

# Completeness of Police Records for Injury Surveillance: A Systematic Review

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## ABSTRACT

**Background:** Injuries are an emerging global health epidemic. They claim more than 16,000 lives across the world daily and account for almost 50% of deaths in people aged 10 to 24 years. The burden of injuries is likely to grow in the coming years. Reliable data that would help in the analysis of injury problems are lacking in many countries. Police records are a potentially important source of data on injuries. **Objectives:** to summarise and present the worldwide literature on the proportions of injuries ascertained by police records; and the extent to which police records are utilised in injury surveillance systems. **Methods:** Peer reviewed and grey literature published between January 2000 to July 2020 in English language on ascertainment of unintentional injuries by police records, or on use of police records for injury surveillance was included. Databases searched were Medline, EMBASE, PubMed, Google Scholar, Cochrane database and the Database of Abstracts of Reviews of Effectiveness (DARE). Reference lists of eligible studies were also scanned. The review was not registered and a review protocol was not published. **Results:** Out of 754 unique studies identified, 712 were excluded after screening of the abstract and 10 were excluded after reading the full text. Four studies were included after screening the reference lists of eligible studies. Ascertainment of fatal injuries by police records was reported between 35% to 96.6% in High-Income-Countries (HICs) 46.4% to 56.2% in Upper-Middle-Income-Countries (UMICs), 4.2% to 77.8% in Lower-Middle-Income-Countries (LMICs) and 46.3% to 58% in Low-Income-Countries (LICs). Ascertainment of non-fatal injuries was reported between 16% to 82% in HICs, 4.7% to 51.5% in UMICs, 6.7% to 24.7% in LMICs and 17% in LICs. Police records are used for injury surveillance either alone or in combination with other data sources. **Conclusion:** Police records are a potentially useful source of information on unintentional injuries. Ascertainment was found to be higher for fatal injuries and in HICs as compared to LICs and LMICs. However, the use of police records as the basis of unintentional injury surveillance systems is presently at a nascent stage. Better enforcement of legal provisions regarding reporting of injuries to the police and increasing awareness is likely to improve the proportions of ascertainment.

**Key words:** Ascertainment, Injuries, Police, Surveillance, Unintentional.

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## BACKGROUND/RATIONALE

Injuries are an emerging global health epidemic that affect millions of people annually.<sup>1</sup> They claim more than 16,000 lives across the world daily and are among the leading causes of global morbidity and mortality.<sup>1,2</sup> Injuries account for almost 50% of deaths in young people between the age of 10 to 24 years and it is estimated that the burden of injuries will grow in the coming years.<sup>3,4</sup> In terms of years of life lost worldwide, injuries have climbed from the 9<sup>th</sup> leading cause in 1990 to the 2<sup>nd</sup> leading cause in 2020.<sup>3</sup> Injuries have serious economic and social consequences, especially in the Low Income Countries (LICs) and Lower Middle Income countries (LMICs) who shoulder 90% of the total global burden<sup>1-5</sup> The majority of global unintentional injuries are due to road traffic accidents.<sup>6</sup> Hence, the United Nations has set a Global Road Safety Target – to reduce deaths and serious injuries by 50% by 2030.<sup>6</sup>

Injury is an important contributor to the disease burden in India and is a leading cause of death for all ages.<sup>7-9</sup> An estimated one million people died from injuries in India in 2012, which accounted for 11% of total mortality.<sup>10</sup> India reported an age-standardized mortality rate of 116 per 100,000 population due to injuries which was higher than the global average.<sup>10</sup> Similarly, the 4,785 years of life lost per 100,000 population in India was 23.6% higher than the global average.<sup>10</sup> Unintentional injuries account for 75% of injury deaths in the country.<sup>10</sup> Thus, unintentional injuries present a formidable public health challenge.<sup>11</sup> There are multiple legislations in India that mandate the reporting of accidents and injuries to the police and other authorities by those injured. These legislations include the Code of Criminal Procedure 1873;<sup>12</sup> the Indian Penal Code 1860,<sup>13</sup> the Building and Other Construction Workers (Regulation of Employment

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and Conditions of Service) Act 1996,<sup>14</sup> the Workmen Compensation Act 1923,<sup>15</sup> and the Employee State Insurance Act 1948.<sup>16</sup> India has a National Programme for Prevention and Management of Trauma and Burn Injuries. It has also set up a National Injury Surveillance Trauma Registry and Capacity Building Centre (NISTRBC) which focuses exclusively on road traffic injuries.<sup>17</sup> Injuries like other diseases are predictable and preventable.<sup>18</sup> However, injury prevention remains a low priority for policy makers, particularly those in LMICs.<sup>19</sup> Reliable data that would help in the analysis of injury problems are lacking in many countries; and injury registries are not in place, particularly in LMICs.<sup>20</sup> The scarcity of data in LICs and LMICs contributes to a lack of awareness among policy makers about the extent of injury problems and is one of the main reasons for the neglect of this health problem.<sup>21</sup> Police records are a potentially important source of data on injuries. However, substantial variations in levels of recording of hospital admissions for road traffic injuries by the police have been reported.<sup>22-25</sup> A critical review of the existing world literature is therefore needed to help understand what proportion of injuries are reported to the police in different countries and to learn whether surveillance systems to monitor the burden and trends of unintentional injuries have been established using police records.

## OBJECTIVES

The purpose of this review was to systematically search, summarise and present the worldwide literature on:

The proportions of fatal and non-fatal injuries that are ascertained by police records;

The extent to which police records are utilised in surveillance systems worldwide to monitor the burden and trends of unintentional injuries.

In this systematic review, we focused only on unintentional injuries. As defined by the WHO, unintentional injuries occur in the absence of predetermined intent, of which the leading causes are road traffic injuries, falls, drowning, burns and poisoning.<sup>6</sup> To the best of our knowledge, this is the first systematic review of the completeness of police records for injury surveillance

## MATERIALS AND METHODS

### Protocol and registration

This review was not registered. The review protocol was not published but it is available from the corresponding author.

### Eligibility criteria

All studies on unintentional injuries in humans, published in the English language in peer and non-peer reviewed (i.e., grey) literature were included in the review. A study was included in the review if the study investigated ascertainment of unintentional injuries by police records; or the establishment of an unintentional injury surveillance system based on police records. Studies related to the epidemiology of injury, population surveys and letters to the editor were excluded as they were not likely to provide evidence regarding the review objectives.

### Information sources

Potentially eligible studies were identified by searching electronic bibliographic databases and scanning the reference lists of eligible studies. Due to a limitation of resources, searches for the review were made only of studies published between January 2000 to July 2020; This period of 20 years was considered long enough to capture important and recent studies on the subject, with earlier eligible studies expected to be retrieved from the scanning of reference lists of all eligible studies retrieved. The search was applied to Medline (2000 – July 2020) and adapted for EMBASE (2000 – July 2020), PubMed Central (2000-July

2020) and Google Scholar (2000 – July 2020). The Cochrane database and the DARE (Database of Abstracts of Reviews of Effectiveness) database were also searched. We searched the Google search engine for grey literature, using the same search terms as we had used to search Medline, EMBASE and PubMed Central.

## Searches

To retrieve potentially eligible studies, an extensive search was conducted in accordance with PRISMA requirements.<sup>26</sup> After several rounds of test searches in January to March, 2020, the main search was conducted on 10<sup>th</sup> May 2020, which was then updated on 16<sup>th</sup> July, 2020. The search terms were formulated first for MEDLINE and were later adapted for EMBASE, PubMed and Google Scholar. The search terms were: “Surve\*; monitor\*; report\*; injur\*; wound; hurt; police; records;”. The terms were selected on the basis of MeSH terms and the keywords used in the eligible studies. The terms were combined using “AND/OR” Boolean operators (Table 1).

## Study selection

Search results were downloaded into a Microsoft excel database. Relevant studies were identified for inclusion in the review using a two-stage

**Table 1: Search Strategy.**

	MEDLINE (OVID)
01	Surve* or Monitor* or Report*
02	Limit 1 to (abstracts and English language and humans and yr="2000 -Current")
03	injur* or wound or hurt
04	Limit 3 to (abstracts and English language and humans and yr="2000 -Current")
05	2 and 4
06	*Police/cl, ec, lj, sn [Classification, Economics, Legislation and Jurisprudence, Statistics and Numerical Data]
07	Limit 6 to (abstracts and English language and humans and yr="2000 -Current")
08	5 and 7
	EMBASE
01	Surve* or Monitor* or Report*
02	limit 1 to (abstracts and human and English language and yr="2000 -Current")
03	injur* or wound or hurt
04	limit 3 to (abstracts and human and English language and yr="2000 -Current")
05	2 and 4
06	Police
07	limit 6 to (abstracts and human and English language and yr="2000 -Current")
08	5 and 7
	Google Scholar
	Surveillance injur* police
	Anywhere in the article
	2000 to 2020
	PubMed
	((surveillance [Title/Abstract]) AND (injur*[Title/Abstract])) AND (police [Title/Abstract])

screening process: In the first stage, the first and the second reviewer independently screened the titles and abstracts to identify potentially eligible studies meeting the inclusion criteria; In the second stage, the full texts of potentially eligible studies were screened independently. The reference lists of eligible studies were screened by the 1<sup>st</sup> author to retrieve other eligible studies. Any disagreements were resolved by discussion. Study authors were not contacted to identify additional studies.

### Data items and data collection process

The first author extracted data from eligible studies into a Microsoft excel sheet. Data items extracted were - study title, author, country of study, country income group, study method, type of injuries studied, other data sources compared with police records, percentage of fatal, non-fatal and total injuries ascertained by police records and summary of any surveillance systems set up using police records.

### Appraisal of quality of studies and the risk of bias

The quality of studies and risk of bias was appraised using the Quality Assessment Tool for Quantitative Studies of Effective Public Health Practice Project (EPHPP).<sup>27</sup> For each study, a rating was assigned to the different components of the study and a global rating for each study was calculated. The tool's dictionary was used to rate the quality of each study.

## RESULTS

### Study selection

The searches of Medline, EMBASE, PubMed and Google Scholar retrieved a total of 855 records of potentially eligible studies: Medline (53 records), EMBASE (161), PubMed (149) and Google Scholar (492). After removing duplicates, there were 754 records of potentially eligible studies. Of these, 712 records were excluded at the first stage screening of the title and abstract as they were neither on the ascertainment of unintentional injuries by police records, nor had they studied an unintentional injury surveillance system based on police records. The full text reports of the 42 remaining records of potentially eligible studies were retrieved and read by the first and the second author independently. Ten out of 42 studies were excluded at this stage as they were on the burden, pattern and causes of injuries, on injury severity and not ascertainment of

injuries, pre-hospital care time intervals from crash scene to hospital, geospatial analysis of injury locations and misclassification of injury severity in police records. Four additional studies that met the inclusion criteria were identified by screening the reference lists of eligible studies and were included. Thus, 36 studies met the criteria and were included in the review.<sup>21,28-62</sup> (Figure 1).

### Study characteristics

36 studies were included in the review.<sup>21,28-62</sup> These were distributed across 30 countries, with the highest number from Australia (4 studies),<sup>30,33,39,60</sup> These 30 countries were categorised using the World Bank's classification of countries by income group. The highest number of studies (15) were from High-Income-Countries (HICs), followed by 11 studies from the Lower-Middle-Income-Countries (LMICs), 6 from Upper-Middle-Income-Countries (UMICs) and 3 studies from Low-Income Countries (LICs). There was one multi-country study, from Europe, included in the review. Non-fatal injury ascertainment by police records was reported in 20 studies, fatal injury ascertainment in 16 studies and total injury ascertainment by the police was reported in 8 studies.

### Studies on ascertainment of injuries by police records

Twenty-nine studies reported on the completeness of ascertainment of unintentional injuries by police records (Table 2). Of these, twenty-eight studies reported on road traffic injuries and one study reported on industrial injuries.<sup>51</sup>

The study designs were either cross-sectional<sup>30,31,33,34,36-38,41-62</sup> or retrospective cohorts.<sup>28,29,32,40</sup> The methods used for the investigation of completeness of police records were: (i) the capture-recapture method<sup>30,40,43,45,48,49,51,52,54,56</sup> (ii) calculation of the percentage of injuries ascertained in the police data base<sup>28,29,31,34-38,40,41,44,46,47,49,52,55,57</sup> (iii) percentage of disagreement between the police database and another data base (discordance rate),<sup>30</sup> (iv) linkage rate of police records with other data sources.<sup>38,58</sup> One study<sup>46</sup> used survey data whereas the majority of studies used hospital data to ascertain completeness of police records. Other sources of data used for the comparative analysis were: fire department and fire insurance records,<sup>35</sup> civil registries,<sup>40,45</sup> trauma registries,<sup>30,32</sup> mortuary records,<sup>42,45</sup> health insurance data,<sup>43</sup> population

**Table 2: Characteristics of studies on completeness of ascertainment of unintentional injuries by police records.**

	Title	Author Setting	Study type (Method)	Type of injuries studied	Other data source compared	Percentage of injuries ascertained by police records		
						F*	NF*	T*
<b>High-income Countries</b>								
1	Reporting road victims: Assessing and correcting data issues through distinct injury scales. <sup>29</sup>	Couto, A. <i>et al.</i> (2016) Portugal	Retrospective cohort (Econometric and statistics tools)	Road traffic injuries	Hospital records	-	-	71
2	Estimating under-reporting of road crash injuries to police using multiple linked data collections. <sup>30</sup>	Watson <i>et al.</i> (2015) Australia	Cross sectional (Discordance rate between police and hospital data)	Road traffic injuries	Hospitals and injury surveillance unit	-	31.4	-
3	Linking emergency medical department and road traffic police casualty data: a tool in assessing the burden of injuries in less resourced countries. <sup>31</sup>	Petridou <i>et al.</i> (2009) Greece	Cross sectional (Under reporting coefficient)	Road traffic injuries	Emergency Department	96.6	16	-
4	Actual incidences of road casualties and their injury severity, modelled from police and hospital data, France. <sup>32</sup>	Amoros <i>et al.</i> (2008) France	Retrospective cohort (Capture-recapture)	Road traffic injuries	Road trauma registry	-	-	29.3

5	Complementing police road-crash records with trauma registry data—an initial evaluation. <sup>33</sup>	Lopez <i>et al.</i> (2000) Australia	Cross sectional (Wilcoxon signed test)	Road traffic injuries	Trauma registry of hospitals	-	82	-	
6	Validity of using linked hospital and police traffic crash records to analyse motorcycle injury crash characteristics. <sup>34</sup>	Wilson <i>et al.</i> (2012) New Zealand	Cross sectional (Percentage of police records linked to hospital records)	road traffic injuries	Hospital discharge records	-	46	-	
7	An evaluation of police reporting of road casualties. <sup>28</sup>	Jeffrey <i>et al.</i> (2009) United Kingdom	Retrospective cohort study (Percentage of hospital admissions not reported to the police)	Road Traffic Injuries	Hospital records	-	55	-	
8	Underreporting of traffic injuries involving children in Japan. <sup>35</sup>	Nakahara and Wakai (2011) Japan	Cross sectional (Ratio of police data to fire department and insurance data)	Road traffic injuries	Fire department and Marine and Fire Insurance Association of Japan	-	50	-	
9	Estimation of the real number of road casualties in Europe. <sup>36</sup>	Broughton <i>et al.</i> (2010) Czech Republic, France, Greece, Hungary, Netherlands, Austria, Spain, UK	Cross-sectional three-step methodology: (Calculation of the national coefficients to estimate the actual casualties from the police database)	Road traffic injuries	Hospital records	-	Czech Republic-1.07, France 1.43, Greece- 5.92, Hungary-0.84, Netherlands-1.29, Spain-1.22, United Kingdom-1.24 for serious injuries	-	
10	The quality of the injury severity classification by the police: An important step for a reliable assessment <sup>37</sup>	Ferreira <i>et al.</i> (2015) Portugal	Cross sectional (Percentage of under reporting)	Road traffic injuries	Hospital records	-	71	-	
11	Epidemiology of Road Traffic Injuries in Qassim Region, Saudi Arabia: Consistency of Police and Health Data <sup>38</sup>	Barrimah <i>et al.</i> (2012) Saudi Arabia	Cross sectional (Percentage of underreporting)	Road traffic injuries	Hospital records	35	47.8	45.3	
12	Data Linkage of Hospital and Police Crash Datasets in NSW <sup>39</sup>	Boufous (2008) Australia	Cross sectional (Percentage of underreporting)	Road traffic injuries	Hospital records	-	-	44.9	
<b>Upper-middle-income countries</b>									
13	Comparing road traffic mortality rates from police-reported data and death registration data in China. <sup>40</sup>	Hu <i>et al.</i> (2011) China	Retrospective cohort (Percentage of underreporting)	Road traffic injuries	Official death registration data	50	-	-	
14	Matching of police and hospital road crash casualty records – a data-linkage study in Malaysia. <sup>41</sup>	Kamaluddin <i>et al.</i> (2019) Malaysia	Cross sectional (Percentage of police records with hospital records)	Road traffic injuries	Hospital records	-	4.70	-	
15	Assessing Quality of Existing Data Sources on Road Traffic Injuries (RTIs) and Their Utility in Informing Injury Prevention in the Western Cape Province, South Africa. <sup>42</sup>	Chokotho <i>et al.</i> (2013) South Africa	Cross sectional (Capture-recapture) Percentage of under reporting	Road traffic injuries	Mortuary	46.4	-	-	
16	Feasibility of road traffic injury surveillance integrating police and health insurance data sets in the Dominican Republic <sup>43</sup>	Puello <i>et al.</i> (2014) Dominican Republic	Cross sectional (Capture-recapture) Percentage of under reporting	Road traffic injuries	Health insurance data set	-	19.8 to 39.8	-	
17	Necessity of an Integrated Road Traffic Injuries Surveillance System: A Community-Based Study <sup>44</sup>	Hatamabadi (2011) Iran	Cross sectional (Percentage of police records with hospital records)	Road traffic injuries	Hospital records	56.2	51.5	55.8	

Lower-middle-income countries									
18	Applying the capture-recapture method to estimate road traffic deaths and injuries in three non-contiguous cities in the Philippines. <sup>45</sup>	Rivera and Lam (2019) Philippines	Cross sectional (Capture-recapture)	Road traffic injuries	Hospitals, civil registry	4.2 to 59.3	3.4 to 18.4	-	
19	Under-reporting of road traffic injuries to the police: results from two data sources in urban India. <sup>46</sup>	Dandona et al. (2008) India	Cross sectional (Percentage of injuries reported to the police)	Road traffic injuries	Population survey and hospital records	77.8	17.2	-	
20	Exploring data sources for road traffic injury in Cameroon: Capture and completeness of police records, newspaper reports and a hospital trauma registry. <sup>47</sup>	Juillard et al. (2017) Cameroon	Cross sectional (Percentage of injuries reported to the police)	Road Traffic injuries	Trauma registry and newspapers.	45	14.6	-	
21	Estimation of non-fatal road traffic injuries in Thai Nguyen, Vietnam using capture-recapture method. <sup>48</sup>	Van et al. (2006) Vietnam	Cross sectional (Capture-recapture)	Road traffic injuries	Hospital records	-	12.3	-	
22	Measuring transport injuries in a developing country: an application of the capture-recapture method <sup>49</sup>	Tercero and Andersson (2004) Nicaragua	Cross sectional (Capture-recapture)	Road traffic injuries	Hospital records	56.1	2.6	-	
23	Comparing Police- and Health Authority-Based Road Traffic Injury Surveillance Systems in Ulaanbaatar, Mongolia <sup>50</sup>	Karamira and Bhatti (2013) Mongolia	Cross sectional (Number of injuries reported by health authorities for every RTI reported by police)	Road traffic injuries	Hospital records	47.6	5.07	-	
24	How safe are industries in India? Ascertain industrial injuries in Dadra and Nagar Haveli, India by capture-recapture method <sup>51</sup>	Yadav S.S. (2019) India	Cross sectional (Capture-recapture)	Road traffic injuries	Hospital records	30	3.6	6.7	
25	Road traffic injuries in northern Laos: trends and risk factors of an underreported public health problem <sup>52</sup>	Slesak et al. (2015) Lao	Cross sectional (Capture-recapture)	Road traffic injuries	Hospital records	58.8	24.2	24.7	
26	A successful model of road traffic injury surveillance in a developing country: process and lessons learnt <sup>53</sup>	Razzak (2012) Pakistan	Cross sectional (Percentage of the total injuries in the surveillance system reported to the police)	Road traffic injuries	Hospital records	50	2-3	-	
27	Estimation of Fatalities Due to Road Traffic Crashes in Karachi, Pakistan, Using Capture-Recapture Method <sup>54</sup>	Lateef (2010) Pakistan	Cross sectional (Capture-recapture)	Road traffic injuries	Hospital records	44	-	-	
Low-income Countries									
28	Estimating the burden of road traffic crashes in Uganda using police and health sector data sources. <sup>55</sup>	Muni et al. (2020) Uganda	Cross sectional (Percentage of estimated injuries reported to the police)	Road traffic injuries	Health facilities and mortuaries	46.3	-	-	
29	Mortality and Morbidity of Urban Road Traffic Crashes in Africa: Capture-Recapture Estimates in Bamako, Mali, 2012. <sup>56</sup>	Sango et al. (2016) Mali	Cross sectional (Capture-recapture)	Road traffic injuries	Health records	58	17	-	

\*F=Fatal; NF=Non-fatal; T=Total

survey,<sup>47</sup> and newspaper reports.<sup>35</sup> The capture recapture method was more commonly used in studies in LMICs.

### Studies on use of police records for an injury surveillance system

The remaining 7 studies reported on the use of police records for an injury surveillance system or on the linking of police records with other databases to obtain a more complete picture of unintentional injuries (Table 3). Four studies were from HICs,<sup>57-60</sup> one from UMICs,<sup>61</sup> and

one each from a LMIC<sup>21</sup> and a LIC.<sup>62</sup> Six studies<sup>57-62</sup> were on road traffic injuries, the remaining study<sup>21</sup> covered all injuries.

### Outcomes

#### Studies on completeness of ascertainment of injuries by police records

In HICs, the ascertainment of fatal injuries by police records was reported in two studies and ascertainment was found to be 96.6%<sup>29</sup> and

35%<sup>38</sup> complete. Ascertainment of non-fatal injuries by police records was reported in nine studies from HICs; reported levels of completeness of ascertainment ranged from 16% to 82%. Three studies reported ascertainment of total injuries (fatal and non-fatal combined); levels of ascertainment by police records were 71%, 44.9% and 29.3%.<sup>29,32,39</sup>

In three studies from UMICs, the reported levels of completeness of ascertainment by police records of fatal injuries were 46.4%, 50% and 56.2%.<sup>40,42,44</sup> Three further studies reported levels of completeness of ascertainment of non-fatal injuries and found that police records ascertained 4.7% to 51.5% of the injuries.<sup>41,43,44</sup> One study reported

ascertainment of total injuries and the level of completeness of ascertainment was found to be 55.8%.<sup>44</sup>

Nine out of eleven studies from LMICs reported the level of completeness of ascertainment of fatal injuries by police records and found that police records ascertained between 4.2% to 77.8% of fatal injuries. Nine studies from LMICs reported the percentage of non-fatal injuries ascertained by the police records which varied from 6.7% to 24.7%. Two studies from LMICs reported that 6.7 % and 24.7% of the total injuries were ascertained by police records.<sup>51,52</sup> Two studies from LICs reported that

**Table 3: Studies on use of police records for injury surveillance system.**

S.N	Title	Author Setting	Study type (Method)	Injury type	Other data sources	Summary of surveillance system method
1	Development of a US Child-Focused Motor Vehicle Crash Surveillance System: A Pilot Study. <sup>57</sup>	Durbin <i>et al.</i> (2011) USA	Cross sectional (Survey)	Road traffic	Information collected through survey	Additional child-specific data were collected via three survey modes: phone, web-based and hard-copy self-administered.
2	Road traffic injuries in one local health unit in the Lazio region: results of a surveillance system integrating police and health data. <sup>58</sup>	Chini <i>et al.</i> (2009) Italy	Cross sectional (record linking and analysis)	Road traffic injuries	Hospital emergency visit, hospitalization and mortality databases	Surveillance system for road traffic injuries by integrating municipal police reports and healthcare records is feasible.
3	Record linkage for road traffic injuries in Ireland using police hospital and injury claims data <sup>59</sup>	Short and Caulfield (2016) Ireland	Cross sectional (record linking and analysis)	Road traffic injuries	Hospitals and injury claims	Anonymized datasets from three separate sources of injury data: hospitals, police and injury claims were linked using probabilistic and deterministic linkage techniques.
4	The Western Australian Road Injury Database (1987–1996): ten years of linked police, hospital and death records of road crashes and injuries <sup>60</sup>	Rosman (2001) Australia	Retrospective Cohort study (record linking and analysis)	Road traffic injuries	hospital and death records	Road Injury Database created through the linkage of crash details from reports to police with the details of injuries to casualties contained in hospital and death records which provided accurate outcome information for casualties in crashes reported to the police. It also enabled estimation of under reporting of crashes for different road user groups
5	A road traffic injury surveillance system using combined data sources in Peru <sup>61</sup>	Medina <i>et al.</i> (2011) Peru	Cross sectional (data extraction, analysis and dissemination)	Road traffic injuries	Health facility records and vehicle insurance reports	A national, hospital-based non-fatal road traffic injury surveillance system was designed. A data collection form was used to record information. Data were analysed periodically and findings were disseminated
6	Potential of using existing injury information for injury surveillance at the local level in developing countries: experiences from Bangladesh <sup>21</sup>	Rahman <i>et al.</i> (2000) Bangladesh	Cross sectional (interviews and validity assessment by comparison of different data sources)	All injuries	Hospital records, newspaper reports, post mortem reports	Identified and assessed existing data sources for their usefulness in forming a sustainable injury surveillance system. Also interviewed local health practitioners to elicit their opinion on participation in injury surveillance system. Found under reporting in police data but also observed that fatality data may be complete in communities with well-funded police departments and can be used for injury surveillance provided police personnel are motivated for comprehensive injury data recording
7	Technological solutions for an effective health surveillance system for road traffic crashes in Burkina Faso <sup>62</sup>	Bonnet <i>et al.</i> (2017) Burkina Faso	Cross sectional (Descriptive reporting and analysis)	Road traffic injuries	Hospital records	A surveillance system was deployed which sent data in real-time to a central platform via SMS. The system extracted the relevant information from the SMS and integrated with the map. Additional information was extracted from reports prepared by police officers.

46.3% and 58% of the fatal and 17% of the non-fatal injuries could be ascertained from the police record.<sup>55,56</sup> (Table 4).

### Studies on use of police records for injury surveillance system:

The studies in this group can be divided into three categories: (i) studies on injury surveillance systems based on police records; (ii) studies on injury surveillance systems based on integrated data, including police records; and (iii) studies reporting results of linking of data from various sources. There were two studies in the first category.<sup>57,62</sup> One study was from Burkina Faso, an LIC.<sup>62</sup> It reported on the development and results of an injury surveillance system for road traffic injuries based on information extracted from police records.<sup>62</sup> The system used mobile technologies for the reporting of information from crash sites via SMS.<sup>62</sup> Additional information was extracted from reports prepared by police officers.<sup>62</sup> Integration of information with a map helped in identifying hot-spots for traffic crashes.<sup>62</sup> The second study in this category was from the USA which reported on the development of a surveillance system for road traffic injuries in children by using a motor vehicle crash surveillance system as a base and collected supplementary child-specific information by telephonic, web-based and hard copy self-administered surveys.<sup>57</sup>

Studies in the next category (injury surveillance systems based on integrated data of police and other sources) combined data of police and health facilities,<sup>21</sup> combined data of police, hospital records and insurance reports.<sup>61</sup> One study in this category from Bangladesh identified and assessed existing data sources, including police records for their usefulness in forming a sustainable injury surveillance system.<sup>21</sup> The study found underreporting in police data but also found that fatality data may be complete in communities with well-funded police departments and can be used for injury surveillance provided police personnel are motivated for comprehensive injury data recording.<sup>21</sup>

The third category in this group comprised studies which linked police records and other data sources to estimate under reporting and obtain a more comprehensive picture of the injury burden.<sup>59,60</sup> The first study in this category was from Ireland which linked injury data from three separate sources: hospitals, police and injury claims to obtain better estimates on the nature and extent of non-fatal injuries.<sup>59</sup> The study found that non-fatal injuries were underestimated by the police and it also identified a number of additional injury cases when the three datasets were combined.<sup>59</sup> The second study in this category linked 10 years of road traffic injuries data from police, hospital records and death records. It found that the combined data provided more accurate outcome information on casualties and enabled estimation of under-reporting of crashes for different road user groups.<sup>60</sup>

## DISCUSSION

### Summary of evidence

The completeness of ascertainment of unintentional injuries reported to the police has received the attention of researchers in many countries. The capture-recapture method has been most commonly deployed in these studies in LMICs. The percentage reporting of fatal injuries to the police tends to be higher than for non-fatal injuries.

In HICs, police records were compared with hospital records or injury surveillance systems or trauma registries, except in one case in Japan, which compared police records with Fire Department records and Marine and Fire Insurance records.<sup>35</sup> In other countries, besides the hospital records, comparisons were made between police records and death registrations, mortuaries, health insurance records, civil registration records, newspaper reports and population surveys. This suggests a better availability of hospital records, trauma registries and injury surveillance systems in HICs when compared to other countries. It also points towards a higher awareness among the victims regarding reporting of injury incidences to the police in these countries. If police reports are to be used as a primary data source for injury surveillance in UMICs, LMICs and LICs, this suggests a need to raise awareness among people in these countries regarding the reporting of injuries to the police and for the simplification of procedures for such reporting, training of police personnel and better capture and maintenance of injury records by the police.

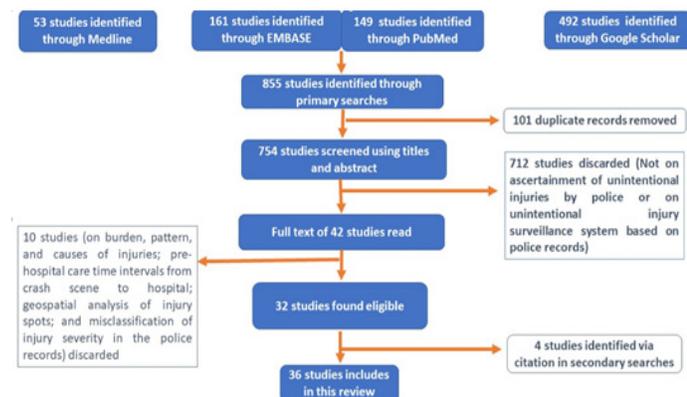
The evidence presented in this review suggests that police records are not a popular data source for setting up injury surveillance systems: their use in injury surveillance systems was reported in a few countries only. Only in one study were police data used as a basis for setting up an injury surveillance system. Besides this study, one study used traffic crash data as a base and collected additional information for injuries to children in road accidents. In other studies, police records were either used for setting up an injury surveillance system in combination with other data sources or were linked with other data sources to get a better picture of the burden of road traffic injuries.

### Limitations

Due to resource constraints, the review excluded the studies published in languages other than English as well as the studies published before 1<sup>st</sup> January, 2000. Studies not having an abstract or full text available were also not included. In addition, the number of databases searched was limited and searches were confined to studies indexed in four: Medline, EMBASE, PubMed and Google Scholar. Therefore, it is possible that some eligible studies may have been missed. However, as the majority of the world injury control literature arises in the United States, Australia and Europe and is therefore published in English and likely to be indexed

**Table 4: Incompleteness of ascertainment of injuries by police records.**

Setting	Levels of completeness of ascertainment of injuries by police records		
	Non-fatal	Fatal	Total
LICs	17%	46.3% and 58%.	
LMICs	6.7% to 24.7%.	4.2% to 77.8%	6.7 % and 24.7%
UMICs	4.7% to 51.5%.	46.4%, 50%, 56.2%.	55.8%.
HICs	from 16% to 82%.	96.6% and 35%	71%, 44.9% and 29.3%.



**Figure 1:** PRISMA flow diagram of study selection process.

in one of these popular databases, we do not consider this possibility to be high.

### Meaning of the study: possible mechanisms and implications for policymakers

This review informs policy makers that despite legal requirements for reporting of accidents and injuries to the police in most of the countries, reporting tends to be low. This calls for better enforcement of legal provisions, heightened awareness among people, simplification of reporting procedures and training of police personnel to record injury data. The review also points towards a lack of use of police records, a potential source of data, for injury surveillance, especially in the LMICs and LICs. Police records in combination with other data sources can provide a more complete understanding of injury occurrence.

### CONCLUSION

Police records are a potentially useful source of information on unintentional injuries and may ascertain a good proportion of fatal injuries. However, there is a need for improvement in the reporting of non-fatal injuries for which raising awareness among people and training and educating police personnel may be needed. The use of police records as the basis of unintentional injury surveillance systems is presently at a nascent stage.

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### CONFLICT OF INTEREST

None.

### ABBREVIATIONS

**DARE:** Database of Abstracts of Reviews of Effectiveness; **EPHPP:** Effective Public Health Practice Project; **EMBASE:** Excerpta Medica database; **HICs:** High-Income-Countries; **LICs:** Low-Income-Countries; **LMICs:** Lower-Middle-Income-Countries; **MEDLINE:** Medical Literature Analysis and Retrieval System Online; **MeSH:** Medical Subject Headings; **NISTRBCB:** National Injury Surveillance Trauma Registry and Capacity Building Centre; **PRISMA:** Preferred Reporting Items for Systematic reviews and Meta-analyses; **UMICs:** Upper-Middle-Income-Countries; **USA:** United States of America; **WHO:** World Health Organization.

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