EXPLANATORY NOTES

EXPLANATORY NOTE 1

METHODOLOGY, DATA COLLECTION AND VALIDATION

Methodology

The methodology involved collecting data from a number of different sectors and stakeholders in each country according to the following process.

National Data Coordinators (NDCs), who were nominated by their governments, were trained in the project methodology. As representatives of their ministries, they were required to identify up to eight other road safety experts within their country from different sectors (e.g. health, police, transport, nongovernmental organizations and/or academia) and to facilitate a consensus meeting of these respondents. While each expert responded to the questionnaire based on their expertise, the consensus meeting facilitated by NDCs allowed for discussion of all responses, and the group used this discussion to agree on one final set of information that best represented their country's situation at the time (up to 2014, using the most recent data available). This was then submitted to the World Health Organization (WHO), see Figure E1.
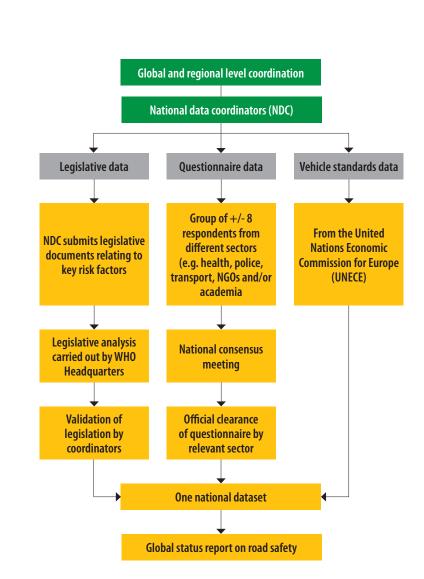
FIGURE E1
Methodology

A major new initiative in this report was the comprehensive collection of legislative documents from all participating countries. The WHO team performed an extensive search of online legislative databases and country-level government websites for legislative documents related to key risk factors.[1] In addition, National Data Coordinators were asked to submit laws relating to the key risk factors. All legislative documents were analysed by lawyers at WHO headquarters who extracted the relevant information. The legal analysis was then shared with National Data Coordinators and a validation process resolved any data conflicts through discussion and submission of new legal documents.

The methodology used to collect information on vehicle standards also differed for this report. Whereas in previous reports this information was collected using the questionnaire, for this project these data were based on information from the UN World Forum for Harmonization of Vehicle Regulations[2] and interpreted with technical support from Global New Car Assessment Programme (Global NCAP).[3]

The report includes data from 180 countries/areas out of a total of 195, covering 6.97 billion people (97% of the world's population). This includes 52 high-income countries, 98 middle-income countries, and 30 low-income countries (see Table E1). Data on legislation and policies represent the country situation in 2014 while data on fatalities and vehicle registration are for 2013, or the most recent year for which these data were available.

TABLE E1
Participation in the Global status report on road safety 2015

Region	Number of participating countries	Number of countries in region	% population participating
African Region	43	47	97.5
Region of the Americas	31	35	95.8
Eastern Mediterranean Region	21	22	96.5
European Region	52	53	95.0
South-East Asian Region	10	11	98.7
Western Pacific Region	23	27	99.6
WORLD	180	195	97.3

Data collection and validation

Questionnaire data

The questionnaire used for this report was based on the questionnaire used in the previous report. However, some questions were modified to improve the quality of responses and some were added or deleted. The questionnaire can be downloaded with an accompanying instruction booklet on www.who.int/violence_injury_prevention/road_safety_status/2015/en/.

The questionnaire, protocol and accompanying guidelines and training materials were all available in the six WHO languages (Arabic, Chinese, English, French, Russian and Spanish). Where needed, NDCs coordinated the translation of these documents into local languages and then translated back into English for the data entry stage. All data were entered into an on-line database from where data could be extracted for analysis.

Data collection began in May 2014 and was completed by December 2014. Validation involved checking data for logical inconsistencies, and these were checked with National Data Coordinators. Following the validation process, final data sets were sent to respective governments for review and sign-off.

---

1 Speed, drink-driving, drug-driving, the use of mobile phones while driving, failure to use motorcycle helmets, seat-belts and child restraints.
2 The UN World Forum for Harmonization of Vehicle Regulations (World Forum the global body responsible for the development of passenger car safety standards). http://www.unece.org/trans/main/wp29/introduction.html
3 Global NCAP is a British organization that conducts testing programmes that will assess the safety of motor vehicles. http://www.globalncap.org/

Fatality data

Estimates on number of road traffic deaths relied in part on data from questionnaires as well as from other sources (see Explanatory Note 3). However, countries/areas were also asked to provide a breakdown of deaths by road user type. These proportions (where available) are reflected in the country profiles (see Explanatory Note 2) and were derived from:

• Country reported data in the current questionnaire;
• If not available from questionnaires, data that countries reported for the previous reports were used;
• If neither of the above were available, countries were assigned regional weighted averages based on countries within the region that had provided data.

These values were then aggregated into regional and global estimates of deaths by road user type.

Legislative data and maps

This report collected information on a number of variables relating to legislation on the five key risk factors (speed, drink–driving, failure to use helmets, seat-belts and child restraints) as well as on two emerging risk factors, drug–driving and the use of mobile phones while driving.

Criteria analysed for each risk factor are detailed in Table E2 while the interpretation methods for each risk factor are detailed in Explanatory Note 2 on country profile.

The information collected was presented in various ways including:
• Country profiles, representing a summary of information for each country;
• Statistical annex, representing the full data set for each country;
• Legislative maps, showing an overview of the situation worldwide for each risk factor.

In order to code the countries for the legislative maps, three categories were used:
• Countries[1] whose national laws meet best practice: shown in green – criteria considered as representing best practices in light of available evidence[2] are highlighted, for each risk factor, in green in Table E2;
• Countries[1] whose national laws are encouraging but where additional efforts are needed for best practice to be met: shown in yellow;
• Countries[1] whose national laws require strong steps to be taken in order to improve their legislation: shown in red.

Vehicle standard data

Data on vehicle standards were collected using information from the UN World Forum for Harmonization of Vehicle Regulations[3], the primary global body responsible for the development of passenger car safety. Technical support on analysing and interpreting this data was provided by Global NCAP[4]. Note that while these data are based on international regulations, in some countries where national regulations are considered to be equivalent to the UN standards (US, Canada, Republic of Korea, China, India, Brazil) these data are used instead. The data collected were based on the following seven variables:

• Frontal impact: UN regulation 94. Note that US regulation 208 is considered equivalent.
• Side impact: UN regulation 95. Note that US regulation 214 is considered equivalent.
• Electronic Stability Control: UN regulation 13H. Note that US regulation FMVSS 126 is considered equivalent.
• Pedestrian protection: UN Regulation 127
• Seat-belts: UN regulation 16. Note that US regulation FMVSS 210 is considered equivalent.

---

1 Or, in countries where laws are set at subnational level, where 80% of subnational entities meet selected criteria.
2 Peden M et al., editors. World report on road traffic injury prevention. Geneva, World Health Organization, 2004.
3 Hosted by the United Nations Economic Commission for Europe (UNECE), the UN World Forum for Harmonization of Vehicle Regulations (World Forum the global body responsible for the development of passenger car safety standards). http://www.unece.org/trans/main/wp29/introduction.html.
4 Global New Car Assessment Programme (Global NCAP) is a British organization that conducts testing programmes that will assess the safety of motor vehicles. http://www.globalncap.org/

- Seat-belt anchorages: UN regulation 14. Note that US regulation FMVSS 210 is considered equivalent.
- Child restraints: UN regulations 44 and 129. Note that US regulation FMVSS213 is considered equivalent.

More information on each of these regulations is included in Section 3. Data on the three variables considered to be particularly important among these seven (frontal impact, electronic stability control and pedestrian protection) are included in the country profiles (and are the variables represented in Figure 15). The remaining variables are shown in the Table A10 of the statistical annex.

TABLE E2
Legislative criteria assessed relating to 7 risk factors

🟧 Risk factors   🟩 Criteria representing best practice   ⬜ Additional criteria presented in the country profiles

Risk factor	Legislative criteria assessed						
Speed	National[1] speed law in place	Speed limits on urban roads ≤ 50 km/h	Local authorities have the power to modify national speed limits	Speed limit on rural roads	Speed limits on motorways		
Drink-driving	National[1] drink-driving law in place	Drink-driving law is based on BAC or equivalent BrAC	BAC limit for general population ≤ 0.05 g/dl	BAC limit for young/novice drivers ≤ 0.02 g/dl			
Motorcycle helmets	National[1] motorcycle helmet law in place	Law applies to motorcycle drivers and adult passengers	Law applies to all road types	Law applies to all engine types	Law requires helmet to be properly fastened	Law requires helmet to meet a national or international standard	Law requires children to wear helmet[2]
Seat-belts	National[1] seat-belt law in place	Law applies to drivers and front seat passengers	Law applies to rear seat passengers				
Child restraints	National[1] child restraint law in place	Law is based on age-weight-height or a combination of these factors	Law restricts children under a certain age-height from sitting in front seat				
Drug driving	National[1] drug driving law in place						
Mobile phones	National[1] law on mobile phone while driving is in place	Law applies to hand-held phones	Law applies to hands-free phones				

[1] Or, in countries where laws are set at subnational level, where 80% of subnational entities meet selected criteria.
[2] For children who are legally allowed to ride as passengers.

EXPLANATORY NOTE 2

COUNTRY PROFILE EXPLANATIONS

The country profiles shown on pages 77 to 256 present a selection of core information about road safety, as reported by each of the 180 participating countries/areas. The country profiles are presented in alphabetical order. Additional national data can also be found in the Tables of the Statistical Annexes (Tables A2–A10).

Data reported for population were extracted from the United Nations Population Division database *(1)*, while gross national income (GNI) per capita for the year 2013 came from World Bank estimates *(2)*. Where no data were available for 2013, published data for the latest year were used. The World Bank Atlas method was used to categorize GNI into bands thus:

- Low-income   =   US $ 1 045 or less
- Middle-income =   US $ 1 046 to US $ 12 745
- High income   =   US $ 12 746 or more

Flags were obtained from the World Flag Database[1]. Flags as of 31 December 2014 were used (to correspond with the year of data collection).

The sections below reflect the way information is structured in each of the Country Profiles. They include details on how data on certain variables are presented and should be interpreted. Variables were coded as "—" if the information was unavailable or non-applicable, or if respondents had ticked a "Don't know" response. Where data were obtained from multiple sources these are listed in alphabetical order.
Dates provided as source documents refer to the year in which these data were published, (rather than the year that the data relate to) unless indicated otherwise.

Data collected by questionnaire were submitted through a consensus meeting (unless otherwise indicated). Each country profile indicates the Ministry that approved this questionnaire data (unless otherwise indicated). Data on legislation were based on WHO's assessment and extensive validation of this information with National Data Coordinators, although it was not officially cleared by the government Ministry.

Institutional framework

A lead agency is considered to be the institution (either stand alone, or within a Ministry) that coordinates road safety at a national level. Information on the existence of a national road safety strategy is indicated as "Yes" or "No"; countries where national strategy development is underway but has not yet been approved or endorsed by government are indicated as "None". Where countries have multiple national strategies on road safety this is always represented as "Yes".

Where countries indicated they have a fatality reduction target, information on this target is included as well as the relevant time period. Specific fatality targets are indicated either as absolute numbers of deaths, or as a rate per 100 000 population.

Safer roads and mobility

- Information on road safety audits of new road infrastructure projects is reported as "Yes" or "No".
- Information on road safety audits on existing road infrastructure projects is reported as "Yes", "Parts of road network", or "No". For those countries where the response given in the question was "parts of the road network" this is represented as "Yes" in the country profile.

---

1 http://www.flags.net

Safer vehicles

Total registered vehicles for 2013: Information about the total number of vehicles in the country includes only registered vehicles, and various categories of such vehicles. This is a cumulative number of vehicles in circulation in 2013 (or the most recent year for which data were available) not the number of vehicles brought into circulation in a particular year. In some cases where new data were not available, the figure from the 2013 Global status report has been used and footnoted to indicate this source. In a few countries the number of vehicles in subcategories did not add up to the total number provided. In some countries, respondents noted that a substantial proportion of the vehicle fleet may not be registered.

Vehicle standards applied: Information on vehicle standards presented in this report is derived from UNECE[1].

- Frontal impact standard (UN Regulation 94 or equivalent national standard), the most important minimum standard for crashworthiness;
- Electronic stability control and anti-skid system (Regulation 13H or GTR 8), relevant to crash avoidance;
- Pedestrian protection (Regulation 127 or GTR 9), important for protection of non car occupants involved in a crash.

Post-crash care

- The emergency-room based injury surveillance system variable only indicates whether there was a system in place and not whether it was national or sentinel in nature.
- Emergency access telephone numbers are given only if one national number was provided. If countries reported multiple national numbers then "multiple numbers" is noted in the corresponding field but the actual numbers are not provided.
- The proportion of those transported by ambulance was based on expert opinion.
- The proportion of those disabled as a result of a road traffic crash is only included if a documented source of information was available, however, this was not necessarily national (as indicated in the corresponding footnote).

Data

- Reported numbers of road traffic deaths are included in the Country Profiles, with a footnote to indicate the source of data and the definition of a road traffic death that was used.
- The estimated number of road traffic deaths is included based on the methodology described in Explanatory Note 3. Where this number was based on a negative binomial regression model, a 95% Confidence Interval is also shown.
- The estimated rate per 100 000 population is based on the estimated number of road traffic deaths referred to above.
- Data on the breakdown by sex may be from a different source to the official road traffic data and are converted to proportions. The proportion of deaths where the sex was unknown has not been reported in the profiles. Proportions may not add up to 100% due to rounding or because only partial information was received (indicated in a footnote).
- Reported fatality data from different countries are not necessarily comparable, as different definitions and timeframes have been used (these are noted in the footnotes or in brackets behind the data). However, the WHO estimates (both absolute numbers and rate per 100 000) allow for comparisons between countries. For more information on the fatality data see Explanatory Note 3.
- The standard colour coding of the pie charts used to represent road user deaths in the categories requested in the questionnaire is shown below. Additional categories are represented by non-standard colours as indicated in the specific Country Profiles.

---

1 http://www.unece.org/trans/main/wp29/introduction.html

- 🟡 Drivers 4-wheeled cars and light vehicles
- 🟠 Occupants 4-wheeled cars and light vehicles
- 🔴 Passengers 4-wheeled cars and light vehicles
- 🔵 Riders motorized 2- or 3-wheelers
- 🔵 Drivers motorized 2- or 3- wheelers
- 🟤 Pillion riders
- 🔵 Cyclists
- 🟢 Pedestrians
- 🟤 Drivers/passengers heavy trucks
- 🔵 Drivers/passengers buses
- 🔴 Other/unspecified
- 🟣 Drivers (all vehicles)
- 🌸 Passengers (all vehicles)
- 🟣 Drivers and passengers (all vehicles)

- Some countries classified road traffic fatalities according to the vehicle or road user "at fault" rather than according to who died. In such cases these categories are presented in the pie charts using additional colour coding.
- Graphs on reported road traffic fatality trends are shown either as road traffic death rates per 100 000 population (solid line) or as an absolute number of road traffic deaths (dotted line), depending on which data were supplied by the country. While many countries track decades' worth of trend data, only a 10-year period is depicted here.
- For countries providing less than 5 years' road traffic fatality trend data, this information is presented in a tabular format instead of a graph.
- For countries with small populations where the number of deaths are under 50, absolute number of deaths rather than rates are shown. Note that in cases where data were only available for regions within a country, this information is indicated in a footnote.

Safer road users

Legislation provided in this section is extracted from the questionnaire and the legislative analysis undertaken by WHO Headquarters in collaboration with NDCs.

Enforcement: respondents were asked, as individuals, to rate the effectiveness of enforcement of various elements of national road safety legislation based on their professional opinion or perception. These responses – on a scale of 0 to 10, where 0 is "not effective" and 10 is "highly effective" – are presented here. A median of these scores is presented here. Median enforcement figures are rounded up. It should be noted that these scores are subjective and should be seen only as an indication of how enforcement is perceived in the country. Many respondents expressed difficulty in assessing law enforcement at a national level since it often varies from region to region within a country and the intensity of the enforcement may vary at different times. Some countries did not wish to provide enforcement scores.

Speed: Speed limits reported here (and in the statistical tables) are for private passenger cars only and have been converted to kilometres per hour. Countries that reported a range for speed limits relating to particular road types are indicated as such. In cases where the legislation provided a speed limit that could be altered under certain circumstances, the default speed limit is reported and the higher limit referenced in a footnote. Road classifications (in particular the definition of an urban road, a rural road and a highway) varied greatly from country to country. Respondents were asked to report on the speed limits of different kinds of road according to the definitions used in the country concerned. In situations where the legislative analysis showed no reference to a national speed limit on certain types of roads this is indicated as "No". In the case of motorways, a footnote may be included where National Data Coordinators indicated that motorways did not exist in their country.

Drink-driving: Blood alcohol concentration (BAC) limits (or breath alcohol limits converted to BAC limits) refer to the maximum amount of alcohol legally acceptable in the blood of a driver on the road – i.e. the blood alcohol level above which a driver may be punished by law. This figure is provided for the general population, and for young/novice drivers in grams per decilitre (g/dl). This survey gathered information on drink–driving laws regardless of the legal status of alcohol in the country. Where alcohol consumption was legally prohibited in a country, as reported in the final country questionnaire, this is indicated by a footnote. BAC limits are reported as "—" for countries that have a drink–driving law but do not define drink–driving by BAC, and by a corresponding footnote.

- The use of random breath testing is indicated based on countries' reports of whether or not such testing is carried out in practice. Those countries where legislation specifically prohibits primary enforcement of drink-driving laws, and thus random breath testing, are indicated as such.
- Deaths attributable to drink-driving were included only when the estimate was based on a published source. In many cases these are not national estimates (as indicated in the source). These estimates are rounded up.

Motorcycle helmets: For information on motorcycle helmet rates (derived from the final country questionnaires), these data were included only when a published source was indicated. Note that "drivers" is taken to mean those driving the motorcycles, while "riders" is understood to include both drivers and passengers. The most disaggregated data are presented here, i.e. separate figures are provided for drivers and passengers where this information was provided. Note that the information provided for drivers and passengers does not necessarily represent the same year, nor come from the same source, as indicated in the corresponding footnotes. The data on passenger rates refer to adult passengers unless otherwise indicated. In many cases these are not national estimates (as indicated in the source). Information on legislation was interpreted strictly: for example, countries where helmet laws apply only to certain types of roads, to certain engine types or certain populations (e.g., minors) were interpreted as not having a national helmet law.

Seat-belts: For information on seat-belt wearing rates (derived from the final country questionnaires), these data were included only when a published source was indicated. The most disaggregated information is presented here, i.e. separate figures are provided for front seat and rear seat occupants where this information was made available. Where respondents provided explanatory information on these data, for example, a source or information on geographical coverage, this information is summarized in the footnotes. Note that the information provided for front seat and rear seat occupants does not necessarily represent the same year, nor come from the same source, as indicated in the corresponding footnotes. Information on legislation was interpreted strictly: for example, countries where seat-belt laws apply only to certain types of roads were interpreted as not having a national seat-belt law.

Child restraints: Information on rates of child restraint use (derived from the final country questionnaires) are presented when a source was provided for the estimate and are included in the most disaggregated form available. Most countries that provided this data, however, had data on children in restraints that was not broken down by age group. Note that where multiple studies are available this information does not necessarily represent the same year, nor come from the same source, as indicated in the corresponding footnotes. The presence of a national child restraint law and its specificities (e.g. based on age, weight, height) was assessed as well as the existence of restriction on children under a certain age sitting in the front seat of passenger cars.

References

1. Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (June 2013). World population Prospects: The 2012 Revision, Highlights. New York: United Nations.
2. World Development Indicators database, World Bank, March 2015. http://data.worldbank.org/indicator/NY.GNP.PCAP. CD/countries.

EXPLANATORY NOTE 3

ESTIMATION OF TOTAL ROAD TRAFFIC DEATHS: WHO DATA AND METHODOLOGY

Background

During the process of preparing the third *Global status report on road safety* WHO generated estimates of road traffic deaths for 2013 for all Member States. Road traffic deaths were estimated by building on the methods used in the second global report by improving and updating the database of vital registration, the data collection instrument (survey) and the database of the covariates for regressions. These estimates were used to generate regional and global estimates, while estimates for individual countries are included in the report only for the 180 countries that participated in the survey.

Death registration information is submitted to WHO regularly by Ministries of Health from around the world, and most is coded using the International Classification of Diseases 9th or 10th revisions *(1, 2, 3)*. Using this classification all deaths that follow from a road traffic death are counted as such, regardless of the time period in which they occur (unlike many official road traffic surveillance data sources, where road traffic death data are based on a 30-day definition following a road traffic crash). WHO applies certain criteria to ascertain the quality of this death registration data and where the death registration data were considered to be of high quality these data were used for this report[1].

For those countries without such good vital registration data, and for which other sources of information on causes of death were unavailable[2], the estimates were based on covariates (some collected in the survey of Member States, others from available published sources). The regression models were fitted to data for the period 2000–2013, a time series for each covariate was used for this period for each Member States. The improved regression model estimated road traffic deaths (all ages, both sexes) as a function of a set of covariates that include measures of economic development, road transport factors and legislation, road use and safety governance/enforcement and health system access was developed.

Due the availability of new data, and updated time series for for many covariates used in the regression, estimates for the full time series have been revised. Hence, the WHO 2015 estimates are not directly comparable to previous WHO estimates published in the first and second global status reports on road safety *(4, 5)*. The 2015 estimation represents the best estimates of WHO for fatalities that occurred during 2013 and earlier years, based on the evidence available up to March 2015. These estimates are not necessarily the official estimates of Member States for that year and are not necessarily endorsed by Member States. However, during the preparation of the report a consultation letter was sent to each Member State that participated in this third *Global status report on road safety* explaining the methodology used during this estimation process and the latest data used for this purpose. In order to allow global and regional comparisons to previous years (2001, 2004, 2007 and 2010), the global and regional estimates for these years were recalculated based on the new data and methods used for 2013.

As in the second report, there are four groups of countries and its estimation methodology is described in detail below.

1. Countries with death registration data

This group includes 85 countries with death registration data meeting the following completeness criteria: completeness for the year estimated at 80% or more, or average completeness for the decade including the country-year was 80% or more. Total road traffic deaths were calculated from the death registration data and population data reported to WHO as follows. Injury deaths classified as "undetermined intent" were redistributed pro-rata across all unintentional and intentional injury categories within age-sex groups. These data were then used to compute age-sex-specific death rates for road traffic deaths. Where completeness was assessed at less than 100%, death rates were adjusted for incompleteness

---

by multiplying by (100/completeness %). These death rates were applied to the UN estimates of population by 5-year age group and sex *(6)* to estimate total road traffic deaths for each country-year.

These countries fall into three categories:

1. Countries with death registration data for year 2013 where the estimated road traffic deaths for 2013 exceeded number reported from the surveillance system. The death-registration based estimate is used. This category contains 17 countries.

2. Countries where the latest death registration data submitted to WHO is earlier than 2012, but not earlier than 2005. Deaths in year 2013 were estimated based on a projection of the most recent death registration data using the trends in reported surveillance data: this category contains 54 countries.

3. Countries where the reported road traffic deaths for 2013 (i.e. from a source other than death registration) exceeded the estimate based on death registration data. For 14 countries, the reported road traffic deaths were used for year 2013.

2. Countries with other sources of information on causes of death

For India, Islamic Republic of Iran, Thailand and Viet Nam, data on total deaths by cause were available for a single year or very few earlier years. These data sources are documented in Annex B of the *Global Burden of Disease: 2004 update* report *(3)* as well as some more recent studies submitted to WHO. For these countries, the regression method described below was used to project forward from the most recent year for which an estimate of total road traffic deaths were available.

3. Countries with populations less than 150 000

For 13 small countries with populations less than 150 000 and which did not have eligible death registration data, regression estimates were not used. The reported deaths were used directly without adjustment.

4. Countries without eligible death registration data

For countries without death registration data at least 80% complete and with populations greater than 150 000, a regression model was used to estimate total road traffic deaths. As for the previous reports, we used a negative binomial regression model, appropriate for modelling non-negative integer count data (number of road traffic deaths) *(7, 8)*. A likelihood ratio test was used to assess that the negative binomial model provided a better fit to the data than a Poisson model (where the variance of the data is constrained to equal the mean).

$$\ln N \ = C \ + \beta_1 \ X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + \ln Pop + \varepsilon \ \ (1)$$

where *N* is the total road traffic deaths (for a country-year), *C* is a constant term, X_i are a set of explanatory covariates, *Pop* is the population for the country-year, and ε is the negative binomial error term. Population was used as exposure, making it possible to interpret the coefficients (β_i) for the independent variables as effects on rates rather than a count. In a previous study, this type of model was used to represent "accident proneness" *(9)*. Karlaftis and Tarko have also found a negative binomial regression model to be the appropriate for count data such as road traffic fatalities *(10)*.

The parameters β_1, β_2, β_3 ⋯ β_n (equation 1) were estimated by fitting the negative binomial regression model to estimated total road traffic deaths for all country-years in the range 2000–2013 meeting the completeness criteria (see section 1 above, and reference 5) by using the number of road of traffic deaths from countries from group 1 described above. We

chose three models (Models A, B and C) that had good in-sample- and out-of-sample fit, and for which all the covariates were statistically significant. The final estimates were derived as the average of the predictions from these three models. The table below describes the covariates used for the three models:

TABLE E3
Covariates used in the model

Independent variables	Description	Source of information	Included in models
ln(GDP)	WHO estimates of Gross Domestic Product (GDP) per capita (international dollars or purchasing power parity dollars, 2011 base)	WHO database	Models A, B, C
ln(vehicles per capita)	Total vehicles per 1000 persons	GSRRS surveys and WHO database	Models A, B, C
Road density	Total roads (km) per 1000 hectares	International Futures database (11)	Models A, B, C
National speed limits on rural roads	The maximum national speed limits on rural roads (km/h) from WHO questionnaire	GSRRS survey	Models A, B, C
National speed limits on urban roads	The maximum national speed limits on urban roads (km/h) from WHO questionnaire	GSRRS survey	Models A, B, C
Health system access	Health system access variable (principal component score based on a set of coverage indicators for each country)	Institute for Health Metrics and Evaluation dataset (12)	Models A, B, C
Alcohol apparent consumption	Liters of alcohol (recorded plus unrecorded) per adult aged 15+	WHO database	Models A, B, C
Population working	Proportion of population aged 15–64 years	World Population Prospects 2012 revision (UNDESA)	Models A, B, C
Percentage motorbikes	Per cent of total vehicles that are motorbikes	GSRRS survey	Model B
Corruption index	Control of corruption index (units range from about -2.5 to +2.5 with higher values corresponding to better control of corruption	World Bank (13), International Futures database (11)	Model B
National policies for walking / cycling	Existence of national policies that encourage walking and / or cycling	GSRRS survey	Model C
Population	Total population (used as offset in negative binomial regression)	World Population Prospects 2012 revision (UNDESA) (6)	Models A, B, C

TABLE E4
Overview of methods used to obtain comparable country estimates

Estimation method	Country
GROUP 1 Countries/areas with good death registration data	Argentina, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Barbados, Belarus, Belgium, Belize, Brazil, Bulgaria, Canada, Chile, China *(14, 15)*, Colombia, Costa Rica, Croatia, Cuba, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Fiji, Finland, France, Georgia, Germany, Greece, Guatemala, Guyana, Hungary, Iceland, Ireland, Israel, Italy, Jamaica, Japan, Kazakhstan, Kuwait, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Maldives, Malta, Mauritius, Mexico, Montenegro, Netherlands, New Zealand, Norway, Oman, Panama, Paraguay, Philippines, Poland, Portugal, Qatar, Republic of Korea, Republic of Moldova, Romania, Russian Federation, Saint Lucia, Serbia, Singapore, Slovakia, Slovenia, South Africa, Spain, Suriname, Sweden, Switzerland, The former Yugoslav Republic of Macedonia, Trinidad and Tobago, Turkey, United Kingdom, United States of America, Uruguay, Uzbekistan, West Bank and Gaza Strip
GROUP 2 Countries with other sources of cause of death infromation	India *(16)*, Iran (Islamic Republic of), Thailand, Viet Nam
GROUP 3 Countries with populations less than 150 000	Andorra, Antigua and Barbuda, Cook Islands,Dominica, Kiribati, Marshall Islands, Micronesia (Federated States of), Monaco, Palau, Saint Vincent and the Grenadines, San Marino, Seychelles, Tonga
GROUP 4 Countries without eligible death registration data	Afghanistan, Albania, Algeria, Angola, Armenia, Bangladesh, Benin, Bhutan, Bolivia (Plurinational State of), Bosnia and Herzegovina, Botswana, Burkina Faso, Cabo Verde, Cambodia, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Honduras, Indonesia, Iraq, Jordan, Kenya, Lao People's Democratic Republic, Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Papua New Guinea, Peru, Rwanda, Samoa, Sao Tome and Principe, Saudi Arabia, Senegal, Sierra Leone, Solomon Islands, Somalia, Sri Lanka, Sudan, Swaziland, Tajikistan, Timor-Leste, Togo, Tunisia, Turkmenistan, Uganda, United Arab Emirates, United Republic of Tanzania, Vanuatu, Yemen, Zambia, Zimbabwe

For specific methods used for each country, see web appendix, at http://violence_injury_prevention/road_safety_status/2015/methodology/en/index.html

References

1.   World Health Organization. International Classification of Diseases – 9th Revision. Geneva, World Health Organization, 1975.

2.   World Health Organization. International Classification of Diseases – 10th Revision. Geneva, World Health Organization, 1990.

3.   The global burden of disease: 2004 update. Geneva, World Health Organization, 2008 (http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/ , accessed 15 September 2015).

4.   Global status report on road safety: time for action. Geneva, World Health Organization, 2009.

5.   Global status report on road safety 2013 Supporting a Decade of Action. Geneva, World Health Organization, 2013.

6.   Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (June 2013). World population Prospects: The 2012 Revision, Highlights. New York: United Nations.

7.   Law TH. The effects of political governance, policy measures and economic growth on the Kuznets relationship in motor vehicle crash deaths. Ph.D thesis, University of London, 2009.

8.   Hilbe JM. Negative Binomial Regression. Cambridge University Press, Cambridge, 2007.

9.   Greenwood M. Yule GU. An enquiry into the nature of frequency distributions representative of multiple happenings with particular reference to the occurrence of multiple attacks of disease or of repeated accidents. Journal of the Royal Statistical Society (Series A), 1920, 83, 255-279.

10. Karlaftis MG., Tarko AP. Heterogeneity considerations in accident modeling. Accident Analysis and Prevention, 1998, 30:425-433.

11. The International Futures (IFs) modeling system, version 6.5.4. Frederick S. Pardee Center for International Futures, Josef Korbel School of International Studies, University of Denver, www.ifs.du.edu.

12. Myerson R et al. Safe pregnancy and delivery: a systematic analysis of the trends in the coverage of antenatal and intrapartumcare. Presentation at Global Health Metrics and Evaluation Conference 2011: Controversies, Innovation, Accountability, Seattle, Washington, 14–16 March 2011.

13. Kaufmann D, Kraay A, Mastruzzi M. Governance Matters VIII: Governance Indicators for 1996-2008. World Bank Policy Research. 2009

14. Chinese Center for Disease Control and Prevention, 全国疾病监测系统死因监测数据集 [National Disease Surveil-lance System monitoring causes of death 2012]. Beijing, Military Medical Science Press, 2013.

15. Vital registration data received from Center for Health Statistics and Information Ministry of Healthy, Beijing, China.

16. Causes of death in India in 2001–2003. New Delhi, Registrar General of India, Government of India, 2009.