PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Road traffic injury mortality and its mechanisms in India: nationally representative mortality survey of 1.1 million homes
AUTHORS	Hsiao, Marvin; Malhotra, Ajai; Thakur, JS; Sheth, Jay; Nathens, Avery; Dhingra, Neeraj; Jha, Prabhat

VERSION 1 - REVIEW

REVIEWER	Shivam Gupta MBBS, MPH, PHD Assistant Scientist Johns Hopkins Bloomberg School of Public Health
REVIEW RETURNED	13-Feb-2013

THE STUDY	Abstract should probably specify which findings are nationally representative and which findings are not. I think only the estimates provided in table 1 are nationally representative - others are not. How long did the translation and systematic extraction takes in total/ average? The number of records can probably be mentioned in the methods section. What made the extraction systematic? The reported Kappa statistics is between the two investigators and the two RAs, or the 2 investigators as one group and two RAs as one group? Household fuel type is a crude measure of community wealth, and potentially unreliable. Short of absolute measures like consumption and expenditure, combination of assets are a widely used measure. Standard references are Filmer and Pritchett and the Demographic and Health Surveys that have conducted in numerous LMICs. Please explain why fuel type was used and why asset score combining different assets were not used.
RESULTS & CONCLUSIONS	The results for VRUs on page 9 are provided as national estimates. It is difficult to understand how these were calculated. Was mode of transport available for all 2299 RTI deaths? How were proportions calculated at national level? Cannot review the figures, because they are inaccessible/ unable to open. Will be happy to review if provided. In table 2, the data on outcome is missing for 25% of the cases. The rate of missingness is very high, and sensitivity analyses with different methods of imputation can help. Articles by Jain A, Menezes RG, Kanchan T, Gagan S, Jain R. Two wheeler accidents on Indian roads--a study from Mangalore, India. J Forensic Leg Med. Apr 2009;16(3):130-133. And Singh H, Dhattarwal, S. K. Pattern and Distribution of injuries in fatal road traffic accidents in Rhotak(haryana). JIAFM. 2004;26(1). Contribute

	to the discussion para 2, page 13. More evidence will help to support the case for primary and secondary prevention. The Indian government is currently investing lot of effort and resources towards pre-hospital and trauma care.

REVIEWER	Dr Carlos Martin Cantera / Elisa Puigdomenech Puig Associate Professor Department of Medicine. Universitat Autònoma de Barcelona. Primary Healthcare University Research Institute-IDIAP Jordi Gol
REVIEW RETURNED	22-Apr-2013

GENERAL COMMENTS	Comment: Introduction Please clarify the term Road Traffic injury death. The term injury refers only to lesions, so it should be clearly noted that the authors mean deaths related to road traffic. Comment: Introduction Since the authors offer results according to the main factors associated to RTI deaths (sex, age, rural/urban setting, vulnerability,...) a sentence stating which are the sections of the Indian society with more road traffic injuries victims (men aged xx-xx, less educated,...) Comment: Methods/Road traffic deaths When the authors say "The RTI deaths in this study..."Do they mean in the MDS? (page 5, line 53) Comment: Methods/Analysis In the Methods/Road traffic deaths section the authors state that RTI deaths of the study were from people who died between 2001-2003.Could the authors provide an explanation why they used the data from the 2005 UN death estimates instead of the 2003 or 2004? (page 6, lines 19-25). Could the authors provide a brief explanation of the rationale and construction of the variables education and occupation? Comment: Results In the third paragraph of the results section the authors state that the 2005 police reports recorded less RTI death, could they provide a

	reference (reference number 27)? (page 9, lines 14-19)
	Comment: Discussion: In page 11, line 53 the authors should state that the 183600 deaths are estimated. Furthermore, they indicate that this number accounts for 2% of all deaths which needs to be referenced. Comment: References: In reference 22 it is not specified the date of access. Comment: Other. Include a list of acronyms.

VERSION 1 – AUTHOR RESPONSE

Reviewer: Shivam Gupta MBBS, MPH, PHD
Assistant Scientist, Johns Hopkins Bloomberg School of Public Health
Baltimore MD 21218

Comment: Abstract should probably specify which findings are nationally representative and which findings are not. I think only the estimates provided in table 1 are nationally representative - others are not.

Response: All estimates were nationally representative except for the place of death, timing of death, and injuries reported, due to the high proportion of unknown data from the narrative extraction process. The proportions of the deceased modes of transportation (also extracted from narrative sections) were extrapolated to national estimates (Figure 2), as only 8% of deaths had unknown deceased's mode of transportation. We have already shown that the deaths with unknown deceased's mode of transportation did not differ from those with known mode of transportation with respect to age, gender, rural/urban, neighbourhood asset, education, and occupation (Supplementary Table 1).

The abstract has been revised to distinguish the nationally representative estimates from those that were not nationally representative (Page 2).

Comment: How long did the translation and systematic extraction takes in total/ average? The number of records can probably be mentioned in the methods section. What made the extraction systematic?

Response: The translation and systematic extraction took about 1 month in total. 2157 of the 2299 RTI deaths had a translated narrative that underwent the systematic extraction procedure. The

systematic extraction refers to the standardized data extraction tool used by the trained investigators and research assistants. Our research group is currently completing a separate manuscript describing the standardized data extraction tool and procedure.

The methods section has been revised to show the number of records and clarify the use of a standardized data extraction tool in the systematic narrative extraction (Page 6).

Comment: The reported Kappa statistics is between the two investigators and the two RAs, or the 2 investigators as one group and two RAs as one group?

Response: The kappa statistic reported (>0.69) was between the 2 investigators, who had the lowest agreement among the 6 possible comparisons between the 2 investigators and 2 RAs.

The methods section was revised to clarify this point (Page 6).

Comment: Household fuel type is a crude measure of community wealth, and potentially unreliable. Short of absolute measures like consumption and expenditure, combinations of assets are a widely used measure. Standard references are Filmer and Pritchett and the Demographic and Health Surveys that have conducted in numerous LMICs. Please explain why fuel type was used and why asset score combining different assets were not used.

Response: With the previous publications on the other causes of mortality (smoking, HIV, cancer), our research group had initially used principle components analysis to generate different composite measures of community wealth based on the variables collected in a household survey (Special Fertility and Mortality Survey, 1998) that was conducted in the same household sampling frame as the Million Death Study. These other variables included 1) number of living rooms, 2) whether separate kitchen was available, 3)whether latrine is within or outside the house, 4) whether the residents owned agricultural land or livestock, 5) type of material used to construct the house, 6) source of drinking water, 7)source of lighting, 8) cooking fuel type, and 9) average monthly expenditure on food, fuel, clothing etc... However, we found that the composite scores were no better than a single score based on the cooking fuel type at explaining the expected variations seen for disease and risk factor related phenomenon (e.g. greater proportion of bidi smoking in the poor vs.greater cigarette smoking in the more wealthy). We also found that the urban/rural variable, together with cooking fuel type, seemed to be equivalent to the composite scores in stratified analysis. Therefore, for the more recent analyses using the Million Death Study data, our research grouphas elected to use a simple single measure based on cooking fuel type as a surrogate marker for community wealth.

We have added a reference to the PCA used for this exposure.

Comment: The results for VRUs on page 9 are provided as national estimates. It is difficult to understand how these were calculated. Was mode of transport available for all 2299 RTI deaths? How were proportions calculated at national level?

Response: The mode of transportation was available for all but 194 (8%) of the 2299 RTI deaths (Supplementary Table 1). The deaths with unknown deceased's mode of transportation did not differ from those with known mode of transportation, with respect to age, gender, rural/urban, neighbourhood asset, education, and occupation (Supplementary Table 1). Therefore, we proceeded to calculate the national estimates for the deceased modes of transportation.

The Results section (Page 9) was revised to clarify how the national estimates were calculated based on the 2105 records that had deceased mode of transportation information.

Comment: Cannot review the figures, because they are inaccessible/ unable to open. Will be happy to review if provided.

Response: Acknowledged. The figures will be uploaded again on the revised manuscript. We can also provide the figures via email to the reviewer if required.

Comment: In table 2, the data on outcome is missing for 25% of the cases. The rate of missingness is very high, and sensitivity analyses with different methods of imputation can help.

Response: We agree that the proportion of missing data for the place of death (25%), timing of death (31%), and injuries reported (51%) were very high and were prohibitive against making unbiased national estimates. In Table 2, the outcome (pedestrian or non-pedestrian) was available for 2105 of 2299 deaths (8% missing and as discussed above, not significantly different with respect to the major socio-demographic traits when compared to those with mode of transportation data). Therefore, we do not think imputation methods are needed for the analysis in Table 2. Regarding the place of death, timing of death, and injuries reported, we also do not think that imputation methods would strengthenthis descriptive study, particularly since national estimates were not made for these 3 variables. Indeed, imputation might introduce some spurious results.

Comment: Articles by Jain A, Menezes RG, Kanchan T, Gagan S, Jain R. Two wheeler accidents on Indian roads--a study from Mangalore, India. J Forensic Leg Med. Apr 2009;16(3):130-133. And Singh H, Dhattarwal, S. K. Pattern and Distribution of injuries in fatal road traffic accidents in Rhotak(haryana). JIAFM. 2004;26(1). Contribute to the discussion para 2, page 13. More evidence will help to support the case for primary and secondary prevention. The Indian government is currently investing lot of effort and resources towards pre-hospital and trauma care.

Response: We agree that the importance of primary and secondary prevention in India cannot be overemphasized. We have revised the discussion (Para 2, Page 13) to emphasize that the high prevalence of instantaneous on-scene deaths and head injuries are consistent with existing studies and support primary and secondary prevention. We have also incorporated the 2 references the reviewer suggested in the Discussion (Paragraph 2 page 14).

Reviewer: Dr Carlos Martin Cantera / Elisa PuigdomenechPuig
Associate Professor, Department of Medicine. Universitat Autònoma de Barcelona, Primary Healthcare University Research Institute-IDIAP JordiGol Sardenya 375, 08025 Barcelona, Spain

This is an interesting manuscript on road traffic injury mortality using data from the first nationally representative survey of the causes of death in India.

Comments:

Comment: Introduction
Please clarify the term Road Traffic injury death. The term injury refers only to lesions, so it should be clearly noted that the authors mean deaths related to road traffic.

Response: We have revised the Introduction to clarify the terminology. (Paragraph 1+2, Page 4)

Comment: Introduction
Since the authors offer results according to the main factors associated to RTI deaths (sex, age, rural/urban setting, vulnerability,...) a sentence stating which are the sections of the Indian society with more road traffic injuries victims (men aged xx-xx, less educated,...)

Response: Our concluding paragraph (Paragraph 2, Page 15) has a summary sentence emphasizing that RTI deaths were mostly among males of productive working ages and among vulnerable road users. In our analysis, we also compared pedestrians to non-pedestrian RTI deaths (Table 2) and described the socio-demographic differences (education, neighbourhood asset, gender, age).

However, we did not compare education level among people who died of RTI to the general Indian population (living comparison) or to the contemporaneous deaths due to other causes (dead comparison). We believe the living and dead comparisons are fraught withmethodological issues (e.g. 1. The socio-demographic variables obtained from a living comparison population may not be comparable to those from our study population due to differences in sampling and other study methods; or 2. Analysis using a dead comparison group can produce irrelevant findings such as smoking being protective against RTI deaths). Therefore, we think these living and dead comparisons are less informative than exploring the particular characteristics of pedestrian RTI deaths that make them the most common among all RTI deaths.

Comment: Methods/Road traffic deaths
When the authors say "The RTI deaths in this study..."Do they mean in the MDS? (page 5, line 53)

Response: Yes. But specifically, the RTI deaths in this study refer to the subset of deaths in the MDS that were assigned ICD-10 codes within V01-V89. We wanted to make the distinction between this current study from the MDS, which is a larger on-going study from 2001 to 2014 and includes all causes of death.

Comment: Methods/Analysis
In the Methods/Road traffic deaths section the authors state that RTI deaths of the study were from people who died between 2001-2003.Could the authors provide an explanation why they used the data from the 2005 UN death estimates instead of the 2003 or 2004? (page 6, lines 19-25).

Response: It was a decision among our research group to generate either 2005 or 2010 estimates, depending on whether forward projection was valid for the mortality condition being studied. While the patterns of motorization and urbanization have changed rapidly in India over the last decade, we felt it was appropriate to project our estimates to 2005 such that these estimates can be compatible and comparable to our other published mortality estimates from the same MDS data (malaria, neonatal/child, snakebite, diarrhea/pneumonia/infectious disease in children, falls). We found that using the 2003 and 2004 UN death estimates yielded almost identical results (stated in Methods section). However, we did not think it would be valid to project our estimates to 2010 as we had done for our cancer and suicide publications (Lancet 2013), given the rapid changes in India with respect to motorization and urbanization.

Could the authors provide a brief explanation of the rationale and construction of the variables education and occupation?

Response: The education variableand its strata were obtained directly from the MDS verbal autopsy records. Likewise, the occupation variable was also from the verbal autopsy records but this was further aggregated into the 3 classes (shown in Table 2) based on the similarities within each class with respect to general socioeconomic status (salaried/wage earner/professional > cultivator/agricultural labour> non-worker). Regression analysis with non-aggregated occupation groupings(data not shown) also gave the same result that occupation does not seem to differ between pedestrian and non-pedestrian RTI deaths.

Comment: Results
In the third paragraph of the results section the authors state that the 2005 police reports recorded

less RTI death, could they provide a reference (reference number 27)? (page 9, lines 14-19)

Response: We have revised the Results and added the reference as noted (Paragraph 1, Page 9).

Comment: Discussion:
In page 11, line 53 the authors should state that the 183600 deaths are estimated. Furthermore, they indicate that this number accounts for 2% of all deaths which needs to be referenced.

Response: We have added a reference as noted (Paragraph 1, Page 11).

Comment: References:
In reference 22 it is not specified the date of access.

Response: We have added the access date.

Comment: Other. Include a list of acronyms.

Response: A list of acronyms is now included.

VERSION 2 – REVIEW

REVIEWER	Shivam Gupta Assistant Scientist Dept. of International Health Johns Hopkins Bloomberg School of Public Health Baltimore MD USA
REVIEW RETURNED	04-Jul-2013

THE STUDY	It is difficult to verify results due to 2 reasons. 1. The methods and statistical methods are based on previous publications by the same group of authors. It is difficult to review all of these to completely understand what was done here. 2. Sampling weights, analytic formulae for estimates provided in the tables are not provided in the supplementary tables. It makes it difficult to try and re create parts of the analyses.
RESULTS & CONCLUSIONS	The results are sometimes difficult to follow, because parts of it relate to national level, and parts of it relate to the sample only.

VERSION 2 – AUTHOR RESPONSE

Reviewer: Shivam Gupta
Assistant Scientist
Dept. of International Health
Johns Hopkins Bloomberg School of Public Health
Baltimore MD USA

It is difficult to verify results due to 2 reasons.
1. The methods and statistical methods are based on previous publications by the same group of authors. It is difficult to review all of these to completely understand what was done here.

2. Sampling weights, analytic formulae for estimates provided in the tables are not provided in the supplementary tables. It makes it difficult to try and re create parts of the analyses.

The results are sometimes difficult to follow, because parts of it relate to national level, and parts of it relate to the sample only.

Authors' Response:
The methods and statistical methods used in this manuscript were based on and were consistent with our previous publications using the same Million Death Study dataset (manuscript references 16-19, 25, and 26), all of which have been peer-reviewed and recently published. We believe the methods section, as it is described currently, provided sufficient detail for readers to understand and critique our analysis. The references cited, especially Jha et al PLoS Med 2006 (ref 16) and Dikshit et al Lancet 2012 (ref 18), provide additional details to allow readers to replicate our analysis. We have also revised the analysis section to further clarify the sample weight used (revision in italics):

"The age and sex-specific proportion of RTI deaths within the 2001-2003 survey was applied to the 2005 United Nations (UN) estimates of the number of deaths from all causes in India, after weighting for sampling probability for each rural or urban stratum by state (although such weighting made little difference because the study was nationally representative).[18,22]"

16 Jha P, Gajalakshmi V, Gupta PC, et al. Prospective Study of One Million Deaths in India: Rationale, Design, and Validation Results. PLoS Med 2006;3:e18.
17 Million Death Study Collaborators,. Causes of neonatal and child mortality in India: a nationally representative mortality survey. Lancet 2010;376:1853–60.
18 Dikshit R, Gupta PC, Ramasundarahettige C, et al. Cancer mortality in India: a nationally representative survey. Lancet 2012;379:1807–16.
19 Patel V, Ramasundarahettige C, Vijayakumar L, et al. Suicide mortality in India: a nationally representative survey. Lancet 2012;379:2343–51.
25 Jha P, Kumar R, Khera A, et al. HIV mortality and infection in India: estimates from nationally representative mortality survey of 1.1 million homes. BMJ 2010;340:c621.
26 Dhingra N, Jha P, Sharma VP, et al. Adult and child malaria mortality in India: a nationally representative mortality survey. Lancet 2010;376:1768–74.

Based on the reviewer's comments in the first round, we have made a clear distinction between the national estimates (gender- and age-specific RTI death numbers, rates, and risks; and RTI death numbers by mode of transportation) and the sample estimates (place and timing of death; injuries sustained). This was done in the Abstract by describing the national estimates first, and then describing the sample proportions (also providing the numerator and denominators), using "Among the study sample" as the transition phrase. Likewise in the Results section, we described the national estimates in the first three paragraphs, then described the sample estimates in the next two paragraphs by stating the study proportions (both percentage and numerator/denominator values) and the reason why national estimates were not made. We believe we have sufficiently addressed the reviewer's concerns in this respect.