcycles registered in the Kathmandu valley in 2024. Pathao, the biggest ride-share operator in Nepal reports (Kathmandu Post, 2024) that it had 190,000 registered riders of two-wheelers and 10,000 4-wheeler taxi drivers. As Pathao is the largest operator and given that riders tend to have all of the apps, then this suggests that of the 1.5 million motorcycles in the Kathmandu Valley about 190,000 are used as motorcycle taxis.

Table 2 reports 25 motorcycle taxi crashes were recorded by the traffic police in 23/24, resulting in 34 injuries and 3 deaths which would suggest an injury and death rate per motorcycle taxi crash of 136% and 12% respectively. If the crash rate of 0.51% of all registered motorcycles shown Table 3 was extrapolated to the 190,000 motorcycle taxis it would equate to 973 motorcycle taxi crashes in 23/24, resulting in 1,324 injuries and 117 deaths. Here we have applied the injury and crash rates from the 25 reported MCT crashes to the estimated 973 MCT crashes a year. These figures indicate the magnitude of the under reporting of motorcycle taxi crashes, injuries and deaths.

The Traffic Police acknowledge that in most cases they do not know whether riders and passengers involved in motorcycle crashes are on a motorcycle taxi unless either the rider or the passenger states this at the scene. The police do not have access to the ride sharing apps to check if a motorcycle rider was providing a taxi service at the time they crashed, and the operators report that they are under no legal obligation to reveal this. In addition, offline or unregistered ride sharing app riders are hesitant to report their status in the event of crash. Furthermore, many crashes do not get reported to the police. A study conducted by our team in one district of Nepal in 2018/19 found that only 19.7% of all-vehicle crashes appeared in police crash records (Khadka et al., 2022). It would be in the public interest if MCT crashes were disaggregated in future Traffic Police reports.

4.2 Media reports of motorcycle taxi crashes

The Himalayan Times regularly reports motor vehicle and public transport crashes and casualties, so finding no reports of motorcycle taxi crashes during the period searched was unexpected. The explanation for this is likely to have several dimensions.

Firstly although 102 two-wheeler crashes were reported during the review period it is likely that the journalists were unaware whether they were motorcycle taxis or not. Less serious crashes are often not reported to the police, and crashes that do not involve the police are less likely to be reported in the media.

Journalists may not prioritise these crashes because the numbers injured or killed in each crash are small compared with those that involve other types of vehicles such as buses. All of these factors combined mean that the public are ill-informed of the risks associated with using motorcycle taxis.

4.3 Structured literature review

From the structured review of the academic literature, we can conclude that there is little evidence of the current development of safer motorcycle taxi system in low- and middle-income countries. SafeBoda, a private motorcycle taxi company that started in Uganda provides examples of good practice, including promoting helmet use.

Several of the studies help us to understand the risk factors for crashes and injuries in motorcycle taxi riders. Mitigating the risks could be summarised as knowing and following the traffic rules, correct helmet use, limiting total ride time and distance, owning a suitable motorcycle, undertaking rider safety training and then practising safe riding behaviour.

However, much less evidence is available from evaluations of interventions or policy change to make motorcycle taxi system safer.

4.4 Implications of data synthesis and global good practices on motorcycle taxi systems in Nepal

The police records are likely an underreporting of the full picture of motorcycle taxi crashes in the Kathmandu valley, hence establishing a systematic way of recording data should be a priority. In terms of media reporting, we did not find a news outlet covering motorcycle taxis in the mainstream media, but there is evidence from other LMICs that MCT related road traffic crashes and injuries are prevalent among MCT riders. If the media were to start covering these stories and providing space in their newspapers, this may highlight to the public the risks associated with MCTs.

The most common good practice that we found in the literature was the provision of rider safety training and helmet wearing promotion schemes for both riders and passengers. The most well recognised of the helmet wearing promotion schemes is the Uganda Helmet Vaccine Initiative which is focused on facilitating and encouraging helmet use among boda boda (MCTs) operators in Kampala, that agencies have started to pilot to increase helmet use among riders and passengers. Similar types of operations could be piloted in Nepal to check their transferability and effectiveness.

A two-wheeler directive from the MoPIT is in its draft version, which has been translated by the project team into English from the Nepali language. Some of the features are the mandatory use of helmets for pillion passengers, work hour limitations of 12 hours per day and use of identifiable vests for riders. It is noteworthy that this two-wheeler directive would make it mandatory for pillion riders to wear a helmet after it is enacted, in line with global good practice.

4.5 Key informant interviews and focus groups

The key informants and focus group participants (riders and passengers) raised some of the same issues that was seen in the literature. The literature revealed good practice such as promoting helmet use. Our participants highlighted some of the barriers to the use of helmets by MCT passengers in Nepal that would need to be overcome.

While some of the risk factors for crashes and injuries were shared with the literature, the interviews and focus groups also raised additional factors such as safety issues raised by passengers and riders under the influence of alcohol and/or drugs, and riders distracted by mobile phones. Personal safety concerns of MCT passengers were highlighted in the focus groups, but not a feature of the studies included in our literature review.

The need for changes in legislation to ensure that all riders and passengers are insured in the case of a crash was raised in the interviews but was not an issue in the literature. The (poor) quality of the road environment was raised as a factor for causing crashes in the interviews but was not a focus of the literature that we reviewed.

4.6 Further reflection

The first motorcycle taxi ride-hailing app was established in Nepal in September 2017. The police data we obtained started distinguishing motorcycle taxis from other motorcycle-related crashes from the fiscal year 2021/2022. We could therefore not obtain motorcycle taxi crash-related data before this fiscal year, leaving 57 months (September 2016 to June 2021) of missing motorcycle taxi crash data in Kathmandu Valley. Interestingly, in the media we searched no motorcycle taxi-related crashes were reported. However, 102 motorcycle crashes were reported without mentioning if taxis were involved. This is likely a reflection of the low level of reporting of motorcycle taxis by the police (motorcycle taxis are not a category in the official data). This underreporting of motorcycle taxi crashes is likely given the public a false sense of the level of risk.

Both the themes that arose from the key informant interviews and focus groups and the evidence from the review of 25 journal articles in the structured literature review provide a broad range of risk factors of motorcycle taxi crashes and injuries. Simply looking at the number of factors that we have identified would suggest that the balance of responsibility for ensuring safety in the motorcycle taxi system lies with the stakeholders. However, the reality is that the other factors are also responsible for safety assurance and

the factors are often interlinked. Good practice in the motorcycle taxi system by private transportation companies like SafeBoda is demonstrated by programmes that encourage the use of helmets and safety training that is replicable in other contexts.

4.6.1 Final reflections from stakeholders from the dissemination event

Here are some of the reflections of the participants that attended the final dissemination event.

"I am happy to be part of this research as a young advisor. This is very important research which will have an overarching effect on not just the safety of two-wheeler taxis but the safety of all motorcycles in Nepal" (Sudeen Dawadi, a regular two-wheeler taxi passenger)

"Just as cricket helmets are crucial for protecting players from injuries, ensuring that two-wheeler taxis operate in a safe environment is essential for protecting passengers and riders" (Indu Barma, Nepal National Women's Team Captain and passenger)

"I have created an online informal network of motorcycle riders as they are working in a risky environment and there is no formal support for them if anything happens, which is especially important for female riders" (Ruth Subba, motorcycle taxi rider)

"The discussions provided valuable insights into the complexity of regulating two-wheeler safety while balancing sustainability and economic concerns for riders" (Sunita Rai, inDrive)

"We believe there are always areas for improvement regarding the safety of both two-wheeler taxi riders and passengers" (Rubik Joshi, Tootle - motorcycle taxi operator)

"It is necessary for the public's safety to create a favourable legal environment for motorcycle taxis to operate" (Er Shreekant Yadav, Department of Transport and Management)

"There is a need for an inclusive policy for two-wheeler taxi that ensures safety, fair pricing and efficient service" (Er Manda Panta, Department of Roads)

"The of mandatory use of helmets for passengers is so important; we need to consider how helmets can be made available for everyone, and helmet use needs to be extensively promoted" Chetna Thapa, Director of Road Boards Nepal

"Everyone should wear helmets - reinstating universal helmet use among two-wheeler users is essential for Nepal in order to save lives and minimize disabilities due to two-wheeler crashes" (Dr Gampo Dorji, World Health Organization)

"We are committed to decrease the health burden related to injuries, but the cost of helmets is a major issue from the riders' perspective; we can work with the government and operators to reduce the cost for the wider adoption of helmets by the largely young Nepali population" (KPI - helmet manufacturer)

"Strengthening road safety must have full political commitment with a need for data and an evidence base and importantly capable human resources" (Dr Suman Baidya, British Embassy, Kathmandu)

"Due to the absence of more efficient public transport, two-wheeler taxis have become the public's choice, but dangerous two-wheeler riders must be identified and prevented from putting themselves and others at risk" (Kanak Mani Dixit, journalist)

4.7 Limitations

It should be noted that although outcome indicators have been set for this project and have been reported against, the desired impact of this project is outside the control of either the researchers or the funder. The researchers have sought to generate new knowledge and influence the critical stakeholders and contribute towards improved motorcycle safety in Nepal and beyond but acknowledge that achieving this is complex and will take time. Thanks to the continued funding of the SafeTrip Nepal project until October 2026 the researchers will be able to continue to engage with the stakeholders and press for the implementation of the project recommendations for an extend period.

5. Conclusions

Our study has reported all the motorcycle taxi crashes recorded by the traffic police but based on the scale of reported motorcycle crashes generally, the testimony of key informants (especially the police and operators) and evidence from studies in other countries such as India (Dandon, et al, 2008) and Australia (Watson, et al 2015) this is likely to be an underestimate of the true number due to underreporting.

The police rely on motorcycle riders disclosing that they are providing a taxi service, and the growing number of offline riders are even less likely to self-report than those working for ride-hailing apps. There is no legal obligation on riders or the ride-share companies to provide this information. Options to strengthen the completeness of the police motorcycle taxi crash records needs to be explored. The underreporting of crashes in the media means that the public are unaware of the risks associated with riding motorcycle taxis.

The literature shows that there is little evidence of the current development of safer motorcycle taxi system in LMICs. SafeBoda, an operator from East Africa provides examples of good motorcycle taxi practice, including promoting helmet use. Mitigating the risk factors for crashes and injuries requires that motorcycle taxi riders know and follow the traffic rules, use helmets correctly, limit total ride time and distance, own a suitable motorcycle, undertake rider safety training and practise safe riding behaviour. Little evidence is available from evaluations of interventions or policy change to make motorcycle taxi system safer.

Overall, the review of global good practices highlights the importance of initiatives to increase appropriate helmet use by motorcycle taxi riders and passengers as very important to reduce injuries and deaths when MCT crashes occur. Stakeholders in Nepal have proposed other ways to improve safety, but the dearth of studies describing successful policy or regulatory changes to motorcycle taxi operations that were formally evaluated should serve as a warning that change is challenging and requires political will, collaboration and public pressure. Keeping that warning in mind the major project outcomes are shared below in Table 17.

Table 17: Summary of major project outcomes (also shown in Table 1)

Project objectives	Findings/outputs	Outcomes
1/ To understand the nature and operation of the motorcycle taxi (MCT) system in Nepal	Process maps were developed which helped identify challenges in the current way MCTs operate in Nepal.	Stakeholders identified and prioritised proposed actions to address these that have been shared with operators and regulators [see Table 15/Table 16]
2/ To illustrate the safety and personal security risks of its use	MCT crash data was collated from the Nepal Police and the media revealing under-reporting, so the public are unaware of the risks associated with riding MCTs. The project brought ride-hailing operators together for the first time, despite them being competitors. It also brought together other stakeholders.	Nepal Police in Kathmandu now more systematically record MCT crashes for each fiscal year which will raise visibility of the issue. Operators discussed possible collaborations on issues linked to rider and passenger safety (both road and personal safety). [see Section 6.1] Strengthening of an informal motorcycle taxi riders' peer support group, using WhatsApp to help each rider ride more safely and to provide mutual support when issues arise. Creating a MCT Passenger Advisory Group that has the potential to grow into a passenger peer support group. Operators, riders and passengers speaking with a common voice makes a compelling case for urgent action to be taken by national regulators to formalise the sector.
3/ To identify potential changes in policy and regulation that could improve safety for riders and passengers	Evidence from the literature and perspectives collected from stakeholders identified risk factors and mitigating actions including the mandatory use of helmets for pillion passengers, work hour limitations, visible identification of MCT riders, discouraging riding under the influence of alcohol/drugs or while distracted by phones, ensuring that all riders/passengers are insured in the case of a crash and improving the road environment for MCTs.	The project outputs have been shared with the regulators and the project outputs and recommendations will be helpful in finalising the regulations outlined in the draft two-wheeler directive that was prepared by the Ministry of Physical Infrastructure and Transport (MoPIT) in 2023. [see Section 6.1]
4/ To synthesise knowledge and understanding with outputs from the NIHR funded SafeTrip Nepal programme to get a fuller picture of the public transport ecosystem.	Recommendations for stakeholder action have been developed.	The recommendations to improve MCT safety will be published as part of a Safer Public Transport Guide for Nepal which will be produce as part of the NIHR funded project: "A Safe System Approach for enabling safer public bus transportation in Nepal".

6. Recommendations

Finally, Section 6.1 includes recommendations for stakeholder action which will be published as part of a Safer Public Transport Guide which will be produce as part of the NIHR funded project: "A Safe System Approach for enabling safer public bus transportation in Nepal". This is followed by Section 6.2 which contains recommendations for further research.

6.1 Recommendations for stakeholder action

From the project's engagement with concerned stakeholders relating to motorcycle taxi operations in Nepal, there is a recognition of the need for safer and more formalised motorcycle taxi operations. The stakeholders that took part in the final project dissemination event on 23rd August support the finalising of the draft two-wheeler directive that was prepared by the Ministry of Physical Infrastructure and Transport (MoPIT) in 2023, informed by the findings of this research project. The stakeholders helped to shape the following recommendations for operators and regulators:

1. To formalise motorcycle taxi operations in Nepal
2. To establish a data sharing agreement between all active operators,
3. To make comprehensive insurance available to all riders for all rides,
4. To agree minimum standards for rider training,
5. To facilitate the mandatory use of helmets by riders and passengers,
6. To agree limits to rider working hours per 24 hours, with adequate rest periods, to enhance occupational safety,
7. To empower motorcycle taxi riders to operate safely, by for example, refusing overloading or to transport minors or heavily intoxicated passengers,
8. To review the use and level of traffic fines to incentivise safer riding,
9. To gather the evidence to confidently identify deaths and injuries from road traffic crashes involving motorcycle taxi riders and passengers.
10. To create safe parking zones for motorcycle taxis in key locations,
11. To create a safer street environment for riders and passengers, by for example increased use of CCTV surveillance, and street lighting, and
12. To consider options for reallocation of road space to improve safety for riders and passengers of 2-wheelers and to improve the efficiency of public transport

Additionally, the stakeholders committed to continue learning from the regional and global context (which is picked up in the recommendations for further research below), and to emphasise that motorcycle taxi operations along with other public transport systems should facilitate the prevention of sexual exploitation, abuse, and harassment of passengers and riders.

6.2 Recommendations for further research

The structured literature review highlighted that there is a need for evaluations of interventions or policy changes to make motorcycle taxi system safer.

Using further funding from the University of the West of England, Bristol, through their ISPF Institutional Support Grant (ODA), further research will be carried out to engage with stakeholders to amplify the potential impact of this project in terms of passenger and rider safety and well-being, while enabling operators to make a profit while providing safe and convenient services. There is opportunity to improve the draft regulations by working with the Nepali Ministry of Physical Infrastructure and Transport (MoPIT) to build in the evidence collected by this research. The planned research activities are:

- Activity 1: Passenger and rider survey delivered online through one of the motorcycle taxi operators Apps. This would seek to provide evidence to MoPIT of the urgent need to finalise and publish their draft motorcycle taxi regulations

- Activity 2: further stakeholder engagement with MoPIT, taxi ride-share operators, riders and passengers to:
    - Set up a Motorcycle Taxi User Group (building on the Passenger Advisory Group already established) and to formalise the embryonic Motorcycle Taxi Rider Group
    - Explore developing charters for riders and passengers (building on global best practice such as SaferBoda in East Africa)
    - Advocate with MoPIT, in order to get the Directive (new regulation for motorcycle taxis) finalised and published
    - Advocate with operators to implement the identified good practice and to adopt (and acknowledge on their App) the rider and passenger charters
- Activity 3: facilitate a forum meeting with MoPIT to give passengers and riders a voice with the regulators, with the operators also in attendance

The expected outputs would be:

- Output 1: Capture evidence of impact by project RA (Dr Prasanna Lama) embedded as a member of both the Rider and Passenger WhatsApp groups
- Output 2: Add charters for riders and passengers to the 'Safer Public Transport for Nepal' guide (being developed by Work Package 2 of a parallel project, SafeTrip Nepal, which focuses on long-distance bus safety)
- Output 3: Directive published on the MoPIT website (note this is desired but may happen after March 2025).

Desired outcomes:

- Desired outcome 1: for MoPIT to host regular forums with the riders and passenger groups with the operators also in attendance (the project will encourage this and leave it to MoPIT to decide if they want to make this a regular event)
- Desired outcome 2: for the operators to sign up to the charters and add them to their ride-hailing apps

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APPENDIX A: 25 PAPERS 'INCLUDED' IN THE LITERATURE REVIEW

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APPENDIX B: CONSENT FORM – KEY INFORMANT INTERVIEW

NHRC REC ref: 626/2023
UWE REC ref: CHSS.23.11.059
Participant identification number: KII_

CONSENT FORM: KEY INFORMANT INTERVIEW

Research Study: Policy and Regulation Development for Motorcycle taxi safety in Nepal
Please put your initials in the appropriate box at the end of each statement below.

	YES	NO
1. I confirm that I have read the information sheet/ the information sheet was read to me dated ..... 2024 (Version 1) for this study. I have had the opportunity to ask questions and have had these answered satisfactorily.		
2. I understand that taking part in this research is voluntary and that I can stop or withdraw from the study at any time until analysis has taken place. I do not need to give a reason for withdrawal.		
3. I understand that my views in the focus group discussion is part of the collection of information for this study.		
4. I agree my views during discussion will be audio recorded. (The recordings will be destroyed after analysis).		
5. I agree that the information and the quotes from the discussion that I share may be used anonymously in the study reports.		
6. I understand that my personal details will be kept confidential.		
7. I agree with the Nepal Injury Research Centre (NIRC) recording and processing information about me for research purposes as described in the participant information sheet and that related to this study.		
8. I understand all anonymised information will be kept in accordance with the terms and conditions of National Ethical guidelines for health research in Nepal 2022 and UK 1998 Data Protection act.		
9. I understand that once the study is complete, the information will be kept securely at Kathmandu Medical College for 5 years and at the University of the West of England for 7 years and then securely destroyed.		
10. I agree to take part in this study.		
Name of Participant: ***Date:*** ***Signature:*** ***Name of Researcher:*** ***Date:*** ***Signature:***		
2 copies: 1 electronic copy for participant, 1 hard copy for Study records		

Note: If you need additional information, please contact Ethical Review Monitoring and Evaluation section of Nepal Health Research Council (NHRC). Kindly refer to protocol registration number 626/2023 during your correspondence.

Namita Ghimire, Research Officer, Ethical Review Monitoring and Evaluation Section, Nepal Health Research Council (NHRC) Kathmandu, Nepal Fax: 977-1-4262469 / 4268284
Tel.: +977 - 4254220 (Ext no 125)
E-mail: approval@nhrc.gov.np

Please note: In a scenario of painful memories triggered during the discussion, the passenger will be referred to psychologist of Kathmandu Medical College, Sinamangal, Kathmandu.

APPENDIX C: KEY INFORMANT INTERVIEW TOPIC GUIDE

Key Informant Interview Topic Guide: Stakeholders related to motorcycle taxis (Regulators, ride sharing app service providers, Traffic Police, Journalists, motorcycle and/or scooters sellers private sector representative) [90 minutes]

Research Study: Policy and Regulations Development for motorcycle taxi safety in Nepal

30% of road traffic deaths involve motorcycles. This rises to 43% in South-East Asia, where motorcycles are often used as taxis. Policy makers are reluctant to formalise these forms of public transport and despite their popularity users rate them poorly compared with other transport options, particularly due to perceived safety risks. Research shows that users would prefer access to light or heavy rail transport in countries such as Nepal, this in a context where road transport provides the main mode of mobility and in the Kathmandu area motorcycles constitute 79.1% of the vehicle fleet. This project will collate available data on motorcycle taxi related deaths and injuries, map the current system of motorcycle taxis in Nepal, identify and engage stakeholders, and develop options for change. Options could include the allocation of road space, passenger safety and promoting the use of cleaner vehicles including electric vehicles.

INTRODUCTION (Duration: 10 minutes)

- Firstly, thank participant for joining interview
- Give a brief introduction of yourself, the purpose of the study
- Explain approximate time (audio- recording, handwritten notes)
- Encourage participant to speak clearly
- Explain that there will be no right or wrong views but in line with the topic
- Assure anonymity and confidentiality of participant and his/her views
- Explain how participants will not be identifiable from any record or report arising from the interview
- Explain participant does not have to talk about anything they feel uncomfortable with and can stop at any time for any reason
- Sign consent form (check that interviewee has signed that he/she is happy for the interview to be audio-recorded)

Warm-up (20 minutes)

Introduction by participant with a brief background, which may include input from the Focus Groups and/or the M/C Passenger Group.

FOR REFERENCE IF DEFINITION NEEDED:

'Public transport' is defined as a system of vehicles such as buses and trains that operate at regular times on fixed routes and are used by the public.

Bike taxi: The bike taxi is usually a motorcycle taxi which usually carries one passenger as a pillion behind the driver. They are available for the public and usually lack regular routes, fixed timings and fixed stations (Tuan & Mateo- Babiano, 2013)[1].

DISCUSSION (50 minutes)

Now we shall begin our discussion in an organised way. For this we will be asking you about your professional opinion about **motorcycle taxi operations in Nepal**. We will be interested in your views on safety of motorcycle taxis, safety concerns, and improvements required for the reduction of its crashes and collisions as well as reduction in the rate of killed and seriously injured (KSI) by it.

[To organize the discussion, use the following questions]:

1. What are the current issues faced by motorcycle taxi in Nepal?

Prompt:

2. How do these issues impact the safety of motorcycle taxis?
3. What changes are required to improve motorcycle taxis' safety?

4. What are your views regarding the causes of motorcycle taxi crashes in Nepal, especially motorcycle and road traffic injuries caused by it?
5. Is there any motorcycle manufacturing company in Nepal?

Prompt:

If "No", how is it imported and what is the registration process of those motorcycles?

Is the testing of motorcycle materials, suitability in Nepal's road done for the motorcycles?

6. What are the provisions related to the maintenance of motorcycles?

Prompt:

Are motorcycles maintained as per the provision?

What is the process for monitoring motorcycle maintenance?

7. What are the criteria required for the registration of motorcycle maintenance workshop?
8. What are the steps of receiving the drivers licensing for motorcycle / scooter= in Nepal?

Prompt:

How are riders trained and assessed for their skills and knowledge?

What can be done to improve riders' training and safety?

9. How are traffic rules enforced in Nepal?

Prompt:

What are the reasons for violations of traffic rules by road users including motorcycle taxi riders?

What do you think can be done to improve the enforcement of traffic rules? 10. What measures are required for the improvement of motorcycle taxis safety? **WRAP-UP (duration: 10 minutes)**

Ending the discussion by saying: Do you think we missed anything that needs to be discussed?

APPENDIX D: CONSENT FORM – FOCUS GROUP DISCUSSIONS

NHRC REC ref: 626/2023
UWE REC ref: CHSS.23.11.059
Participant identification number: _____

CONSENT FORM: FOCUS GROUP DISCUSSION

Research Study: Policy and Regulation Development for Motorcycle taxi safety in Nepal
Please put your initials in the appropriate box at the end of each statement below.

	YES	NO
1. I confirm that I have read the information sheet/ the information sheet was read to me dated .....2024 (Version 1) for this study. I have had the opportunity to ask questions and have had these answered satisfactorily.		
2. I understand that taking part in this research is voluntary and that I can stop or withdraw from the study at any time until analysis has taken place. I do not need to give a reason for withdrawal.		
3. I understand that my views in the focus group discussion is part of the collection of information for this study.		
4. I agree my views during discussion will be audio recorded. (The recordings will be destroyed after analysis).		
5. I agree that the information and the quotes from the discussion that I share may be used anonymously in the study reports.		
6. I understand that my personal details will be kept confidential.		
7. I agree with the Nepal Injury Research Centre (NIRC) recording and processing information about me for research purposes as described in the participant information sheet and that related to this study.		
8. I understand all anonymised information will be kept in accordance with the terms and conditions of National Ethical guidelines for health research in Nepal 2022 and UK 1998 Data Protection act.		
9. I understand that once the study is complete, the information will be kept securely at Kathmandu Medical College for 5 years and at the University of the West of England for 7 years and then securely destroyed.		
10. I agree to take part in this study.		
Name of Participant: ***Date:*** ***Signature:*** ***Name of Researcher:*** ***Date:*** ***Signature:***		
2 copies: 1 electronic copy for participant, 1 hard copy for Study records		

Note: If you need additional information, please contact Ethical Review and M and E section of Nepal Health Research Council (NHRC). Kindly refer to protocol registration number 626/2023 during your correspondence.
Namita Ghimire, Research Officer, Ethical Review Monitoring and Evaluation Section, Nepal Health Research Council (NHRC) Kathmandu, Nepal Fax: 977-1-4262469 / 4268284
Tel.: +977 - 4254220 (Ext no 125)
E-mail: approval@nhrc.gov.np
Please note: In a scenario of painful memories triggered during the discussion, the passenger will be referred to psychologist of Kathmandu Medical College, Sinamangal, Kathmandu.

APPENDIX E: FOCUS GROUP DISCUSSION TOPIC GUIDE

Focus Group Discussion Topic Guide: Ride sharing app passengers and riders including women, disabled, youth and elderly people. (90 minutes)

Research Study: Policy and Regulations Development for motorcycle taxi safety in Nepal

30% of road traffic deaths involve motorcycles. This rises to 43% in South-East Asia, where motorcycles are often used as taxis. Policy makers are reluctant to formalise these forms of public transport and despite their popularity users rate them poorly compared with other transport options, particularly due to perceived safety risks. Research shows that users would prefer access to light or heavy rail transport in countries such as Nepal, this in a context where road transport provides the main mode of mobility and in the Kathmandu area motorcycles constitute 79.1% of the vehicle fleet. This project will collate available data on motorcycle taxi related deaths and injuries, map the current system of motorcycle taxis in Nepal, identify and engage stakeholders, and develop options for change. Options could include the allocation of road space, passenger safety and promoting the use of cleaner vehicles including electric vehicles.

INTRODUCTION (Duration: 15 minutes)

- Firstly, thank participant for joining discussion
- Give a brief introduction of yourself, the purpose of the study
- Explain approximate time (audio- recording, handwritten notes)
- Encourage participant to speak clearly
- Explain that there will be no right or wrong views but in line with the topic
- Assure anonymity and confidentiality of participant and his/her views
- Explain how participants will not be identifiable from any record or report arising from the interview
- Explain participant does not have to talk about anything they feel uncomfortable with and can stop at any time for any reason
- Sign consent form (check that interviewee has signed that he/she is happy for the interview to be audio-recorded)

Warm-up (15 minutes)

Introduction by participant with a brief background.

FOR REFERENCE IF DEFINITION NEEDED:

'Public transport' is defined as a system of vehicles such as buses and trains that operate at regular times on fixed routes and are used by the public.

Bike taxi: The bike taxi is usually a motorcycle taxi which usually carries one passenger as a pillion behind the driver. They are available for the public and usually lack regular routes, fixed timings and fixed stations (Tuan & Mateo- Babiano, 2013)[1].

DISCUSSION (40 minutes)

Now we shall begin our discussion in an organised way. For this we will be asking you about your experience as a **motorcycle taxi passenger and/or rider**. We will be interested in your views on safety of motorcycle taxis, safety concerns, and improvements required for the reduction of its crashes and collisions as well as reduction in the rate of killed and seriously injured (KSI) by it.

[To organize the discussion, use the following questions]:

1. Why have you chosen ride sharing app instead of opting for public transport?
2. For what purpose do you use ride sharing app- to go to school, markets, office?

Prompt:

What are your biggest safety concerns while using motorcycle taxi in Nepal? What is your experience of using motorcycle taxis in Nepal?

What are your experiences with motorcycle taxi crashes in Nepal?

Prompt:

A. Were you involved directly?

B. Have you witnessed crashes?

C. Do you know people that have been affected?

3. What are your views regarding the causes of motorcycle taxi crashes in Nepal?

Prompt:

What is your role for safety while using motorcycle taxi? Example- riding online or offline, use of own helmets as pillions passengers are to use helmet dictated by law, aware of rule and regulation of motorcycle taxi if available.

Are the vehicles properly maintained?

4. Do the riders ride with care? If not, what are the reasons for carelessness by the riders?

Are there sufficient safety signs/ markings/ signals on the road?

Prompt:

How do you think these concerns can be addressed?

What kind of safety measures would you like to see implemented on motorcycle taxis in Nepal?

5. How do you communicate any safety concerns or incidents while using motorcycle taxis in Nepal?

Prompt:

What can be done to improve communication and reporting mechanisms for motorcycle safety?

6. How do you think motorcycle taxis can be made more inclusive for people with disabilities, women, and other marginalised groups?

Prompt:

What kind of facilities and services would you like to see implemented to make motorcycle taxis more inclusive?

What is your opinion on motorcycle taxi not recognized legally by the Government? How can it be improved? What motorcycle taxi apps have you used and what is your experience?

Do you have any suggestions for improving the ride sharing app service?

Question for Motorcycle taxi RIDERS only (10 minutes) What role do other road users play for your safety as a rider?

What do you think about the ride sharing app policy that promotes and sometimes compromise the passenger's safety e.g- sharing information like phone number could be risky?

1. What is your opinion on use of helmets by the passengers that rider provides them to wear?

WRAP-UP (duration: 10 minutes)

Ending the discussion by saying: Do you think we missed anything that needs to be discussed?

APPENDIX F: NHRC ETHICS APPROVAL

Government of Nepal

Nepal Health Research Council (NHRC)

Estd. 1991

Ref. No. 606

17 October 2023

Prof. Dr. Sunil Kumar Joshi

Principal Investigator, Nepal Injury Research Centre (NIRC) Kathmandu Medical College

Dr. Jonathan Flower

Principal Investigator, Centre for Transport and Society, UWE Bristol

Ref: Approval of research protocol

Dear Prof. Dr. Joshi and Dr. Flower,

This is to certify that the following protocol and related documents have been reviewed and granted approval through the expedited review process for its implementation.

Protocol Registration No/ Submitted Date	626/2023 5 October 2023	**Sponsor Protocol No**	NA
Principal Investigator/s	Prof. Dr. Sunil Kumar Joshi Dr. Jonathan Flower	**Sponsor Institution**	University of West of England, Bristol
Title	Policy and regulation development for motorcycle taxi safety in Nepal		
Protocol Version No	NA	**Version Date**	NA
Other Documents	1. Informed consent form 2. Data collection tools 3. Sponsor agreement letter 4. CoI Declaration 5. Role of Investigator 6. Training certificate 7. Work plan	**Risk Category**	Minimal risk
Co-Investigator/s	1. Dr. Julie Mytton 2. Mr. Sanjeev Poudel		
Study Site	Kathmandu Valley		
Type of Review	√ Expedited ☐ Full Board **Review Date:** 17 October 2023	**Timeline of study** 17 October 2023 to 31 August 2024 **Duration of Approval** 17 October 2023 to 16 October 2024 **This approval will be valid for one year**	**Frequency of continuing review** NA

Tel: +977 1 4254220, Ramshah Path, PO Box: 7626, Kathmandu, Nepal
Website: http://www.nhrc.gov.np, E-mail: nhrc@nhrc.gov.np

University of the West of England
Frenchay Campus, Coldharbour Lane
Bristol, BS16 1QY
United Kingdom
Tel: +44 (0) 117 3284017
Email: jonathan.flower@uwe.ac.uk
Web: www.uwe.ac.uk

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