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EVALUATING SRI LANKA'S ROAD TRAFFIC CRASH AND INJURY RESEARCH: A SYSTEMATIC REVIEW FOCUSING ON DATA SOURCES AND METHODOLOGICAL APPROACHES

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Abstract:
Sri Lanka has the worst mortality rate due to road traffic injuries in the South Asia region. Previous research serves as evidence for national-level policymaking and interventions, of which the reliability of data is doubted due to underreporting and inaccuracies. To comprehend the nature of this problem, a critical assessment of Sri Lanka's existing road traffic crash and injury research is crucial. A mixed-methods systematic review was conducted by systematically searching five electronic databases: Medline (Ovid), Embase (Elsevier), Cumulative Index to Nursing and Allied Health Literature (CINAHL) (EBSCO), Web of Science (Clarivate), and Scopus against a pre-determined inclusion criterion. Studies were assessed for inclusion by two independent reviewers. A manual

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search of reference lists of eligible studies and a hand search on Google Scholar were also performed. The Mixed Methods Appraisal Tool (MMAT) was utilised to assess the methodological quality of studies. Data synthesis was guided by descriptive statistics and the thematic synthesis method. Thirty articles were included. Four broad themes were identified: *1. Data landscapes and data sources: Navigating the bias; 2. Geographical disparities: Concentration and variation in study locations; 3. Limitations in methodological and analytical diversity;* and *4. Temporal disparities in research focus and frequency.* Critical gaps were observed in data sources, methodological approaches, geographical coverage, and research timelines, all of which impact the effectiveness of preventive strategies. The observed limitations impel us to consider the applicability and reliability of existing evidence in shaping data-supported decision-making. Efforts may be directed at improving data sources and methodological approaches. Protocol registration: PROSPERO International Prospective Register of Systematic Reviews (CRD42024586530).

Keywords: road traffic crashes, road traffic injuries, injury control, injury prevention, road safety

1. Introduction

Road traffic crashes and injuries have significant impacts on individuals, their families, the healthcare systems, and the economic productivity of nations (Bhavan, 2019; World Bank, 2020a; World Health Organization, 2023b). Annually, around 1.19 million individuals die due to road traffic crashes worldwide (World Health Organization, 2023b). It is the leading cause of mortality in children and young adults in the age group 5–29 years (World Health Organization, 2023b). In addition, two-thirds of crash fatalities involve the 18–59-year working-age population (World Health Organization, 2023b). Notably, about 90% of crash fatalities occur in low and middle-income countries (LMICs) (Epidemiology Unit, 2024; World Health Organization, 2023a). The region of South Asia, which comprises eight LMICs, accounts for 25% of global road traffic crash fatalities and represents around 25% of the world's population (World Bank, 2020b). Of the countries in the South Asia region, Sri Lanka has the worst mortality rate due to road traffic injuries (World Bank, 2020a). In 2019, the mortality rate due to road traffic injuries in Sri Lanka was 19.7 per 100,000 population, ranking immediately behind Ecuador and Armenia globally (World Bank Group, 2024) and first in its region (World Bank Group, 2024). The second-highest mortality rate in the region was observed in Nepal, which was 16.3 per 100,000 population (World Bank Group, 2024).

Sri Lanka is a small island country with a lower-middle-income economy and a population of 22.156 million (World Bank, 2022). The island nation has achieved a relatively high standard of health for a lower-middle-income country (Rajapaksa *et al.*, 2021). In terms of life expectancy at birth, neonatal, infant, and under-5 mortality rates (per 1,000 live births), Sri Lanka falls only slightly behind high-income countries such as

the United States and the United Kingdom (World Bank, 2024a, 2024b, 2024c). Despite these achievements, the island nation has experienced a discrepant and increasing burden of road traffic crashes, especially over the last decade (Madhumali *et al.*, 2021).

Numerous research studies have been carried out in the country to investigate and explore the prevalence of road traffic crashes (Somasundaraswaran, 2006), the underlying causes and contributing factors (Dhananjaya & Alibuhtto, 2016; Kodithuwakku & Peiris, 2022), the number of injuries and fatalities, (Dharmaratne *et al.*, 2015; Lakmal *et al.*, 2021) the socio-demographics of the injured (Selvaratnam *et al.*, 2022), the economic impact (Bhavan, 2019), and potential safety measures to minimise and mitigate road traffic crashes (Jayanetti *et al.*, 2021). These studies were primarily based on police data—i.e., local police station data or national police database data, and hospital-based data. Among the three data sources, only the national police database data facilitates island-wide investigative explorations into road traffic crashes (Dharmaratne *et al.*, 2015). As hospital-based data on road traffic crashes are not digitised in a standard format, such systematic inquiries are not feasible through local-level retrospective or prospective data collections in hospital settings in Sri Lanka.

Interestingly, police data was identified to underreport crash incidence and likely incorporate inaccuracies (Periyasamy *et al.*, 2013; Sampath & Fonseka, 2010; Tennakoon *et al.*, 2020). Though by law, it is mandatory to report all road traffic crashes to the police within 24 hours, some individuals may fail to do so, reducing the integrity of the data collected via this system (Bhalla *et al.*, 2010; Dharmaratne *et al.*, 2015). Although unintentional, the introduction of '*on the spot*' insurance policy, in which insurance companies pay the vehicle owners directly for any damages without requiring police involvement (Periyasamy *et al.*, 2013), may have also contributed to the observed avoidance. Similarly, hospital-based data may also suffer from underreporting, as individuals may choose not to go to a hospital post-road traffic crash (Periyasamy *et al.*, 2013). In addition, as police and hospital-based data are primarily paper-based in Sri Lanka, retrieval of complete and accurate records is made more difficult due to illegible handwriting, reporting errors, and missing records. This may be more pronounced when data collection occurs retrospectively from hospital-based clinical records. Similar difficulties may also be experienced with the national police database since the initial collection and entry of data are still paper-based.

Previous research studies have aimed to investigate the accuracy of police data in reporting road traffic crashes and to assess the clinical outcomes of patients who sustain injuries from such accidents. However, to our knowledge, no research studies in Sri Lanka have provided a comprehensive understanding of earlier road traffic crash and injury research, particularly reviews of their data sources, methodological approaches, and the geographic distribution of study locations across the island.

Such a comprehensive understanding is crucial because previous research often serves as evidence for national-level policymaking and interventions. Worryingly, the primary data sources of previous research have been found to underreport crash incidents and contain inaccuracies, undermining the integrity of data used for national

road safety policies and interventions. Therefore, the main objective of the present systematic review is to critically analyse the existing road traffic crash and injury research in Sri Lanka, focusing on the data sources utilised, the methodological approaches adopted, and the geographic distribution of the studies across the country. The present systematic review will help identify commonalities, problems, and gaps in knowledge, facilitating better evidence for interventions and policies to prevent road traffic crashes and injuries and promote road safety in the country.

3. Materials and Methods

A mixed-methods systematic review, incorporating quantitative, qualitative, and mixed-methods studies and quantitative and qualitative analyses, was conducted to critically analyse existing road traffic crash and injury research in Sri Lanka. The protocol for this study was registered in the PROSPERO International Prospective Register of Systematic Reviews (CRD42024586530) (Booth *et al.*, 2012).

3.1 Review question

How does previous research on road traffic accidents, crashes, injuries, and fatalities in Sri Lanka mould future efforts to control and prevent road traffic injuries and fatalities and promote road safety?

3.2 Inclusion and exclusion criteria

The inclusion criteria of the present systematic review consider (1) studies that explore road traffic accidents, crashes, injuries, and fatalities (2) studies that focus only on Sri Lanka; (3) peer-reviewed studies that are published in the English language and available in full-text; and (4) studies with a qualitative, quantitative, or mixed methods study design. The date of publication was not restricted, and articles from the database inception to 3rd September 2024 were considered.

Studies that (1) do not focus on road traffic accidents, crashes, injuries, and fatalities (2) conducted outside of Sri Lanka; (3) are not peer-reviewed and published only in languages other than the English language; and (4) literature reviews, systematic reviews, scoping reviews, conference abstracts, reports, and grey literature were excluded.

3.3 Search strategy and data sources

We initially developed a search strategy for the Medline (Ovid) electronic database using medical subject headings (MeSH), keywords, free text, Boolean operators, and syntaxes such as truncation, nesting, and nested proximity. The search terms included road traffic accidents, road traffic injuries, data sources, medical records, data analysis, and Sri Lanka. The search strategy was pilot-tested in Medline (Ovid) and subsequently refined. The refined Medline (Ovid) search strategy was adapted to the remaining electronic databases, which include Embase (Elsevier), Cumulative Index to Nursing and Allied

Health Literature (CINAHL) (EBSCO), Web of Science (Clarivate), and Scopus (Supplementary Material 1). Additionally, of the papers deemed eligible after the screening process, a manual search of reference lists was performed. Further, studies that may not have been identified in the primary database searches were located through a supplementary search on Google Scholar.

3.4 Study selection

Studies identified through the systematic literature search performed on the five electronic databases were exported to EndNote 20 reference management software (Clarivate, 2013). Duplicates were removed based on identical titles, author names, and publication years. A title and abstract screening was performed against the inclusion and exclusion criteria. Two reviewers (N.C.S. and N.D.S.) performed this step independently, and any disagreements were resolved through discussion and consensus-based decisions or the involvement of a third reviewer. Studies that satisfied the criteria for inclusion were moved to full-text screening and retrieved in full-text for further assessment. Each retrieved article was assessed by two reviewers (N.C.S. and N.D.S.) independently against the inclusion and exclusion criteria to consider for inclusion. Any disagreements were resolved through discussion and consensus-based decisions or the involvement of a third reviewer. The reference lists of eligible studies were searched manually to further identify relevant studies for inclusion. For the same purpose, a hand search on Google Scholar was also performed by reviewer N.C.S. using the keywords utilised during the electronic database search, which was reviewed by N.D.S. Any disagreements were resolved through discussion and consensus-based decisions or the involvement of a third reviewer. The process of study selection is presented through the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) flow diagram (Page *et al.*, 2021).

3.5 Risk of bias assessment

The risk of bias or the methodological quality of all quantitative, qualitative, and mixed-methods studies was assessed using the Mixed Methods Appraisal Tool (MMAT) Version 2018 (Hong, Pluye, *et al.*, 2018) (Supplementary Material 2). The MMAT was specifically selected as it allows the assessment of the methodological quality of diverse study designs, including mixed-methods studies, which is not often facilitated through other tools (Hong, Fàbregues, *et al.*, 2018; Pluye, 2013). Two reviewers (N.C.S. and N.D.S.) performed the assessment independently. Any disagreements were resolved through discussion and consensus-based decisions or the involvement of a third reviewer.

3.6 Data extraction

A simple data extraction form was utilised to extract data, including authors, year of publication, the study aims, sample size, gender of the sample, the age range of the sample, study location, period of data collection, study design, and the data sources from all the studies included in the review. The two reviewers, N.C.S. and N.D.S.,

independently performed data extraction. Prior to the commencement of data extraction, a calibration exercise was performed by the two reviewers. This step was carried out to ensure consistency and reduce potential biases in data extraction to enhance the reliability and accuracy of extracted information across studies. Any disagreements were resolved through discussion and consensus-based decisions.

3.7 Data synthesis

Data synthesis of the present review was guided by descriptive statistics and the thematic synthesis method (Thomas & Harden, 2008). Key information under study methods and results was transferred to a Word document, and the texts were coded using open coding. The coding was performed to understand recurring elements across the selected papers. These codes were then grouped into thematic clusters through a collaborative process involving iterative discussions among the research team. Each theme was supported with supplementary descriptive analyses. Any disagreements were resolved through discussion among the members of the team and consensus-based decisions.

4. Results

The systematic search of databases provided a total of 175 articles. 77 duplicates were removed, leaving 98 articles for title and abstract screening. Title and abstract screening yielded 14 articles for full-text screening, of which four were excluded (Supplementary Material 3). Finally, nine articles from the database search, five articles from the reference lists search, and 16 articles from the hand search were included in the present systematic review (Figure 1). Table 1 summarises the characteristics of each study included in the review.

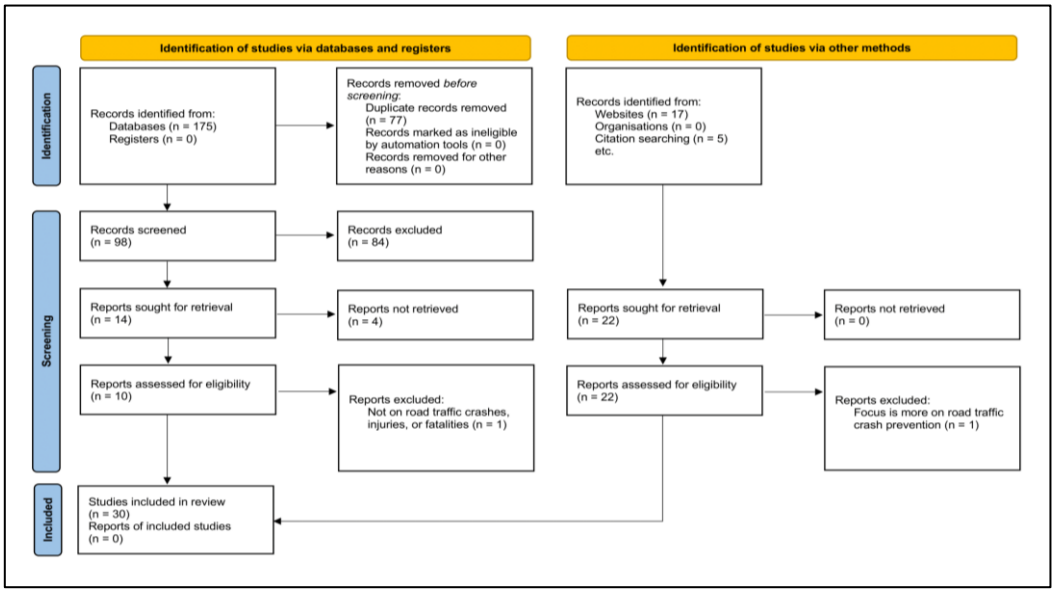


Figure 1: PRISMA flow diagram illustrating the selection of studies and inclusion in the systematic review

Table 1: Characteristics of each study included in the review

Author & Year	Study Aims	Sample Size, Gender & Age range (years)	Location	Data Collection Period	Study Design	Data Sources
Amarasinghe & Dharmaratne (2019)	To describe characteristics of RTCs and socio-demographics of involved road users reported at the Kurunegala Police Division	1887 (1586 males, 301 females) 1 – 86 years	Ten Police stations and nine government hospitals in Kurunegala	April – December 2013	Descriptive cross-sectional study	Patient interviews, family members or relative interviews, police reports
Bandara *et al.* (2019)	To determine the nature of the incident, nature of injuries, and mechanism of causation of injury due to three-wheeler crashes	310 (281 males, 29 females) <10 – >60 years	Teaching Hospital Peradeniya	2016 – 2018	Retrospective descriptive study	Clinical forensic examinations, Medico-Legal Examination forms
de Silva *et al.* (2001)	To study the pattern of injuries and some causative factors of three-wheeler-related accidents	100 (80 males, 20 females) 0 – 70 years	Accident Unit, Colombo South Teaching Hospital	1 May 1998 – 1 November 1998	Prospective descriptive study	Patient interviews
De Silva *et al.* (2018)	To describe the epidemiology and map the location of hot spots of road traffic crashes within the Galle Municipality area	752 (673 males, 65 females, 14 unknown) Age range not provided	Galle	1 January 2013 – 31 December 2013	Ecological Study	Local Police data
Dharmaratne *et al.* (2015)	To describe the trends in road traffic crashes, injuries, and fatalities in Sri Lanka and identify factors associated with these trends	Sample size, gender counts, and age range not provided	–	1938 – 2013	Secondary data analysis	Police database, Department of Motor Traffic data
Dharmaratne & Stevenson (2006)	To assess the safety of government versus non-government modes of public road transportation	Sample size, gender counts, and age range not provided	Kandy	1 October 1998 – 30 September 1999	Retrospective descriptive study	Local Police data
Edirisinghe *et al.* (2014)	To study the injury patterns in different types of vulnerable road users (VRUs) encountered in medico-legal autopsies and to find if pedestrians could be differentiated from other types of VRUs	328 (285 males, 43 females) <10 – >60 years	North Colombo Teaching Hospital, Ragama	January 2005 – December 2012	Retrospective descriptive study	Post-mortem reports, toxicological reports, police information, eyewitness records
Jayanetti *et al.* (2021)	To investigate the causes of road accidents in Sri Lanka, examine the problems associated with the current road conditions in the country, and propose strategies to improve road safety in the country	20 Gender counts and age range not provided	Galle Road from Galle Face to Panadura, Kottawa – Piliyandala Road, Piliyandala –Katubedda Road	–	Qualitative study	Semi-structured interviews, non-participatory observations
Jayatilleke *et al.* (2009)	To explore the effects of working conditions of private bus drivers on crash risk	264 (all males) 20 – 69 years	Kandy	August 2006 – September 2006	Case-Control study	Local Police data, Central Province Passenger Transport Service Authority data, self-administered questionnaire
Jayatilleke *et al.* (2010)	To examine the association between the common types of traffic rule violations committed by private sector bus drivers and bus crashes	264 (all males) <34 – ≥34 years	Kandy	August 2006 – September 2006	Case-Control study	Local Police data, Central Province Passenger Transport Service Authority data, self-administered questionnaire
Jayatilleke *et al.* (2015)	To examine the factors associated with RTCs among for-hire three-wheeler drivers	176 (all males) 20 – ≥60 years	Kandy	August 2008 – March 2009	Case-Control study	Local Police data, self-administered questionnaire
Jayarathna & Warushahennadi (2022)	To describe characteristics of three-wheeler crash, post-crash events, contributory factors, and the importance of safety accessories need	390 (238 males, 152 females) <10 – >70 years	Teaching Hospital Karapitiya, Galle	2019 – 2021	Cross-sectional descriptive type analytical study	Detailed history taking, clinical forensic examinations, Medico-Legal Examination forms

	to prevent three-wheeler accidents and reduce their outcomes					
Jeepara & Pirasath (2011)	To evaluate selected aetiological factors, type of injuries, treatments and outcome of victims involved in road traffic accidents admitting to a single surgical unit, Teaching Hospital, Batticaloa	106 (76 males, 30 females) Age range not provided	Teaching Hospital Batticaloa	1 April 2011 – 31 June 2011	Not provided	Patient interviews
Kodithuwakku & Peiris (2021)	To determine the factors associated with the severity of road traffic accidents in Sri Lanka	Sample size and gender counts not provided <18 – >60 years	–	2005 – 2019	Secondary data analysis	Police database
Kodithuwakku & Peiris (2022)	To identify significant factors influencing road traffic accidents in Sri Lanka and give recommendations to minimise road traffic accidents	Sample size and gender counts not provided <18 – 60 years	–	2005 – 2019	Secondary data analysis	Police database
Kumara & Walgampaya (2021)	To find out the severity factors and risk areas of the expressway accidents	Sample size, gender counts, and age range not provided	Kottawa to Godagama interchange	January 2011 – December 2018	Mixed-methods study	Southern Expressway Operation Maintenance and Management Division (EOMMD) data, live driving, photographic survey, random relevant officials' interviews, police data, and other information sources
Lakmal *et al.* (2021)	To describe patient demographics, identify human risk factors, and review the management outcome of automobile trauma to correlate the potential impact of new legislation on injury prevention	473 (332 males, 141 females) 4 – 82 years	Accident Service Unit, Colombo South Teaching Hospital	1 June 2018 – 31 July 2018	Prospective observational study	Hospital notes, direct questioning of patients, forensic autopsy records
Madhumali *et al.* (2021)	To find risk variables that impact road traffic accidents in Kandy and Kurunegala districts in Sri Lanka	360 (349 males, 11 females) <25 – >51 years	Teaching Hospitals, Kandy and Kurunegala	25 September – 25 November 2018	Descriptive cross-sectional study	Patient interviews, family members or relative interviews, police reports
Rathnaweera & Gunarathna (2020)	To identify the characteristics of motorcycle accidents and to describe and compare injury patterns of the riders and pillion riders who are admitted to the Teaching Hospital Karapitiya	812 (694 males, 118 females) <10 – >70 years	Teaching Hospital Karapitiya, Galle	1 January 2010 – 31 December 2014	Retrospective descriptive cross-sectional study	Medico-Legal Examination forms, bed-head-tickets, imaging data, police records, and other relevant medical reports
Renuraj *et al.* (2015)	To study factors influencing the severity of accidents in Jaffna	692 (649 males, 43 females) <18 – >60 years	Jaffna	2009 – 2013	Not provided	Local Police data
Shajith *et al.* (2019)	To evaluate the causal factors and the level of risk for factors involved in motorcycle related fatal accidents	Sample size and gender counts not provided 0 – ≥60 years	–	2012 – 2014	Secondary data analysis	Police database
Sampath & Fonseka (2010)	To describe the characteristics of three-wheeler drivers and to determine the associated driver factors in accidents involving three wheelers	338 (all males) <25 – >46 years	Panadura	–	Descriptive cross-sectional study	Participant interviews, Urban Council Panadura data
Selvaratnam *et al.* (2022)	To identify ENT injuries due to road traffic accidents, their prevalence according to the age and gender of patients, and the clinical	62 (49 males, 13 females) ≤20 – >60 years	National Hospital Kandy	January 2016 – March 2019	Retrospective descriptive study	Bed-Head-Tickets

	presentation among the patients managed in the National Hospital Kandy					
Senaviratna & Cooray (2020)	To identify significant factors affecting motor vehicle accidents in Sri Lanka and estimate the effect of the statistically significant factors on accident severity	78531(77311 males, 1220 females) Age range not provided	–	2014 – 2016	Secondary data analysis	Police database
Somasundaraswaran (2006)	Not stated explicitly	Sample size, gender counts, and age range not provided	–	1989 – 2005	Secondary data analysis	Police database
Tennakoon *et al.* (2020)	To determine crash characteristics and patterns of injuries sustained by victims of road traffic crashes admitted to a tertiary-care hospital and investigate if these differ for older people	573 (467 males, 106 females) 5 months – 90 years	Colombo South Teaching Hospital	1 January 2017 – 31 March 2017	Retrospective hospital-based study	Clinical records
Vadysinghe *et al.* (2018)	To identify the injury pattern, and ascertain the cause of death among occupants of three wheelers	132 (110 males, 22 females) 5 – >60 years	Tertiary care hospitals Kandy, Peradeniya, and Kalubowila	2005 – 2014	Retrospective study	Post-mortem reports, police investigations (including eyewitness accounts)
Weerawardena *et al.* (2013)	To identify the factors associated with road traffic accident in local settings to reduce the burden of this condition	214 (166 males, 48 females) 1 – 75 years	Teaching Hospital Anuradhapura	1 October 2012 – 31 March 2013	Prospective cohort study	History taking from patients or bystanders, x-ray, ultrasound, and CT scans
Weerawardena *et al.* (2018)	To describe the injuries and identify causes of injury in road traffic accidents in a semi urban regional area in North Central Province of Sri Lanka to plan a strategy to prevent road traffic accidents	199 (146 males, 53 females) 18 months – 76 years	District General Hospital Polonnaruwa	1 February 2017 – 1 May 2017	Prospective study	Not stated explicitly
Weerawardena *et al.* (2020)	To identify the characteristics of patients with road traffic accidents	394 (323 males, 71 females) 5 – 85 year	General Hospital Matara	1 September 2019 – 29 February 2020	Not provided	Not stated explicitly

Among the studies included, one was a qualitative study, one was a mixed-methods study, and the remaining 28 were quantitative studies. Overall, the majority of the studies included had a good methodological quality (Supplementary Material 2). However, the methodological quality of three of the studies could not be assessed as their study designs were not provided. Four broad themes were identified: *1. Data landscapes and data sources: Navigating the bias; 2. Geographical disparities: Concentration and variation in study locations; 3. Limitations in methodological and analytical diversity; and 4. Temporal disparities in research focus and frequency*.

4.1 Data landscapes and data sources: Navigating the bias

This theme informs the reader of the different types of data utilised in road traffic crash and injury research studies in Sri Lanka (n=30) and how often each data type was used as a primary data source for the research studies. Police data were used as the primary source of data in the largest portion of studies (n=12, 40%) (Figure 2). Among them, an equal number of studies have used local-level police data (n=6) (De Silva *et al.*, 2018; Dharmaratne & Stevenson, 2006; Jayatilleke *et al.*, 2009; Jayatilleke *et al.*, 2015b; Jayatilleke *et al.*, 2010; Renuraj *et al.*, 2015) and national police database data (n=6) (Dharmaratne *et al.*, 2015; Kodithuwakku & Peiris, 2022; Kodithuwakku & Peiris, 2021; Senaviratna & Cooray, 2020; Shajith *et al.*, 2019; Somasundaraswaran, 2006).

Following police data, the second most frequently utilised data source was hospital-based data (n=8, 27%). The hospital-based data included patient interviews, family and relative interviews, bystander interviews, bed-head tickets, imaging data, medico-legal examination forms, post-mortem reports, and other hospital notes and records. Five studies—Amarasinghe and Dharmaratne (Amarasinghe & Dharmaratne, 2019), Edirisinghe and colleagues (Edirisinghe *et al.*, 2014), Madhumali and colleagues (Madhumali *et al.*, 2021), Rathnaweera and Gunarathna (Rathnaweera & Gunarathna, 2020), and Vadysinghe and colleagues (Vadysinghe *et al.*, 2018) have used both hospital-based data and police data.

Notably, Jayanetti and colleagues (Jayanetti *et al.*, 2021), Kumara and Walgampaya (Kumara & Walgampaya, 2021), and Sampath and Fonseka (Sampath & Fonseka, 2010) have used alternative data sources such as interviews in non-clinical settings, data from the Urban Council and Southern Expressway Operation Maintenance and Management Division (EOMMD), and non-participatory observations as their primary data sources. Surprisingly, two studies did not explicitly state the data sources they utilised (Weerawardena *et al.*, 2018; Weerawardena *et al.*, 2020).

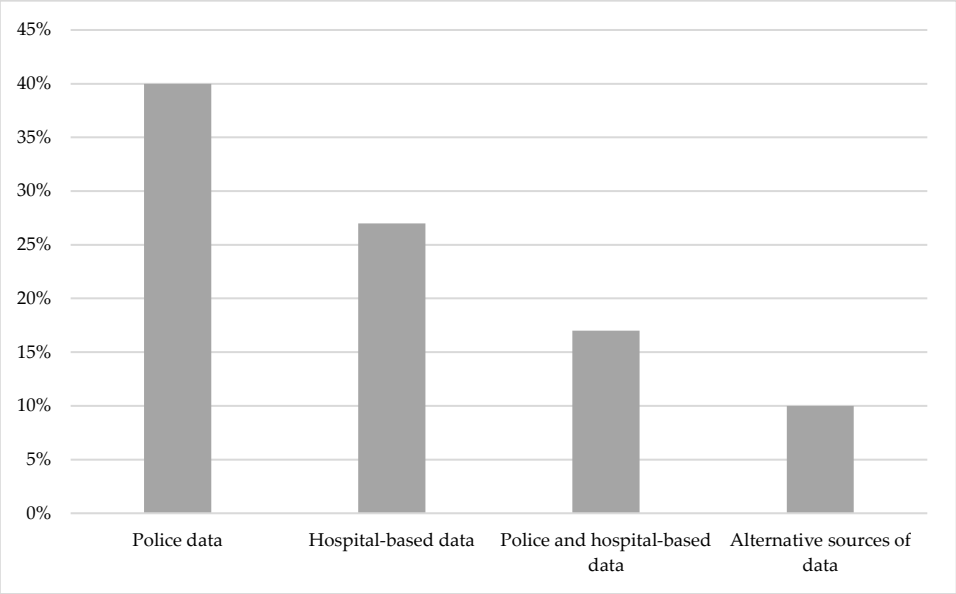


Figure 2: Percentages of studies based on the data source

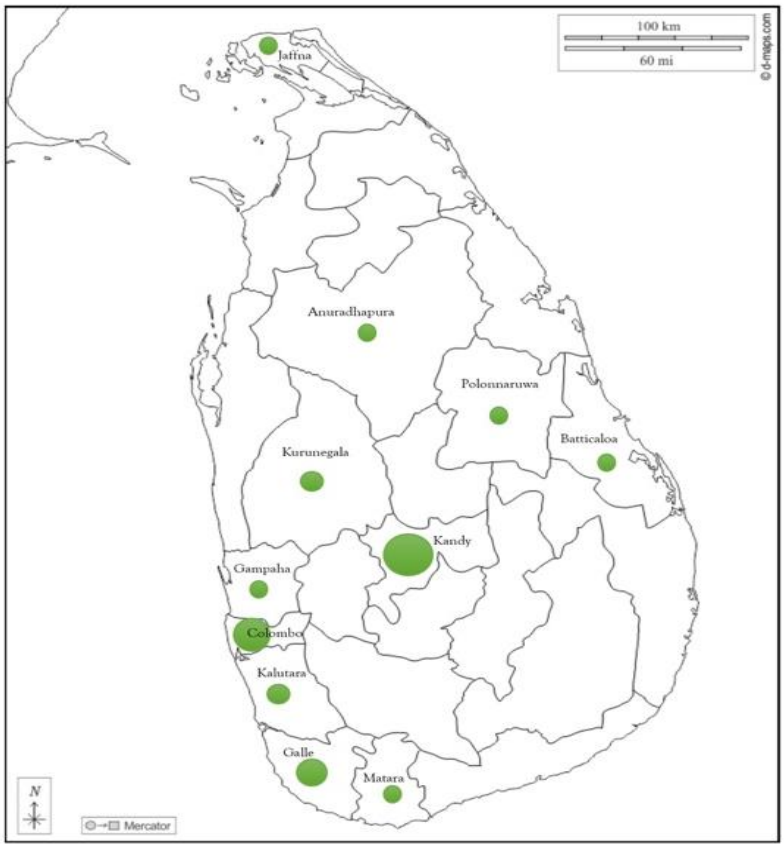
4.2 Geographical disparities: Concentration and variation in study locations

The theme depicts how road traffic crash and injury research studies conducted in Sri Lanka are distributed across the island, and which primary data sources were utilised in each study location (n=30). Figure 3 illustrates the district-wise geographical distribution of road traffic crash and injury research across the island.

The most frequently studied area (n=6) was the Kandy district (including the suburb of Peradeniya) (Bandara *et al.*, 2019; Dharmaratne & Stevenson, 2006; Jayatilleke *et al.*, 2009; Jayatilleke *et al.*, 2015a; Jayatilleke *et al.*, 2010; Selvaratnam *et al.*, 2022). The second most studied area (n=4) was the Colombo district (including the suburb Kalubowila) (de Silva *et al.*, 2001; Edirisinghe *et al.*, 2014; Lakmal *et al.*, 2021; Tennakoon *et al.*, 2020). Following Colombo, the Galle district has the greatest number of road traffic crash and injury research (n=3) (De Silva *et al.*, 2018; Jayarathna & Warushahennadi, 2022; Rathnaweera & Gunarathna, 2020).

The remaining studies were distributed across eight districts: Gampaha (including the suburb Ragama) (Edirisinghe *et al.*, 2014), Kalutara (Sampath & Fonseka, 2010), Anuradhapura (Weerawardena *et al.*, 2013), Polonnaruwa (Weerawardena *et al.*, 2018), Batticaloa (Jeepara & Pirasath, 2011), Matara (Weerawardena *et al.*, 2020), Jaffna (Renuraj *et al.*, 2015), and Kurunegala (Amarasinghe & Dharmaratne, 2019). Four studies were carried out in more than one district (Jayanetti *et al.*, 2021; Kumara & Walgampaya, 2021; Madhumali *et al.*, 2021; Vadysinghe *et al.*, 2018). Notably, among the twenty-five districts in Sri Lanka, only eleven were the subject of road traffic crash and injury research studies, representing only 44% of the country's districts.

Figure 3: District-wise distribution of road traffic crash and injury research across the island (Depose, 2024)



Note: The following analysis considered n=24 studies. The remaining n=6 studies that have conducted secondary data analyses utilising national police data were excluded.

Figure 4 illustrates the city and suburb-wise distribution of road traffic crash and injury research across the island, the number of studies conducted in each location, and the primary data sources used in each study location. The use of only a single data source was observed in Anuradhapura, Batticaloa, and Jaffna. Unlike in other study locations, the data sources used in their research studies in Polonnaruwa and Matara are unknown, as they were not stated explicitly. The most diverse use of data sources was observed in Galle and Kandy. However, the majority of studies carried out in Kandy have used police data. Accordingly, road traffic crash and injury research studies in Sri Lanka were primarily distributed only across particular geographical locations and, hence, appear to be concentrated.

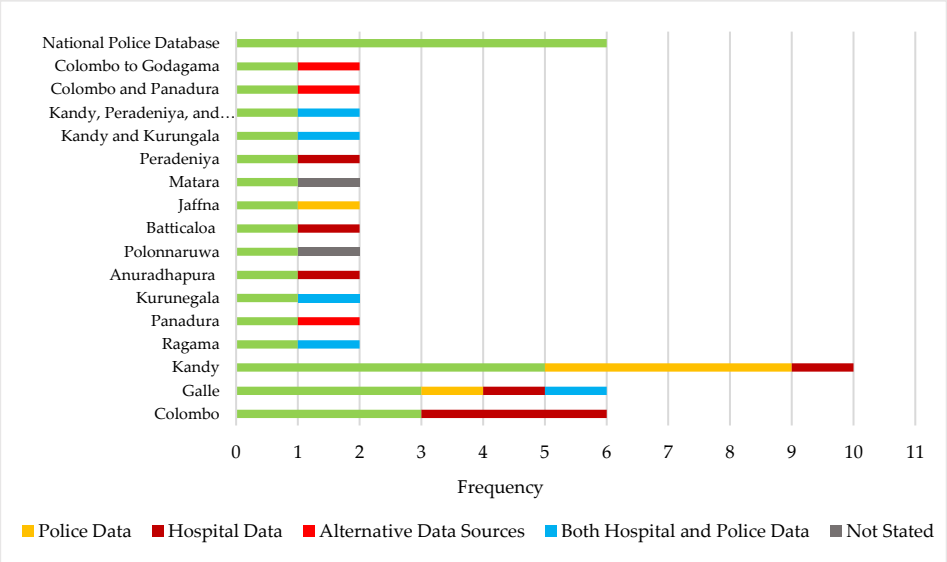


Figure 4: City and suburb-wise distribution of road traffic crash and injury research across the island, the number of studies conducted in each location, and the primary data sources used in each study location

4.3 Limitations in methodological and analytical diversity

This theme demonstrates the methodological approaches used in road traffic crash and injury research studies in Sri Lanka (n=30) with an attempt to highlight any limitations associated with the methodologies incorporated. The most common methodological approaches were secondary data analyses using the national police database data (n=6) and the retrospective descriptive study design (n=6) (Figure 5). The second most common methodological approaches were descriptive cross-sectional study design (n=3) and case-control study design (n=3), followed by prospective descriptive study design (n=2).

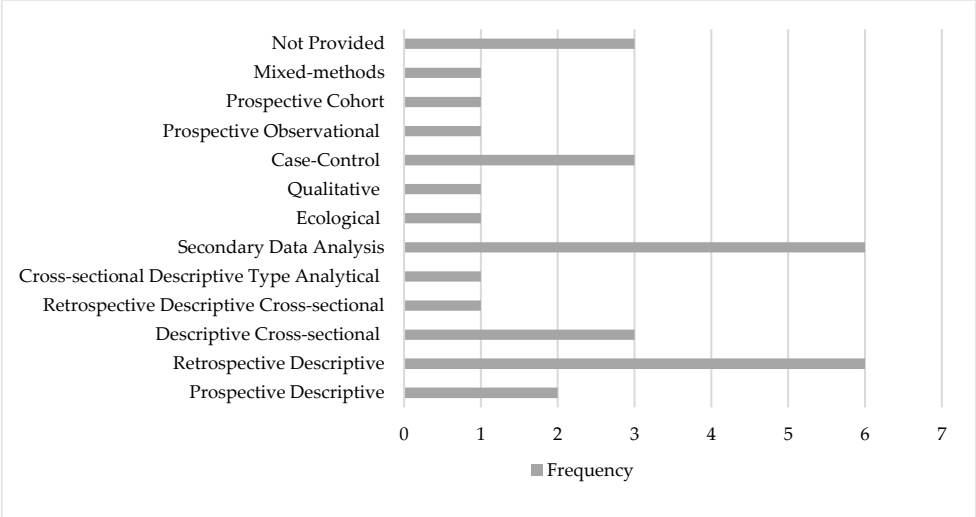


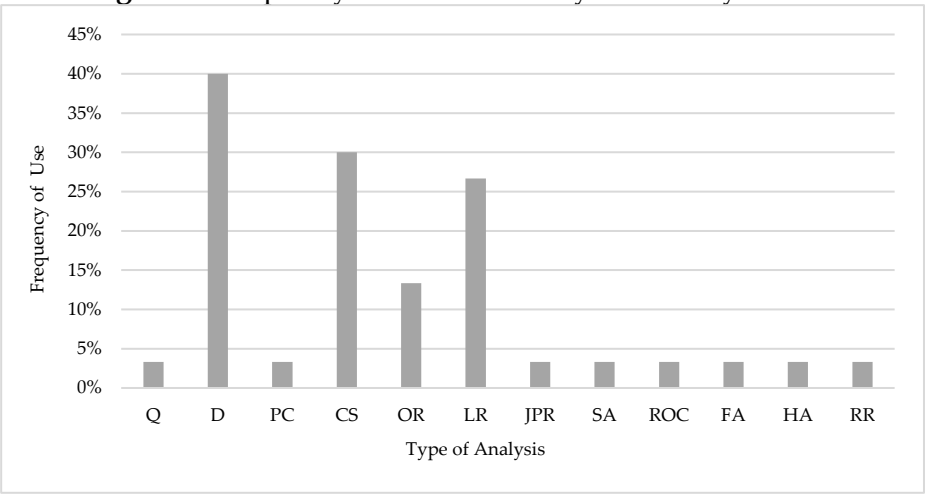
Figure 5: Study designs incorporated in road traffic crash and injury research in Sri Lanka and their frequency of usage

An equal number of studies have incorporated ecological, qualitative, prospective observational, prospective cohort, and mixed-methods study designs. Also, retrospective descriptive, cross-sectional and cross-sectional descriptive-type analytical study designs. Interestingly, three studies did not provide the study designs incorporated, which is crucial in assessing the reliability and validity of their findings, methodological rigour, and comparing results across studies.

More importantly, several studies did not mention the temporality of data collection, sample size, age and gender distribution of the sample, and the data sources utilised (Table 1). Unlike the temporality of data collection, which was absent in only one study, the sample size, gender distribution of the sample, and age distribution of the sample were not provided in seven, eight, and seven of the studies, respectively. Similarly, the data sources used were missing in two studies.

Of the included research studies, 40% (n=12) were purely descriptive, while 30% (n=9) used the chi-square test of association, and 26.67% (n=8) used logistic regression along with descriptive analyses (Figure 6). One study has used Getis-Ord Gi* Statistics and performed hotspot analysis, which is a technique that helps identify areas posing higher risks of road traffic crashes. In addition, four studies (13.33%) have used odds ratio calculations to predict the likelihood of accidents based on multiple risk factors (i.e., drunk driving, type of vehicle, etc.). Of the four studies that utilised odds ratios, three studies mentioned using logistic regression. However, none of these three articles provided model fit statistics, standard error estimates, or effect sizes to understand the degree to which the proposed factors substantially account for variance in the likelihood of accident occurrence. Such absences significantly limit the interpretability of the logistic regression results, making it difficult to assess the true predictive power of the identified risk factors.

Figure 6: Frequency of statistical analyses used by studies



Note: Q = Qualitative, **D** = Descriptive, **PC** = Pearson Correlation, **CS** – Chi-Square, **OR** = Odds Ratio, **LR** = Logistic Regression, **JPR** = Joint Point Regression, **SA** = Spatial Analysis, **ROC** = Receiver Operating Characteristic Curve, **FA** = Factor Analysis, **HA** = Hotspot Analysis, and **RR** = Risk Ratio

One study has used both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). However, though the statistical procedures used to conduct factor analyses seemed appropriate, the study lacked evidence of conducting any form of content validity to ensure the relevance of the variables used in the factor structure exploration. In addition, the study was also missing reliability analyses, which are a prerequisite in CFA. Such issues are of particular importance, especially when accompanied by a lack of clear descriptions for actions, as they may threaten the overall validity of the study. Interestingly, none of the studies were observed to have utilised group difference testing (t-tests, Analysis of Variance, Multivariate Analysis of Variance, etc.) and Structural Equation Modelling (SEM) to test hypotheses.

4.4 Temporal disparities in research focus and frequency

This theme demonstrates the temporality of road traffic crash and injury research studies in Sri Lanka from 2001 to the present, covering over two decades (n=30). 2021 observed the most studies published per year (n=5), followed by 2020 (n=4) (Figure 7). Following these two years, the other significant years for studies included 2015, 2018, 2019, and 2022 (n=3 each). No studies were observed for the years 2002 to 2005, 2007 to 2008, 2012, 2016 to 2017, and 2023. Despite the observed gaps across the timeline of research studies, a slight recurrence in road traffic crash and injury research can be observed over the years.

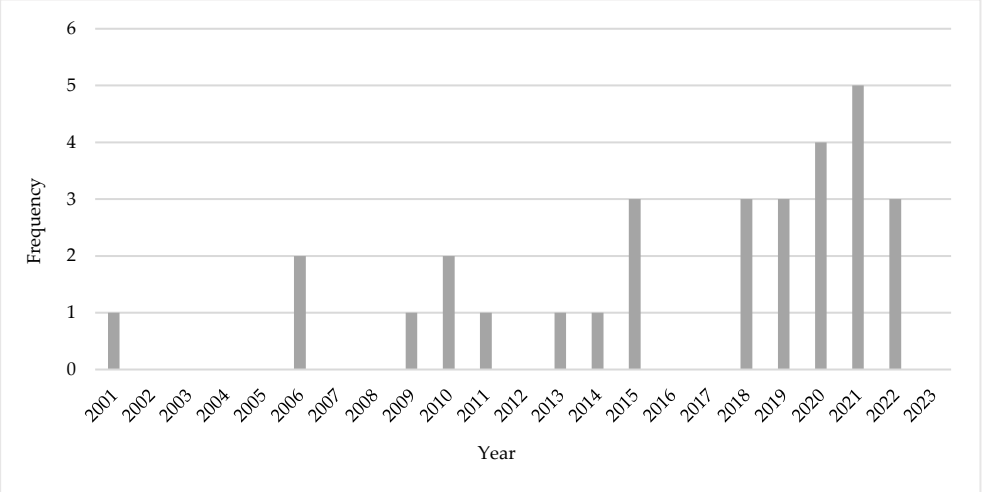


Figure 7: Year of publication of studies and the number of studies published

5. Discussion and Conclusions

The present systematic review identified four major themes related to road traffic crash and injury research in Sri Lanka. Firstly, it was observed that these investigative explorations are mostly based on police and hospital-based data. This finding of hospital and police data utilisation for road traffic crash and injury research was also observed by Bhalla and colleagues (Bhalla *et al.*, 2010). Most of the research analysed in the present study had obtained police data for subsequent statistical analysis. This widespread use of police data in road traffic crash and injury research could be due to the nature of the

data police records capture, which enables researchers to easily analyse trends in road traffic crashes and injuries. This data includes types of injuries sustained and causative factors, amongst others, regionally and nationally. However, as Bhalla and colleagues (Bhalla *et al.*, 2010) and Periyasamy and colleagues (Periyasamy *et al.*, 2013) report, police data may underreport accident incidences and incorporate reporting errors. For instance, police data involves a manual double-entry of data, initially on paper and subsequently into the database, increasing the possibility of typographic errors and missing data (De Silva *et al.*, 2018; Rabbani *et al.*, 2022). In certain instances, critical information associated with road traffic crashes, such as evidence of driving under the influence of alcohol, is not sufficiently recorded (Dhananjaya & Alibuhtto, 2016). Relying solely on police data, with its inherent limitations, may risk skewing the understanding of road traffic crashes and injuries, leading to policies and interventions that may fail to address the root causes of crashes and injuries effectively (Khadka *et al.*, 2022; Rabbani *et al.*, 2022). Similar to police data, hospital-based data—i.e., bed-head-tickets, medico-legal examination forms, post-mortem reports, in Sri Lanka, are also paper-based. Illegible handwriting, spelling errors, incomplete records, and difficulty locating records are key issues observed in hospital-based patient records (Kankananarachchi *et al.*, 2018; Mallawarachchi & Mallawarachchı, 2020). For instance, bed-head-tickets contain details about the patient, and in-patient management, including medications given, medical investigations and laboratory tests performed, their reports, any surgical interventions performed, and referrals for other specialists (Mallawarachchi & Mallawarachchı, 2020). While unclear and missing records impact patient care in hospitals, they could also negatively impact research outcomes when done in retrospect. Hence, electronic health records may be prioritised to improve patient outcomes and support research endeavours by facilitating efficient and effective chart review for researchers (Hoover, 2017).

Secondly, the findings of the present inquiry indicated that road traffic crash and injury research covered only eleven of the twenty-five districts in Sri Lanka. These regional disparities imply that little is known about road traffic crashes and injuries in more than half of the districts in the country. This is of particular concern because variations in vehicle types, vulnerable road user demographics, and road conditions across districts could significantly affect the frequency and severity of road traffic crashes and injuries. One of the underlying factors for the observed disparity in the geographic distribution of road traffic crash and injury research studies may include the location of the researchers. Predominantly, researchers are attached to state universities that are scattered across thirteen districts (University Grants Commission, 2024). As Selvaratnam *et al.* (2023) reason, the distribution of universities in Sri Lanka is unequal, with a majority of universities located in the Colombo district. Nonetheless, the highest number of road traffic crash and injury research has taken place in the Kandy district despite having a single university. Although Rathnapura, Badulla, Vavuniya, and Ampara districts also house key state universities, no research studies related to road traffic crashes and injuries were observed in these districts. As Selvaratnam *et al.* (2023) reason, limitations and deficits in resources and budgetary allocations for universities may have been a key

reason for limited research output. Aturupane (Aturupane, 2018) also explains that research output in a majority of the state universities in Sri Lanka is in short supply. Concerningly, understudying areas may leave populations vulnerable to more road traffic crashes and injuries, impacting their health and safety more adversely. The only national-level studies relied on police data, which is known to have issues with data accuracy. This may be suggestive of a lack of high-quality studies exploring and evaluating road traffic crashes and injuries in the entire country, impacting preventive mechanisms that responsible authorities may take to reduce road traffic crashes and injuries. The introduction of a national-level trauma registry could address the existing research gaps by providing comprehensive and standardised data on road traffic injuries, eliminating the need for researchers to rely on low-quality or regional data sources, and facilitating more informed national policies and interventions (Mobinizadeh *et al.*, 2022).

Thirdly, our exploration of the road traffic crash and injury research indicated many of the Sri Lankan research studies published lack key methodological information, such as the temporality of data collection, sample size, age, gender distribution, and data sources utilised. A lack of methodological rigour could threaten the validity of a study. For instance, a lack of consideration for an optimal sample size may contaminate inferences drawn from the data due to *Type I* (false positive) and *Type II* (false negative) errors. Similar to lapses in study methodology, statistical analyses also fell short of many conventional inferential statistical measures to investigate the magnitude of predictive factors of road traffic injuries. The majority of the research lacked any information about effect size calculations, such as coefficient of determination (R^2), eta squared (η^2), and Cohen's *d*, leaving a questionable impression on the statistical significance of the studies. Particularly because statistically significant findings sometimes provide negligible effect sizes (Kalinowski & Fidler, 2010). These concerns are exacerbated when the studies lack a clear elaboration on their methodology and the strategies for data analysis. Moreover, most studies have failed to apply appropriate operational definitions to measure factors associated with road traffic crashes, which further restricts the researchers from conducting rigorous scientific research. It is further observed that most research entails descriptive analyses or a combination of descriptive statistics and regression analyses, displaying a lack of diversity in statistical methods used for data analysis. Lack of group difference testing and hypothesis testing via t-tests and analysis of variance are also noted as a limitation. This lack of comprehensive and rigorous methods of data analysis limits our ability as a healthcare system to risk-stratify patients, particularly in the identification of patients at a high risk of morbidity and mortality. As a result, the data collected and shared would be of less utility in clinical practice, contradicting what is generally aimed at from road traffic crash and injury research.

Fourthly, the present study also noticed that a substantial number of road traffic crash and injury research studies have taken place in the years between 2018 to 2022, indicating an inability to comprehend the nature of road traffic crash and injury research in the preceding decades. Coupled with the previously mentioned three findings of the present inquiry, these may hinder data-supported decision-making and national-level

policymaking, as the data may fail to provide a complete picture. This, in turn, may potentially impact road traffic crash and injury prevention and safety promotion (Rabbani *et al.*, 2022). However, despite challenges in research, the consistency with which the topic has been evaluated emphasises its perceived importance within the research and the public health community. This suggests the need for a national programme for the monitoring of data on road traffic crashes and injuries.

5.1 Recommendations and implications for road safety

We recommend that researchers and responsible authorities improve data sources, for example, by designing and implementing a hospital-based electronic health records system and encouraging the implementation of an electronic trauma registry. Implementing hospital-based electronic health records systems and an electronic trauma registry would not only enhance data accuracy and accessibility for research but also improve patient care by enabling real-time data tracking and more effective trauma management. A national-level trauma registry would also help improve the coverage of research in areas previously under-studied. The geographic scope of road traffic crash and injury research may be expanded by introducing direct grants to study under-evaluated regions across the country. State universities may be supported by allocating resources and funds to encourage more road traffic crash and injury research. Future research may be directed at enhancing methodological and analytical quality and diversity in road traffic crash and injury research. Research studies may also consider incorporating grey literature.

5.2 Strengths and limitations of the study

To the best of our knowledge, this is the first systematic review that explores existing road traffic crash and injury research in Sri Lanka, focusing on the data sources utilised, the methodological approaches adopted, and the geographic distribution of the studies across the country. Our review highlights the need for more systematic archival of road traffic crash and injury data and the employment of comprehensive and rigorous methods of data analysis for subsequent decision-making. We utilised a mixed-method strategy in the present systematic review in which data were primarily analysed qualitatively but substantiated with descriptive statistics to provide quantitative context and a robust synthesis within the constraints of available data. Although an amalgam of themes and descriptive statistics provided valuable insights, it may lack the statistical generalisability associated with meta-analytic approaches of systematic reviews. Considering the heterogeneity in the designs and methodologies of the studies included in the present review, a meta-analytic synthesis was deemed unfeasible. As a result, future research could focus on conducting a meta-analysis if more homogeneous data become available for a deeper quantitative synthesis. Our study only considered primary studies, which are peer-reviewed, available in full text and published in English, that investigated road traffic crashes, injuries, and fatalities. There may be abstracts, conference papers, and grey literature that could provide further insight into road traffic

crash and injury research in Sri Lanka. The study attempted to develop an understanding of road traffic crash and injury research in Sri Lanka to facilitate better evidence for data-supported decision-making and policy-making. Hence, our evidence base may not be exhaustive.

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The authors declare no conflicts of interest.

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Supplementary Materials

Supplementary Material 1: Database search strategies

MEDLINE (Ovid)

1	exp Accidents, Traffic/	49579
2	road traffic accident*.mp.	3764
3	road traffic crash*.mp.	782
4	"Wounds and Injuries"/	82669
5	road traffic injur*.mp.	1461
6	((road traffic or automobile or motor vehicle) adj3 (accident* or crash* or injur* or fatal*)).mp.	16388
7	((road traffic or crash or accident) adj3 (factor* or characteristic* or sever*)).mp.	3226
8	1 or 2 or 3 or 4 or 5 or 6 or 7	130565
9	hospital records/ or medical records/ or trauma severity indices/	78337
10	(hospital data or patient* data* or hospital record* or patient* record* or medical record*).mp.	265854
11	(police data or police record* or police database*).mp.	719
12	data source*.mp.	55938
13	(trauma data or accident data).mp.	2012
14	9 or 10 or 11 or 12 or 13	330255
15	(method* or methodological approach).mp.	10100241
16	Data Analysis/	4826
17	(data analys* or statistical analys*).mp.	249763
18	15 or 16 or 17	10171031
19	14 or 18	10306154
20	Sri Lanka/	7422
21	8 and 19 and 20	31

Embase (Elsevier)

17	#6 AND #15 AND #16	66
16	'sri lanka'	25,931
15	#11 OR #14	15,463,077
14	#12 OR #13	15,256,754
13	'data analys*' OR 'statistical analys*'	978,869
12	method* OR 'methodological approach'	14,931,959
11	#7 OR #8 OR #9 OR #10	732,260
10	'trauma data' OR 'accident data'	3,155
9	'data source*'	74,085
8	'police data' OR 'police record*' OR 'police database*'	906
7	'hospital data' OR 'patient* data*' OR 'hospital record*' OR 'patient* record*' OR 'medical record*'	660,146
6	#1 OR #2 OR #3 OR #4 OR #5	93,421
5	('road traffic' OR crash OR accident) NEAR/3 (factor* OR characteristic* OR sever*)	4,531
4	('road traffic' OR automobile OR 'motor vehicle') NEAR/3 (accident* OR crash* OR injur* OR fatal*)	26,816
3	'road traffic injur*'	2,831
2	'road traffic crash*'	974
1	'traffic accident*' OR 'road traffic accident*'	85,674

CINAHL (EBSCO)

S21	S8 AND S19 AND S20	10
S20	MH Sri Lanka	2,499
S19	S14 OR S18	2,517,749
S18	S15 OR S16 OR S17	2,462,685
S17	"data analys*" OR "statistical analys*"	561,999
S16	MH "data analysis"	24,077
S15	method* OR "methodological approach"	2,205,204
S14	S9 OR S10 OR S11 OR S12 OR S13	118,155
S13	"trauma data" OR "accident data"	966
S12	"data source*"	21,269
S11	"police data" OR "police record*" OR "police database*"	327
S10	"hospital data" OR "patient* data*" OR "hospital record*" OR "patient* record*" OR "medical record*"	96,853
S9	MH "medical records"	22,222
S8	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7	18,713
S7	("road traffic" OR crash OR accident) N3 (factor* OR characteristic* OR sever*)	3,110
S6	("road traffic" OR automobile OR "motor vehicle") N3 (accident* OR crash* OR injur* OR fatal*)	6,740
S5	"Road traffic injur*"	779
S4	TI("Road traffic accident*" OR "Road traffic crash*") OR AB("Road traffic accident*" OR "Road traffic crash*")	1,711
S3	"Road traffic crash*"	10,018
S2	"Road traffic accident*"	10,695
S1	MH accidents	3,673

Web of Science (Clarivate)

1	TS=("traffic accident*" OR "road traffic accident*")	21162
2	TS=("road traffic crash*")	1205
3	TS=("road traffic injur*")	2266
4	TS=(("road traffic" OR automobile OR "motor vehicle") NEAR/3 (accident* OR crash* OR injur* OR fatal*))	24016
5	TS=(("road traffic" OR crash OR accident) NEAR/3 (factor* OR characteristic* OR sever*))	21746
6	#5 OR #4 OR #3 OR #2 OR #1	55398
7	TS=("hospital data" OR "patient* data*" OR "hospital record*" OR "patient* record*" OR "medical record*")	226298
8	TS=("police data" OR "police record*" OR "police database*")	1570
9	TS=("data source*")	103080
10	TS=("trauma data" OR "accident data")	4021
11	#7 OR #8 OR #9 OR #10	332097
12	TS=(method* OR "methodological approach")	16906363
13	TS=("data analys*" OR "statistical analys*")	606255
14	#12 OR #13	17183296
15	#11 OR #14	17310284
16	TS=("Sri Lanka")	24768
17	#6 AND #15 AND #16	31

Scopus

(TITLE-ABS-KEY ("traffic accident*" OR "road traffic accident*" OR "road traffic crash*" OR "road traffic injur*") OR TITLE-ABS-KEY (("road traffic" OR automobile OR "motor vehicle") W/3 (accident* OR crash* OR injur* OR fatal*)) OR TITLE-ABS-KEY (("road traffic" OR crash OR accident) W/3 (factor* OR characteristic* OR sever*))) AND (TITLE-ABS-KEY ("hospital data" OR "patient* data*" OR "hospital record*" OR "patient* record*" OR "medical record*") OR TITLE-ABS-KEY ("police data" OR "police

record*" OR "police database*") OR TITLE-ABS-KEY ("data source*" OR "trauma data" OR "accident data") OR TITLE-ABS-KEY (method* OR "methodological approach") OR TITLE-ABS-KEY ("data analys*" OR "statistical analys*")) AND (TITLE-ABS-KEY ("Sri Lanka"))
37

Supplementary Material 2: Quality assessment of studies included in the review

Table 1: Quality assessment of quantitative non-randomised studies included in the review against the methodological quality criteria for quantitative non-randomised studies in the mixed methods appraisal tool (MMAT)

Author and Year	3.1. Are the participants representative of the target population?	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?	3.3. Are there complete outcome data?	3.4. Are the confounders accounted for in the design and analysis?	3.5 During the study period, is the intervention administered (or exposure occurred) as intended?
Amarasinghe & Dharmaratne (2019)	Yes	Yes	Yes	Can't tell	Yes
Bandara et al. (2019)	Yes	Yes	Yes	Yes	Yes
De Silva et al. (2018)	Yes	Yes	Yes	Yes	Yes
Dharmaratne & Stevenson (2006)	Yes	Yes	Yes	Can't tell	Yes
Edirisinghe et al. (2014)	Yes	Yes	Yes	Can't tell	Yes
Jayatilleke et al. (2009)	Yes	Yes	Yes	Yes	Yes
Jayatilleke et al. (2010)	Yes	Yes	Yes	Yes	Yes
Jayatilleke et al. (2015)	Yes	Yes	Yes	Yes	Yes
Jayarathna & Warushahennadi (2022)	Yes	Yes	Yes	Can't tell	Yes
Kodithuwakku & Peiris (2021)	Yes	Yes	Yes	Yes	Yes
Kodithuwakku & Peiris (2022)	Yes	Yes	Yes	Yes	Yes
Lakmal et al. (2021)	Yes	Yes	Yes	Can't tell	Yes
Madhumali et al. (2021)	Yes	Yes	Yes	Can't tell	Yes
Rathnaweera & Gunarathna (2020)	Yes	Yes	Yes	No	Yes
Sampath & Fonseka (2010)	Yes	Yes	Yes	Can't tell	Yes
Senaviratna & Cooray (2020)	Yes	Yes	Yes	Yes	Yes
Shajith et al. (2019)	Yes	Yes	Yes	Yes	Yes
Somasundaraswaran (2006)	Yes	Yes	Yes	Yes	Yes
Tennakoon et al. (2020)	Yes	Yes	Yes	Can't tell	Yes
Vadysinghe et al. (2018)	Yes	Yes	Yes	No	Yes
Weerawardena et al. (2013)	Yes	Yes	Yes	No	Yes

Table 2: Quality assessment of quantitative descriptive studies included in the review against the methodological quality criteria for quantitative descriptive studies in the mixed methods appraisal tool (MMAT)

Author and Year	4.1. Is the sampling strategy relevant to address the research question?	4.2. Is the sample representative of the target population?	4.3. Are the measurements appropriate?	4.4. Is the risk of nonresponse bias low?	4.5. Is the statistical analysis appropriate to answer the research question?
de Silva et al. (2001)	Yes	Yes	Yes	Yes	Yes
Dharmaratne et al. (2015)	Yes	Yes	Yes	Yes	Yes
Selvaratnam et al. (2022)	Yes	Yes	Yes	Yes	Yes
Weerawardena et al. (2018)	Yes	Yes	Yes	Yes	Yes

Table 3: Quality assessment of qualitative studies included in the review against the methodological quality criteria for qualitative studies in the mixed methods appraisal tool (MMAT)

Author and Year	4.1. Is the qualitative approach appropriate to answer the research question?	4.2. Are the qualitative data collection methods adequate to address the research question?	4.3. Are the findings adequately derived from the data?	4.4. Is the interpretation of results sufficiently substantiated by data?	4.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?
Jayanetti et al. (2021)	Yes	Yes	Yes	Yes	Yes

Table 4: Quality assessment of mixed-methods studies included in the review against the methodological quality criteria for mixed methods studies in the mixed methods appraisal tool (MMAT)

Author and Year	4.1. Is there an adequate rationale for using a mixed methods design to address the research question?	4.2. Are the different components of the study effectively integrated to answer the research question?	4.3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	4.4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?	4.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?
Kumara & Walgampaya (2021)	Yes	Yes	Yes	Yes	Yes

Supplementary Material 3: Studies excluded from the systematic review

Table 1: Studies that were excluded from the present systematic review

Authors & Year	Manuscript Title	Reason for Exclusion
Gong (2015)	Road traffic injuries and near misses among adolescents in Galle, Sri Lanka.	An abstract. Not a peer-reviewed full-text journal article.
Gong et al. (2015)	The prevalence and risk factors of road traffic crashes among adolescents in Galle, Sri Lanka.	An abstract. Not a peer-reviewed full-text journal article.
Rajakaruna et al. (2019)	Hospital based assessment of motorcycle related accidents in a Sri Lankan suburb.	An abstract. Not a peer-reviewed full-text journal article.
Sayer & Hitchcock (1984)	Analysis of police and medical road accident data: Sri Lanka 1977-81.	An abstract. Not a peer-reviewed full-text journal article.
Dias & Wickramarachchi (2021)	Analysing pedestrian safety in school zones based on behaviour risk.	Not on road traffic crashes, injuries, or fatalities.
Samarakoon et al. (2018)	Road accidents in Sri Lanka: Correlations of psychological, cultural and geographical factors in eastern province, Sri Lanka.	Focus is more on road traffic crash prevention.