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The quality of police data on RTC fatalities in India

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ABSTRACT

Background Police records are the major source of data on road traffic collision (RTC) deaths in India.

Objective To examine the utility and quality of police data on RTC deaths available from two sources.

Methods Police data on RTC deaths available from National Crime Records Bureau (NCRB) and Ministry of Road Transport and Highways (MoRTH) were accessed. The utility of these data for surveillance and consistency of data reported by the two organisations was examined. Data completeness was assessed for India, its six geographic regions and for the mode of travel using cause of death estimates from the Sample Registration System (SRS) and Global Burden of Disease (GBD) as a reference.

Results Data imperative for surveillance including deaths by age and sex for each state, the counterpart vehicle or object and use of safety equipment were not available. The total number of deaths reported by NCRB and MoRTH was similar across states but showed large differences by mode of travel categories. Compared with GBD, completeness of the number of fatalities reported by both sources in 2010 was approximately 50%. Completeness for the geographic regions ranged from 26.4% to 76.4%, using SRS data, in 2001–2003.

Conclusions This detailed examination of police data on RTC fatalities from two sources has raised several questions about the validity of these data and has highlighted a number of gaps that limit the usefulness of these data for surveillance and informing road safety policies. Unless these are addressed, significant reductions in RTC fatalities cannot be achieved in India.

INTRODUCTION

With over 90% of the world's fatalities on roads occurring in the low-income and middle-income countries,[1 2] timely, accurate and reliable data on road traffic collision (RTC) and the resulting mortality and morbidity are needed to formulate, monitor and evaluate prevention and control strategies and policies.[1 3] The need for such data has increasingly been highlighted over the last few years,[1 4] and guidelines are now available on a variety of aspects for improving data quality and usefulness for policymakers and researchers.[3 5–7]

India is among the 10 countries that account for 62% of the world's RTC fatalities,[1] and RTC were among the top 10 causes of death in India in 2010.[8 9] In India, police data are the only major data source for road safety programmes and policymaking. Therefore, accuracy and reliability of the police data is paramount not only to understand the burden of RTC but also to generate political will and resources to address this burden in India. Road safety in India is the mandate of the Ministry of Road Transport and Highways (MoRTH).[10 11] The main source of routine data used by MoRTH on RTC are those reported by the police since the vital registration system is incomplete.[12–17] The police data on RTC are known to suffer limitations such as under-reporting in many countries,[3 12 18–21] and some of these limitations have also been reported with the police data on RTC in India.[12 18 22] Police data on RTC are reported by two organisations in the public domain: MoRTH and the National Crime Records Bureau (NCRB).[13 23]

In the background of previous work highlighting broad issues of inadequacy and non-reliability of police data in India,[12 18] and that the quality and reliability of injury surveillance data can vary between systems in the same country, in this paper, we examine in more detail the utility and quality of police data on road traffic fatalities in India for surveillance available from two sources—NCRB and MoRTH—highlighting specific areas for improvement. With the current efforts to address road safety in India,[11] this research aims to inform further development of RTC surveillance by the police.

METHODS

In India, the police define an RTC death as a death occurring immediately or within 30 days as a result of an injury from a RTC.[24] We accessed the police data on RTC fatalities available in the public domain from two sources—NCRB and MoRTH.[11 13 23] The primary source of these police data is the First Information Report (FIR) completed by a police officer for a RTC.[18 25 26] The main features of each data source used in this study are summarised in table 1. NCRB provides summary reports of data reported by police from the districts (lower administrative levels) and states to the police authorities at the national level.[23] NCRB data were accessed for years 2001–2011. MoRTH has recently started generating reports on RTC, and these were accessed for all available years, 2008–2011.[27–30] The 2008 report also provided data on the total number of RTC deaths for the years 2006 and 2007. The MoRTH data are also based on police reports at the state level and are reported in more detail as compared with the NCRB reports using a data collection format developed under the United Nations Economic and Social Commission for Asia and the Pacific project on road safety.[11] The data available on RTC deaths through NCRB and MoRTH were evaluated in detail by examining the extent of available data and consistency of the data between the two organisation's reports. The completeness of reported data in NCRB reports was assessed.

The completeness of the data was assessed by comparing the numbers of deaths reported by NCRB and MoRTH to two other sources of causes of death: the Sample Registration System (SRS) and Global Burden of Disease Study 2010 (GBD). As

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Table 1 RTC death data sources for India and their characteristics

Characteristics	RTC death data sources			
	National Crime Records Bureau	Ministry of Road Transport and Highways	Sample Registration System	Global Burden of Disease study
Primary source	Police records	Police records	Verbal autopsy of deaths in nationally representative sample of Indian population	Modelling of causes of death based on best available data
Role in study	Data source to be validated	Data source to be validated	Gold standard	Reference
Years available	Annually since 1967	Annually since 2008	2001–2003	1990, 2005 and 2010
Years for which data accessed	2001–2011	2006–2011*	2001–2003	2005 and 2010
Lowest level of geographic representativeness of RTC data by				
(i) Total RTC deaths	State	State	State	All India
(ii) Mode of travel	State	State†	Not available	All India‡
(iii) Sex	State	Not available	All India	All India‡

*The 2008 report contains 2006 and 2007 data.
†Available only from 2008.
‡Available only for the year 2010.
RTC, road traffic collision.

the civil registration system in India is incomplete, the SRS is the main source of mortality data in India and is based on verbal autopsy.[17 31] The SRS monitors births and deaths in a nationally representative sample of 1.1 million households in India.[31] The most recent causes of death from SRS are available for deaths that occurred between 2001 and 2003, and RTC accounted for an estimated 2% of all deaths in India.[2 32 33]

The GBD 2010 study estimated country-level mortality from 235 causes of death for 187 countries including India.[34] For RTC fatalities, the data sources included in GBD were civil registration, verbal autopsy, police records, mortality surveillance, burial and mortuary records, surveys, censuses and hospital records. Data available were assessed for quality and accuracy, and modelling techniques were applied in order to generate numbers of deaths by cause for the years 1990 and 2010.[34] These estimates were then used to interpolate the numbers of deaths for the year 2005. We accessed the GBD cause of death estimates for India for 2005 and 2010.[8]

Assessment of police data on RTC fatalities

Data availability

Data available in the NCRB and MoRTH reports on numbers of fatal RTC and the resulting number of deaths were examined. Since India is a large and diverse country, the data availability at national or state level was noted. In addition, we examined the availability of definitions for the reported data, timeliness and regularity of data publication, and whether more detailed data beyond those reported were available in public domain.

Consistency of the data reporting

Both the NCRB and MoRTH reports have the same primary source, the data collected by police. We compared the number of RTC deaths reported for each year from 2006 to 2011 in the MoRTH and NCRB reports for the states and the six geographic regions of India. We also compared the reported number of deaths in MoRTH and NCRB by mode of travel category for years 2009 (the earliest year MoRTH provided these data) and 2011. The per cent differences in the data from the two sources were calculated.

Completeness of data

The completeness of data for the number of the RTC deaths reported by NCRB and MoRTH was examined by using the SRS and GBD data as references. Data on the proportion of deaths due to unintentional injury and RTC by major geographic regions from the SRS were available for 2001–2003,[31 32] as were all-cause death rates.[32 35 36] Using the all-cause death rates and the proportion of RTC deaths of all deaths, we estimated the total number of RTC deaths in India between 2001 and 2003 using mid-year population totals. Population totals were obtained by applying the average exponential growth rate for 2001–2011 as estimated by the Census of 2011 to the population totals from the Census of 2001.[37] NCRB data for 2001–2003 on the total number of RTC deaths, deaths by sex and by geographic region were compared with the estimates from the SRS.[32] NCRB and MoRTH data on RTC deaths were also compared with the more recent GBD estimates of total RTC deaths, by mode of travel, and by sex for the years 2005 and 2010.[8]

Completeness of NCRB and MoRTH fatality data was calculated by dividing the number of deaths reported in a particular year by the estimated number of deaths from the SRS or GBD for that year. The uncertainty intervals (UI) reported by GBD and the CIs reported by SRS were used in the same manner to generate UIs and CIs for the completeness estimates wherever possible. As the mode of travel categories reported from the NCRB, MoRTH and GBD data were different, completeness was estimated only for the directly comparable categories, which included pedestrian, bicycle, motorised vehicle with two wheels and motorised vehicle with three or more wheels.

RESULTS

Data availability

The data reported for RTC fatalities in the NCRB and MoRTH reports and whether these are reported at the state or national level are shown in table 2. Neither organisation reported the distribution of fatal crashes by age and sex at the state level. NCRB reported the age and sex distribution at the national level in 15-year age groups. MoRTH reported data by a wider variety of variables for road traffic fatalities than did NCRB. The cause of RTC deaths was reported only in the MoRTH reports. An overwhelmingly high proportion of RTC deaths

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Table 2 Level of road traffic collision death data reported by the National Crime Records Bureau and the Ministry of Road Transport and Highways in India

	National Crime Records Bureau reports		Ministry of Road Transport and Highways reports	
Data	Reported (Y/N)	Lowest level*	Reported (Y/N)	Lowest level*
No. of fatal crashes				
Total	N	–	Y	State/UT
No. of deaths				
Total	Y	State/UT	Y	State/UT
By sex	Y	State/UT	N	–
By sex and age group	Y†	National	N	–
By mode of travel	Y	State/UT	Y‡	State/UT
By type of vehicle and object primarily responsible	N	–	Y	State/UT
By type of highway	N	–	Y	State/UT
By rural/urban locality	N	–	Y	State/UT
By cause of crash	N	–	Y§	State/UT
Due to intake of alcohol/drugs¶	N	–	Y	State/UT
Due to exceeded lawful speed limit¶	N	–	Y	State/UT
Due to overloading/overcrowding	N	–	Y	State/UT
Due to load protruding	N	–	Y	State/UT

The primary data source for both reports is police records.
*Lowest level refers to lowest administrative level at which data were reported. UT denotes union territory.
†Age groups used were 0–14, 15–29, 30–44, 45–59 and 60+ years.
‡Only since 2009.
§Reported causes include fault of driver, fault of cyclist, fault of pedestrian, defect in motor vehicle, defect in road condition, weather condition and all other causes.
¶These are reported only for those crashes documented as 'fault of driver' under cause of crash.

(71.7–81.7%) were attributed to the fault of the driver in 2008–2011. Among the RTC deaths reported as caused by driver's fault, between 56% and 65.8% were reported to be due to exceeding the speed limit, and between 8.5% and 10.3% due to intake of alcohol or drugs in 2008–2011, respectively. 'Other reasons' was the next reported cause of death over these 4 years.

NCRB data were published with about a 2- to 3-year delay from 2001 to 2006. However, since 2006, the previous year's data were published annually. MoRTH publications were available for the years 2008–2011. No publication date was reported for the 2008 data, the 2009 and 2010 data were published in 2011 and 2011 data were published in 2012. This indicates that the timeliness and regularity of the NCRB and MoRTH publications have improved in recent years. More detailed data beyond that in the publications were not accessible in the public domain from either organisation and nor were detailed definitions of the data reported.

Consistency of data reporting

Table 3 shows the per cent difference in the number of RTC deaths reported by MoRTH and NCRB for the years 2010 and 2011 for the states. Data for each state for the years 2006 to 2009 are shown in online supplementary appendix 1. While the difference in the number of deaths reported was small for most states, a few states had substantial differences. For example, in Punjab in 2010, there was a 39.8% difference in the number of reported deaths, and in Uttar Pradesh in 2011 there was a 30.3% difference. The southern states showed the least difference in the reported numbers of deaths between the two organisations. Only two states, Tamil Nadu and Rajasthan, had the same number of deaths in both reports for each year between 2006 and 2011. One state, Gujarat, showed progressively less variation in the number of deaths reported by the two organisations over the years to 0% in 2011.

Table 4 shows the differences in the number of RTC deaths by mode of travel categories reported by MoRTH and NCRB for the years 2009 and 2011. There was very little consistency in the number of deaths reported by the mode of travel in the two reports. In fact, though the difference in the overall number of reported deaths by NCRB and MoRTH was minimal for India (table 3), there were substantial differences in numbers of deaths reported by mode of travel (table 4). Also interesting to note is that even the two states (Tamil Nadu and Rajasthan) that showed no difference in the total number of reported deaths by NCRB and MoRTH (table 3) still showed substantial differences in the number of reported deaths by mode of travel (table 4). The only exception was Kerala, which in 2011 showed no difference in the number of deaths reported by NCRB and MoRTH for all but two modes of travel categories.

Data completeness

The RTC mortality rates in India estimated from NCRB, MoRTH, SRS and GBD for years 2001–2010 are shown in figure 1. The rates estimated from NCRB and MoRTH data were significantly lower than those from the other two sources. NCRB reported an average of 82 188 RTC deaths per year between 2001 and 2003; 98 254 deaths in 2005 and 133 938 deaths in 2010. The estimated completeness of NCRB data compared with GBD estimates was 44.7% in 2005 and 50.1% (95% UI 31.1 to 77.6) in 2010, and compared with SRS was 48.2% (99% CI 45.7 to 50.7) in 2001–2003. MoRTH reported 134 513 RTC deaths in 2010, with an estimated completeness of 49.1% (95% UI 30.5 to 76.1) compared with GBD. Figure 2 shows the completeness of 2001–2003 NCRB data for the six geographic regions using the SRS estimates as the reference. The completeness of the south and west regions was highest at 76.4% and 75.5%, respectively, with the other regions much lower, ranging from 26.4% to 40.3%. The northeast region had the lowest completeness.

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Table 3 Per cent difference in reported number of RTC deaths between MoRTH and NCRB for states by six geographic regions, 2006 to 2011

	Reported number of RTC deaths					
	2010			2011		
Region/state	NCRB	MoRTH	% difference	NCRB	MoRTH	% difference
Northeast	2939	3145	6.6	3321	3298	−0.8
Arunachal Pradesh	139	148	6.1	126	126	0.0
Assam	2030	2256	10.0	2342	2342	0.0
Manipur	153	154	0.6	156	158	1.3
Meghalaya	184	163	−12.9	229	219	−4.4
Mizoram	82	82	0.0	81	81	0.0
Nagaland	44	40	−10.0	36	25	−44.0
Sikkim	71	71	0.0	106	106	0.0
Tripura	236	231	−2.2	245	245	0.0
North	10 184	11 339	10.2	12 723	12 818	0.7
Haryana	5006	4719	−6.1	4681	4762	1.7
Himachal Pradesh	1099	1102	0.3	1083	1072	−1.0
Jammu & Kashmir	1029	1045	1.5	1140	1116	−2.2
Punjab	2133	3542	39.8	4897	4931	0.7
Uttarakhand	917	931	1.5	922	937	1.6
West	21 789	20 173	−8.0	22 024	21 398	−2.9
Gujarat	7384	7506	1.6	8006	8008	0.0
Goa	342	327	−4.6	338	333	−1.5
Maharashtra	14 063	12 340	−14.0	13 680	13 057	−4.8
Central	35 689	35 379	−0.9	35 938	41 596	13.6
Chhattisgarh	2888	2956	2.3	3454	2983	−15.8
Madhya Pradesh	8539	8085	−5.6	8256	7869	−4.9
Rajasthan	9163	9163	0.0	9232	9232	0.0
Uttar Pradesh	15 099	15 175	0.5	14 996	21 512	30.3
East	16 408	17 194	4.6	16 568	17 128	3.3
Bihar	4693	5137	8.6	5072	5090	0.4
Jharkhand	2140	2540	15.7	2053	2572	20.2
Orissa	4105	3837	−0.07	3797	3802	0.1
West Bengal	5470	5680	3.7	5646	5664	0.3
South	44 270	44 633	0.8	43 683	43 703	0.1
Andhra Pradesh	15 337	15 684	2.2	15 158	15 165	0.0
Karnataka	9574	9590	0.2	8958	8971	0.1
Kerala	3950	3950	0.0	4145	4145	0.0
Tamil Nadu	15 409	15 409	0.0	15 422	15 422	0.0
All states	131 279	131 863	0.4	134 257	139 945	4.1

A positive value indicates the MoRTH reported a higher number of deaths than NCRB, and a negative value indicates NCRB reported a higher number of deaths.
MoRTH, Ministry of Road Transport and Highways; NCRB, National Crime Records Bureau; RTC, road traffic collision.

Figure 3 shows the completeness of deaths by mode of transport categories as compared with GBD estimate for the year 2010. NCRB reported 12 142 pedestrian, 3224 bicycle, 28 234 motorised vehicle with two wheels and 70 459 motorised vehicle with three or more wheels deaths, whereas MoRTH reported 11 754, 6203, 35 303 and 58 256 deaths, respectively, in the same categories. Pedestrian deaths were the most under-reported by both NCRB and MoRTH, followed by bicycle and two-wheeler deaths. Though MoRTH reported almost double the amount of bicycle deaths as NCRB, completeness was still low. Deaths in the motorised vehicle with three or more wheels category were over-reported by NCRB and MoRTH.

The completeness of NCRB data by sex was 48.5% (99% CI 45.9 to 51.6) and 45.6% (99% CI 40.6 to 52.0) in 2001–2003 for males and females, respectively. In 2010, compared with GBD, the completeness was 52.9% (95% UI 29.5 to 86.7) for males and 34.2% (95% UI 19.6 to 58.9) for females.

DISCUSSION

Effective road safety requires valid data on a variety of aspects of road safety. To our knowledge, this is the first detailed examination of police data on RTC fatalities in India from two sources. It has raised several questions about the validity of these data and has highlighted a number of important gaps that limit the usefulness of these data for surveillance and informing policies to address road safety.

The RTC death data available from NCRB and MoRTH were of varying levels of detail, with the latter providing more detailed output for crashes. In order to understand any problem fully, it is important for the data to be reported by the age and sex distribution. The national-level age and sex disaggregated data presented by NCRB used wide 15-year age groups and were not available at the state level, thereby limiting its utility.[22] While the MoRTH reports provided some data on the vehicle or object primarily responsible, cause of crash and whether alcohol, drugs or speed were a factor, the utility of these data

Table 4 Per cent difference in MoRTH and NCRB reported number of RTC deaths by mode of travel for 18 large Indian states and all India, 2009 and 2011

	Reported number of RTC deaths by mode of travel															
	Pedestrian		Bicycle		Motorised two-wheeler*		Motorised three-wheeler†		Car, taxi, jeep		Truck		Bus		Others‡	
Region/state	2009	2011	2009	2011	2009	2011	2009	2011	2009	2011	2009	2011	2009	2011	2009	2011
Northeast (% difference, [n§])	−53.7 (134)	−34.1 (85)	21.7 (69)	−3.9 (51)	1.6 (372)	1.3 (551)	7.2 (125)	16.5 (121)	13.9 (667)	−19.0 (762)	−5.1 (626)	−13.4 (724)	−33.2 (470)	12.1 (471)	34.1 (387)	31.7 (537)
Assam	−116.7	12.3	7.0	−5.3	−0.7	8.5	−29.2	−12.9	26.1	−28.4	3.4	−12.8	−44.8	4.1	37.0	36.0
North (% difference, [n§])	15.4 (1121)	−97.8 (536)	58.9 (565)	60.1 (671)	25.7 (2428)	24.9 (3419)	−11.7 (309)	21.6 (371)	−0.5 (2115)	−6.1 (2634)	−50.5 (1169)	−37.5 (1513)	−4.5 (1189)	12.6 (1198)	21.2 (2467)	−5.5 (2476)
Haryana	−15.2	−303.5	64.6	75.0	4.1	17.9	−49.1	12.2	−35.4	−50.1	−59.8	−16.8	−26.4	−2.1	24.1	39.0
Punjab	55.9	28.6	61.0	42.8	45.9	31.6	49.4	42.1	−13.5	0.9	−30.6	−113.2	19.9	−30.1	57.0	−38.8
Uttarakhand	0.0	−2200	−54.5	0.0	31.4	20.1	−38.5	0.0	39.5	51.4	−72.4	−4.0	10.6	63.4	−73.9	−273.3
West (% difference, [n§])	18.3 (2978)	−38.0 (1659)	25.4 (590)	37.2 (616)	−3.7 (5068)	15.3 (6729)	−2.9 (1243)	14.2 (1703)	−26.3 (3130)	−13.0 (3585)	−43.3 (2633)	−52.7 (2608)	−14.4 (748)	10.9 (1449)	1.3 (2310)	6.1 (3049)
Gujarat	25.6	30.3	26.9	−2.2	11.0	16.6	9.3	−5.6	−18.3	−3.4	−11.4	−19.0	1.5	−18.9	−3.7	−10.2
Maharashtra	15.4	−132.8	25.7	55.3	−9.9	15.1	−14.3	27.9	−33.5	−21.3	−71.4	−93.4	−39.3	27.0	5.4	14.1
Central (% difference, [n§])	12.5 (3817)	28.3 (4906)	27.5 (1841)	56.5 (2854)	7.4 (7569)	26.4 (10 405)	1.9 (1136)	9.3 (1475)	−1.6 (6485)	7.5 (7302)	−31.4 (5035)	−29.7 (5503)	−13.7 (2646)	8.5 (3198)	−12.7 (5384)	10.0 (5953)
Chhattisgarh	−37.2	−116.2	−107.8	−80.6	−20.0	−129.1	−92.3	−34.9	−21.8	−3.5	−31.1	−94.7	31.7	48.3	12.6	45.0
Madhya Pradesh	13.5	44.6	−10.9	40.8	4.5	13.6	−6.3	5.5	−5.6	−34.4	−62.4	−80.3	−42.7	−3.4	−8.9	−53.1
Rajasthan	34.6	−3.5	42.1	16.9	15.1	1.7	−17.4	−53.3	−5.5	−3.3	−18.0	5.3	10.9	8.0	−23.5	−2.3
Uttar Pradesh	1.6	35.9	39.7	65.3	9.6	50.9	13.2	21.6	4.3	26.7	−29.2	−24.6	−29.5	4.5	−19.2	23.4
East (% difference, [n§])	−44.2 (849)	21.9 (1246)	37.7 (480)	14.8 (461)	4.1 (2318)	11.7 (2801)	37.8 (617)	38.0 (912)	19.7 (2540)	24.0 (3025)	−65.4 (2424)	−41.6 (2971)	−8.3 (1731)	−4.6 (2162)	26.2 (3988)	4.4 (3550)
Bihar	−243.2	−111.1	−5.3	−19.3	31.6	27.4	−4.2	22.1	43.3	41.2	2.7	−20.3	38.4	−33.2	−268.8	−40.6
Jharkhand	−42.9	−2.2	69.3	−33.7	−25.8	−1.5	38.6	0.8	10.4	−4.9	−80.1	−17.6	24.3	44.0	57.4	61.7
Orissa	21.0	76.4	52.4	64.6	−5.9	21.5	36.1	31.0	20.8	19.9	−12.3	−38.9	−1.3	−18.3	−22.3	−46.8
West Bengal	−36.5	15.3	30.3	33.3	10.0	−7.9	62.9	67.5	−58.7	6.0	−1417	−76.3	−156.8	−1.1	68.1	14.7
South (% difference, [n§])	65.3 (6897)	−13.8 (3310)	57.7 (1727)	65.6 (2006)	2.3 (8865)	17.4 (13 162)	−15.8 (2856)	7.7 (3209)	−24.2 (4856)	3.9 (6020)	−112.2 (3845)	−49.2 (5480)	17.8 (6176)	−25.9 (3516)	−10.4 (5838)	0.1 (7000)
Andhra Pradesh	67.3	57.2	49.1	62.6	−73.6	10.8	−51.5	4.2	−19.1	−18.8	−93.4	−55.3	63.8	−26.9	0.5	14.7
Karnataka	64.1	−257.7	72.4	18.6	24.6	3.9	1.3	28.6	−0.8	29.9	−51.3	5.9	−30.3	5.1	−75.8	−12.1
Kerala	−38.5	0.0	−13.4	0.0	−36.4	0.0	25.7	0.0	41.3	18.8	44.4	0.0	65.2	0.0	10.7	−204.9
Tamil Nadu	94.2	−111.7	66.7	75.8	22.2	32.2	20.3	0.0	−67.6	1.0	−280.3	−93.3	−108.6	−43.3	9.8	−9.9
All states (% difference, [n§])	33.3 (15 796)	0.2 (11 742)	40.0 (5272)	54.5 (6659)	4.9 (26 620)	19.5 (37 067)	−4.1 (6286)	13.8 (7791)	−7.7 (19 793)	3.1 (23 328)	−58.7 (15 732)	−40.5 (18 799)	2.1 (12 960)	−3.1 (11 994)	2.2 (20 374)	4.3 (22 565)

A positive value indicates the MoRTH reported a higher number of deaths than NCRB, and a negative value indicates NCRB reported a higher number of deaths.
*Motorised two-wheeler includes luna, scooter, motorcycle.
†Motorised three-wheeler includes autorickshaw, tempo.
‡For MoRTH, this category includes animal-drawn vehicles, cycle rickshaws, hand carts, rickshaws, other persons and deaths not assigned a mode of travel category.
§Number of deaths reported by the MoRTH.
MoRTH, Ministry of Road Transport and Highways; NCRB, National Crime Records Bureau; RTC, road traffic collision.

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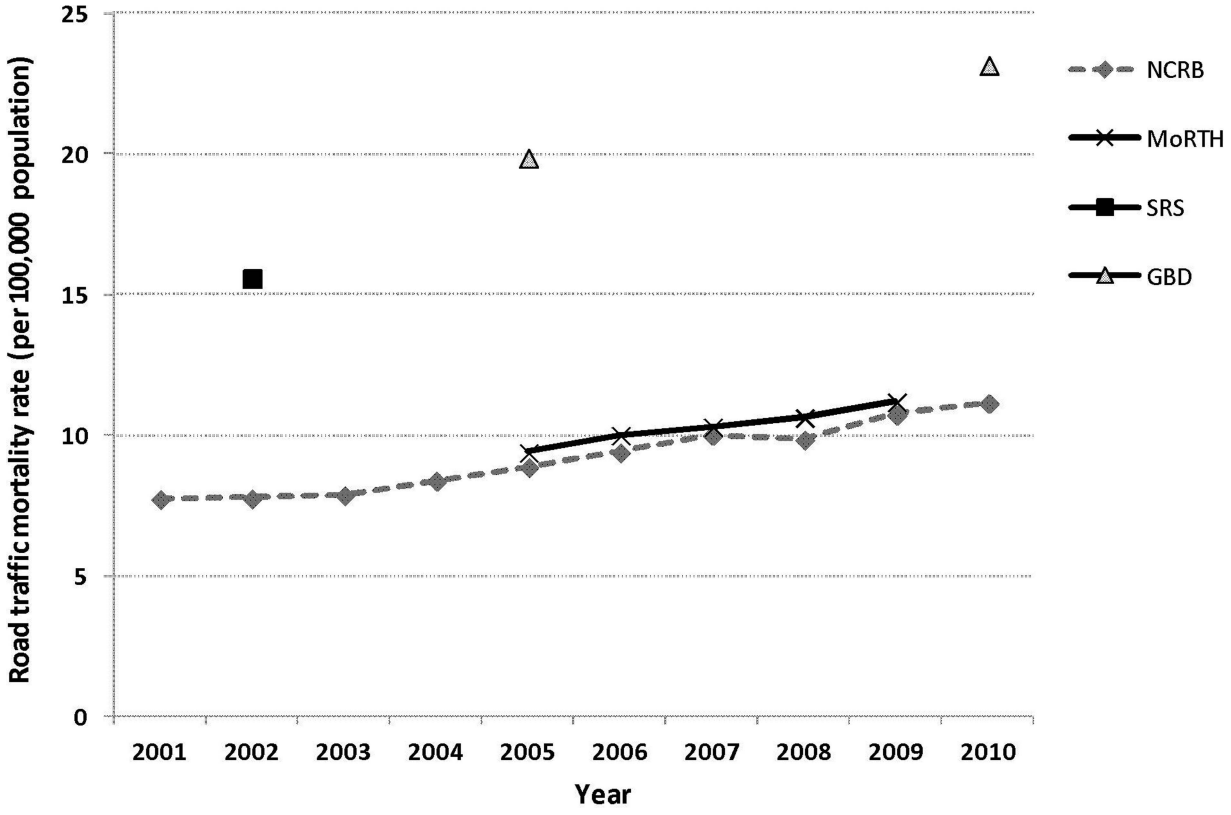


Figure 1 RTC mortality rate estimates from different sources, India, 2001–2010. NCRB, National Crime Records Bureau; MoRTH, Ministry of Road Transport and Highways; these data are from police records; SRS, Sample Registration System; GBD, Global Burden of Disease study.

may be limited as there were no details on how these are determined. Concerns regarding the limited capacity and capability of proper assessment of crashes within the Indian context have been reported previously.[12 22] The major cause of RTC was reported as 'the fault of the driver', and it has been previously shown that the reason for reporting fault of driver by police in India is to avoid administrative burden since such crashes do not require court proceedings.[12 22] Neither organisation provided data on the use of safety equipment nor the counterpart vehicle involved in the crash.

There were some differences noted in the reported numbers of deaths between the NCRB and MoRTH reports. The disparities in the numbers of reported deaths were particularly large for a couple of states, which highlights the varying levels of non-reporting of data from the states. While these differences were only small for the overall number of deaths, they were substantial for the mode of travel categories, even at the national level, and also for states that did not have differences in the overall numbers between the two reports. Since the data from both organisations are based on data collected by police, one would have expected the reported numbers to be the same. As the mode of travel categories was reported slightly differently by NCRB and MoRTH with no clear description of these categories, we made assumptions to make these categories comparable for analysis, which could have led to some differences in the reported numbers. However, even the clearly comparable mode of travel categories—pedestrian, bicycle and motorised two-wheeler—had large discrepancies between the two sources, which further highlights the inadequate quality of the data reported. Another factor that we considered for these differences was whether the data reported were provisional and not final in some reports. However, detailed assessment revealed that the final and provisional numbers were the same when the final reports for the same year were made available. These inconsistencies point to poor data reporting systems and inconsistencies in the classification of mode of travel. Addressing this issue and standardising the reporting of mode of travel categories is important as RTC death data by mode of travel are crucial for surveillance and planning of control policies. Such inconsistencies in reporting have also been highlighted in a recent comparison of NCRB data with that from SRS.[33]

A major limitation of the NCRB and MoRTH data on RTC fatalities is completeness. There was under-reporting of road traffic fatalities overall, however, particularly of pedestrians and bicyclists. These vulnerable road users account for the highest proportion of road traffic deaths in India[18 32 33] and thus focused efforts are needed to improve reporting of these deaths. In 2010, the completeness for male deaths was almost 20% higher than for female deaths. A recent comparison of NCRB data with that of SRS suggested that females were more likely than males to be a pedestrian RTC fatality.[33] This difference could probably explain the under-reporting of females as we found the pedestrian fatalities to be under-reported in the police data. There were substantial differences in completeness between regions, with the west and south regions having the highest completeness. This demonstrates that better quality data are being generated in some areas of India and that the practices in these areas could be examined more closely for application in areas with poorer completeness.

The method by which the data on RTC are collected by police serves to explain many of the gaps identified in the study. As previously mentioned, the FIR filed by police is the primary source of information on an RTC in India.[18 25 26] The information for the FIR can be provided by any member of the public

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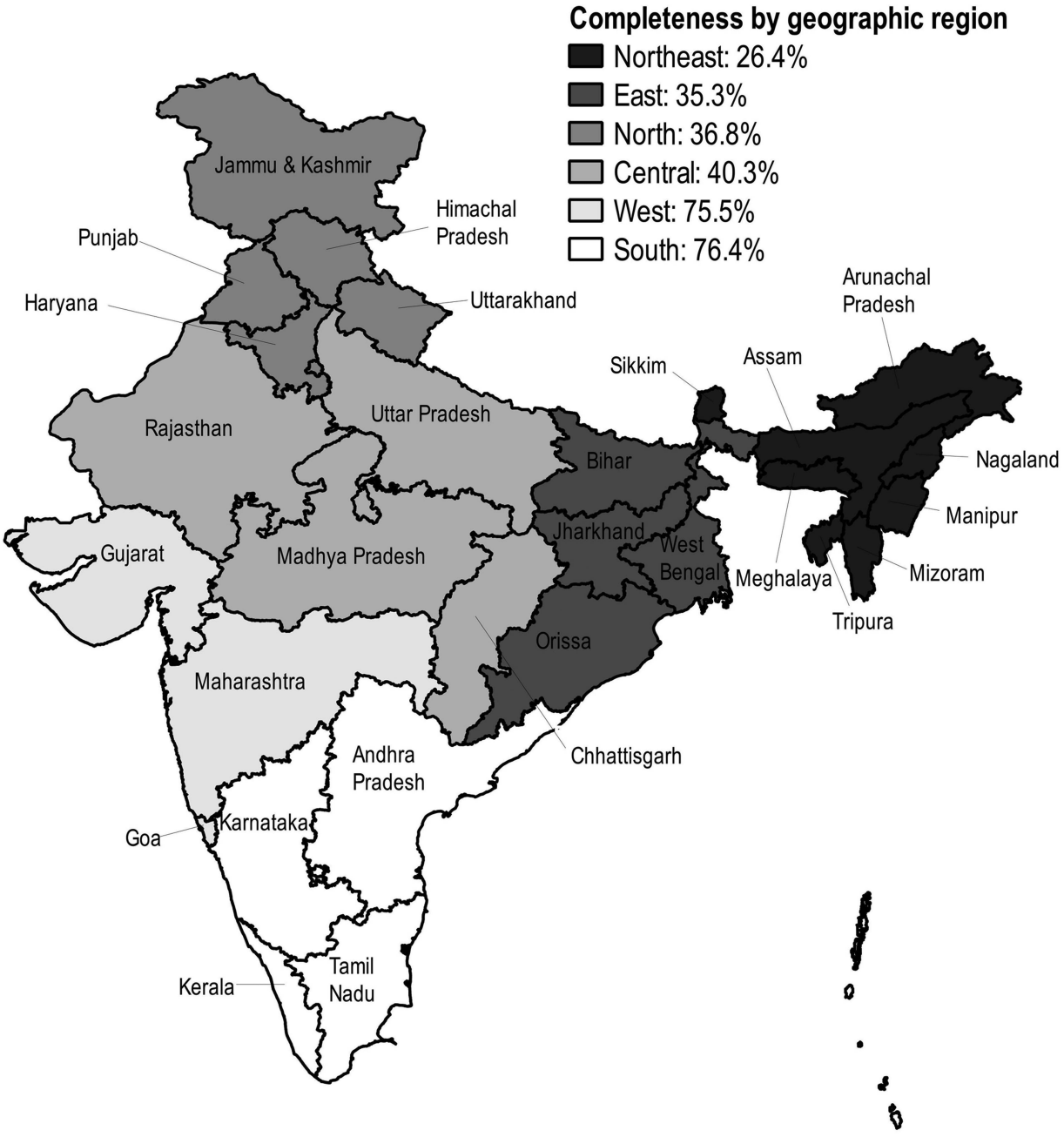


Figure 2 Estimated completeness of National Crimes Record Bureau data based on police records of RTC deaths for six geographic regions of India as compared with the Sample Registration System, 2001–2003. Region populations from Census of 2011 in millions were 46 in the northeast region; 270 in the east region; 83 in the north region; 366 in the central region; 174 in the west region; 251 in the south region.

regardless of whether they had witnessed the RTC or not, with it not being mandatory for the police to attend the crash scene to document details.

Globally, several well-established road traffic injury surveillance systems exist nationally and regionally that promote the use of standard reporting of crash and injury data.[4] The reporting of police data by MoRTH is done using one such standard format recommended by the United Nations Economic and Social Commission for Asia and the Pacific.[29] This reporting format covers the essential RTC surveillance data for informing policies and programmes and feeds into the Asia Pacific Road Accident Database. However, as highlighted by this analysis, efforts are needed to strengthen the quality of data reported. An effort to improve collection of RTC data in India has been undertaken in the state of Tamil Nadu, where a Road Accident Data Management System (RADMS) is being implemented since 2008.[38] RADMS involves the police using a precoded data collection form at the crash scene and entering these indicators into a database.[38] It is envisaged that this system will assist with streamlined reporting and quicker availability of data for a variety of actions to improve road safety.[3 30 38]

While these initiatives can be an important improvement in reporting and availability of data, it is paramount to address the issue of poor quality of data, which in turn limits the utility of these data for evidence-based action. This analysis has highlighted the gross under-reporting of fatal crashes besides the higher under-reporting of non-fatal crashes that is already documented.[12 18] In addition to under-reporting, there are considerable quality issues such as the inconsistencies in the number of deaths reported, non-reporting of age and sex distribution and use of safety equipment,

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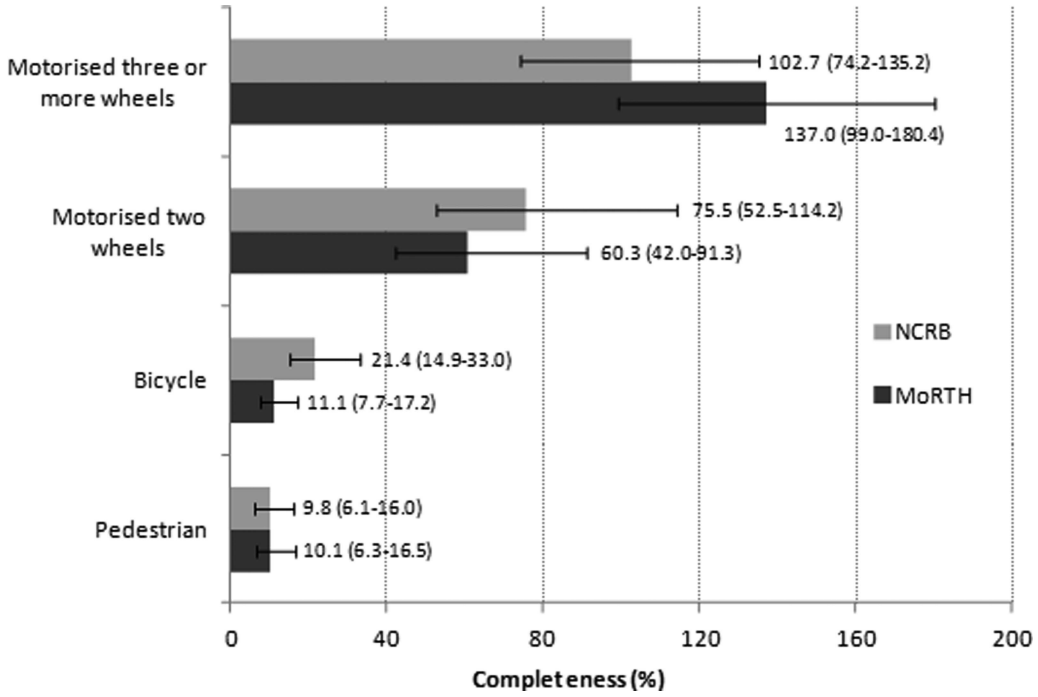


Figure 3 Estimated completeness of National Crimes Record Bureau (NCRB) and Ministry of Road Transport and Highways (MoRTH) data of RTC deaths for pedestrian, bicycle, motorised vehicle with two wheels and motorised vehicle with three or more wheels mode of transport categories as compared with the Global Burden of Disease study 2010. Motorised vehicles with two wheels include luna, scooter, motorcycle. Motorised vehicles with three or more wheels include autorickshaw, tempo, car, jeep, taxi, truck, bus.

and inadequate documentation of the cause of RTC. These need prompt examining to arrive at a reasonable understanding of the burden of RTC by policymakers in India. There is an urgent need to increase technical capacity of the various agencies involved in surveillance, reporting and use of these data.[18] Access to data is also an issue that needs to be addressed. The publication of summary data in reports is an important dissemination strategy; however, more detailed data are required to examine road safety issues more closely. Online databases, such as those used in some high-income countries, can provide this detail, as can the provision of de-identified unit-level data on request.[3] Access to the primary de-identified data in the public domain for use by researchers or agencies outside of the government can also assist in checking and ensuring data quality standards.

In conclusion, police records are the major source of data on RTC and resulting fatalities for surveillance and road safety in India. This analysis has highlighted the availability and quality issues in the police data available from two organisations. With the enormous burden of road traffic injuries in India, better information of various aspects of RTC is needed. The government should foster effective collaborations to develop technical capacity within the system to improve data quality and to manage and use these data for effective policies and action. Unless this is urgently addressed, significant reductions in the numbers of RTC-related fatalities and injuries cannot be achieved in India.

What is already known on the subject

- Police data are an important source of data on RTC fatalities in India as the civil registration system is incomplete.
- Police data are known to have data quality issues.
- Inadequate data on RTC fatalities is a reason for the lack of political will to address road safety in India.

What this study adds

- This study examined the comprehensiveness and quality of police data available from two sources in India—National Crime Records Bureau and Ministry of Road Transport and Highways.
- Police data available from the two sources varied by type and consistency; several issues about quality and inadequacy of data for surveillance of RTC deaths are highlighted.
- Completeness of the numbers of deaths reported was less than 50% for all India with significant variation between the six geographic regions, and gross under-reporting of deaths of vulnerable road users such as pedestrians.

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Contributors All authors contributed to the design, analysis and interpretation of this research, and the writing of the manuscript. MZR accessed the data and conducted the analyses. All authors approved the final version of the manuscript.

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Competing interests None.

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Data sharing statement All data used in this study are available in the public domain and web links have been provided.

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REFERENCES

1 World Health Organization. *Global Status Report on Road Safety: Time for Action*. Geneva: World Health Organization, 2009. http://whqlibdoc.who.int/publications/2009/9789241563840_eng.pdf (accessed 8 Apr 2014).
2 Office of the Registrar General and Census Commissioner. *Report on Causes of Death in India 2001–2003*. New Delhi: Ministry of Home Affairs, Government of India, 2009. http://www.cghr.org/wordpress/wp-content/uploads/Causes_of_death_2001–03.pdf (accessed 8 Apr 2014).
3 World Health Organization, FIA Foundation for the Automobile and Society, Global Road Safety Partnership, World Bank. *Data Systems: A Road Safety Manual for Decision-Makers and Practitioners*. Geneva: World Health Organization, 2010. whqlibdoc.who.int/publications/2010/9789241598965_eng.pdf
4 World Health Organization. *World Report on Road Traffic Injury Prevention*. Geneva: World Health Organization, 2004. whqlibdoc.who.int/publications/2004/9241562609.pdf
5 Mohan D, Tiwari G, Khayesi M, *et al*. *Road Traffic Injury Prevention Training Manual*. Geneva: World Health Organization & Indian Institute of Technology Delhi, 2006. http://whqlibdoc.who.int/publications/2006/9241546751_eng.pdf (accessed 8 Apr 2014).
6 World Health Organization. *Guidelines for Trauma Quality Improvement Programmes*. Geneva: World Health Organization, International Society for Surgery & International Association for Trauma Surgery and Intesive Care, 2009. http://whqlibdoc.who.int/publications/2009/9789241597746_eng.pdf (accessed 8 Apr 2014).
7 World Health Organization. *Preventing Injuries and Violence: A Guide for Ministries of Health*. Geneva: World Health Organization, 2007. http://www.who.int/violence_injury_prevention/publications/injury_policy_planning/prevention_moh/en/index.html (accessed 8 Apr 2014).
8 Global Burden of Disease Study 2010. *India Global Burden of Disease Study 2010 (GBD 2010) Results 1990–2010*. Seattle: Institute for Health Metrics and Evaluation, 2013. http://ghdx.healthmetricsandevaluation.org/record/india-global-burden-disease-study-2010-gbd-2010-results-1990–2010 (accessed 12 Dec 2013)..
9 Murray CJ, Ezzati M, Flaxman AD, *et al*. GBD 2010: a multi-investigator collaboration for global comparative descriptive epidemiology. *Lancet* 2012;380:2055–8.
10 Ministry of Road Transport and Highways—Government of India. *About us*. New Delhi: Ministry of Road Transport and Highways. http://morth.nic.in/index1.asp?lang=1&linkid=10&lid=144 (accessed 13 Oct 2012).
11 Ministry of Road Transport and Highways—Government of India. *Status Paper on Road Safety in India*. United Nations Economic and Social Commission for Asia and the Pacific; 2010. http://www.unescap.org/ttdw/common/Meetings/TIS/EGM-Roadsafety-2011/Status/Countries/India-2010-Status.pdf (accessed 8 Apr 2014).
12 Dandona R, Mishra A. Deaths due to road traffic crashes in Hyderabad city in India: need for strengthening surveillance. *Natl Med J India* 2004;17:74–9.
13 Ministry of Road Transport and Highways—Government of India. *Road Accidents in India*. New Delhi: Ministry of Road Transport and Highways. http://morth.nic.in/index2.asp?slid=311&sublinkid=141&lang=1 (accessed 8 Apr 2014).
14 Garg N, Hyder AA. Road traffic injuries in India: a review of the literature. *Scand J Public Health* 2006;34:100–9.
15 Garg N, Hyder AA. Exploring the relationship between development and road traffic injuries: a case study from India. *Eur J Public Health* 2006;16:487–91.
16 Grimm M, Treibich C. Determinants of road traffic crash fatalities across Indian states. *Health Econ* 2012;22:915–30.
17 Mahapatra P, Chalapati Rao PV. Cause of death reporting systems in India: a performance analysis. *Natl Med J India* 2001;14:154–62.
18 Dandona R, Kumar GA, Ameer MA, *et al*. Under-reporting of road traffic injuries to the police: results from two data sources in urban India. *Inj Prev* 2008;14:360–5.
19 Bhalla K, Harrison JE, Shahraz S, *et al*. Availability and quality of cause-of-death data for estimating the global burden of injuries. *Bull World Health Organ* 2010;88:831–8C.
20 Hu G, Baker T, Baker SP. Comparing road traffic mortality rates from police-reported data and death registration data in China. *Bull World Health Organ* 2011;89:41–5.
21 Yeh P, Bhalla K. Comparison of Road Injury Deaths Reported in the Global Status Report on Road Safety with Estimates from National Death Registration Data. Cambridge: Harvard University School of Public Health, 2010. https://sites.google.com/site/gbdinjuryexpertgroup/discussion-151/Road_deaths_GSRRS_vs_GIMD_FEB12.pdf?attredirects=0 (accessed 8 Apr 2014).
22 Dandona R. Making road safety a public health concern for policy-makers in India. *Natl Med J India* 2006;19:126–33.
23 National Crime Records Bureau—Government of India. *Accidental Deaths and Suicides in India—Annual Publication*. New Delhi: Ministry of Home Affairs—Government of India. http://ncrb.nic.in/accdeaths.htm (accessed 8 Apr 2014).
24 Central Bureau of Health Intelligence. *National Road Safety Profile of India, 2008*. New Delhi: Ministry of Health and Family Welfare—Government of India, 2008.
25 Shah B, Menon GR. *Workshop on Development of a Feasibility Module for Road Traffic Injury Surveillance*. New Delhi: Division of Non-Communicable Diseases, Indian Council of Medical Research, 2006. http://icmr.nic.in/final/Final%20Report%20of%20the%20workshop%20on%20Development%20of%20a%20feasibility%20module%20for%20Road%20Traffic%20Injury%20Surveillance.pdf (accessed 8 Apr 2014).
26 Commonwealth Human Rights Initiative. *What is First Information Report?* http://www.humanrightsinitiative.org/publications/police/fir.pdf (accessed 8 Apr 2014).
27 Ministry of Road Transport and Highways. *Road Accidents in India, 2008*. New Delhi: Ministry of Road Transport and Highways—Government of India.
28 Ministry of Road Transport and Highways. *Road Accidents in India, 2009*. New Delhi: Ministry of Road Transport and Highways—Government of India, 2011. http://morth.nic.in/showfile.asp?lid=419 (accessed 8 Apr 2014).
29 Ministry of Road Transport and Highways. *Road Accidents in India, 2010*. New Delhi: Ministry of Road Transport and Highways—Government of India, 2011. http://morth.nic.in/showfile.asp?lid=761 (accessed 8 Apr 2014).
30 Ministry of Road Transport and Highways. *Road Accidents in India, 2011*. New Delhi: Ministry of Road Transport and Highways—Government of India, 2012. http://morth.nic.in/showfile.asp?lid=835 (accessed 8 Apr 2014).
31 Registrar General and Census Commissioner. *Report on Causes of Death in India, 2001–2003*. New Delhi: Ministry of Home Affairs—Government of India, 2009. http://www.cghr.org/wordpress/wp-content/uploads/Causes_of_death_2001-03.pdf (accessed 8 Apr 2014).
32 Jagnoor J, Suraweera W, Keay L, *et al*. Unintentional injury mortality in India, 2005: Nationally representative mortality survey of 1.1 million homes. *BMC Public Health* 2012;12:487.
33 Hsiao M, Malhotra A, Thakur JS, *et al*. Road traffic injury mortality and its mechanisms in India: nationally representative mortality survey of 1.1 million homes. *BMJ Open* 2013;3:e002621.
34 Lozano R, Naghavi M, Foreman K, *et al*. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012;380:2095–128.
35 Registrar General and Census Commissioner. *Sample Registration System Bulletin, 2001*. New Delhi: Ministry of Home Affairs—Government of India, 2002. http://censusindia.gov.in/vital_statistics/SRS_Bulletins/SRS_Bulletins_links/SRS_Bulletin_Vol_36_Issue_2.pdf (accessed 8 Apr 2014).
36 Registrar General and Census Commissioner. *Sample Registration System Bulletin, 2003*. New Delhi: Ministry of Home Affairs—Government of India, 2005. http://censusindia.gov.in/vital_statistics/SRS_Bulletins/SRS_Bulletins_links/SRS_Bulletin_April_2005.pdf (accessed 8 Apr 2014).
37 Registrar General and Census Commissioner. *Provisional Population Totals of 2011*. New Delhi: Ministry of Home Affairs—Government of India, 2011. http://www.censusindia.gov.in/2011-prov-results/PPT_2.html (accessed 8 Apr 2014).
38 *Improving Road Safety: Tamil Nadu Road Sector Project*: Department of Economic Affairs, Ministry of Finance, Government of India; World Bank; 2011.

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The quality of police data on RTC fatalities in India

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