

Estimation of Road Traffic Fatalities for the Global Status Report on Road Safety

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Marrakech 12 October



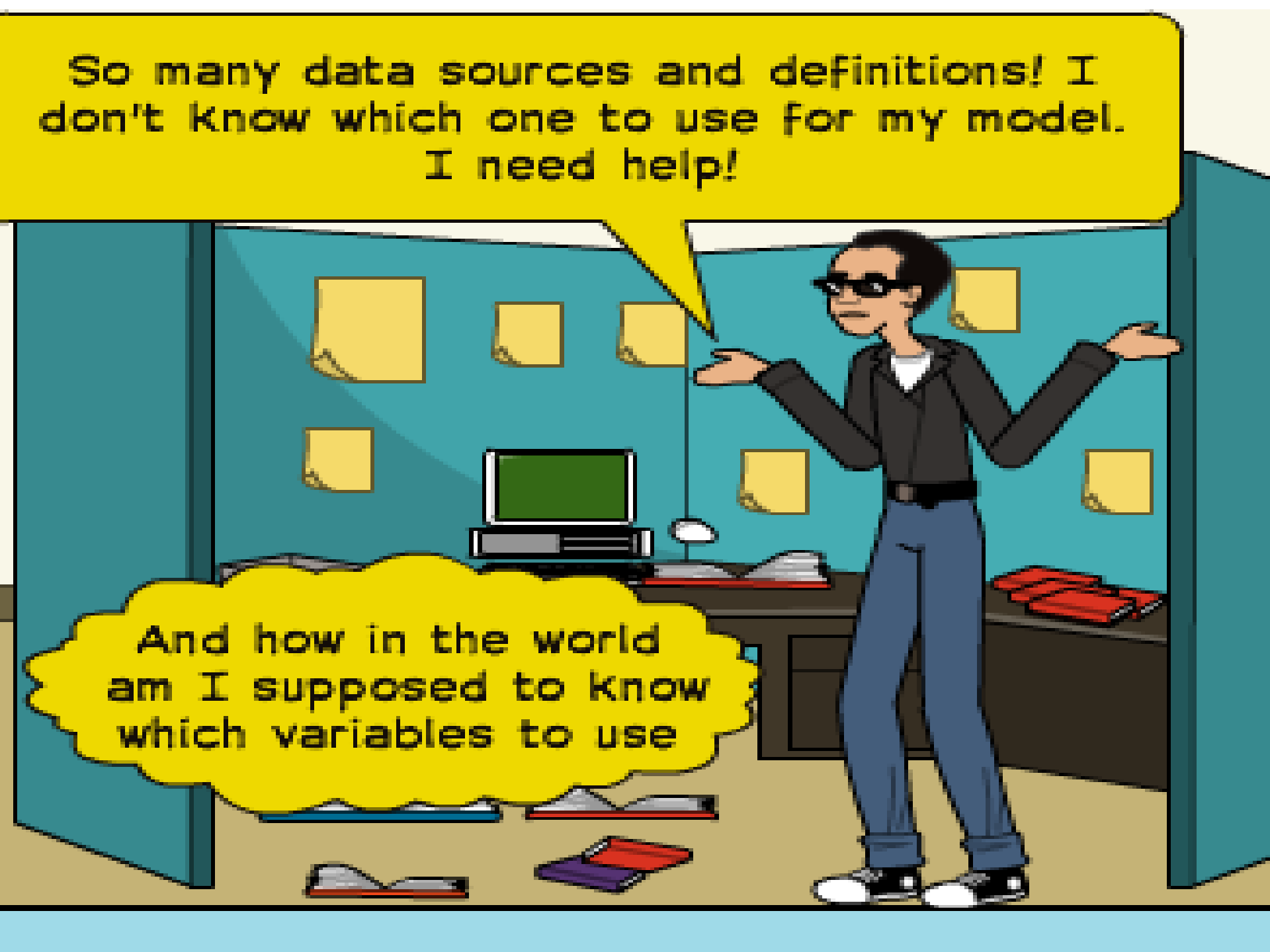
**World Health
Organization**

Data collected had challenges

- Definitions of road traffic death used by countries differ
- Underreporting of fatalities in reported data
- Incompleteness of data from countries (e.g. some countries have data only from some geographical regions)
- Significant differences in data from vital registration vs. police and other types of data

So many data sources and definitions! I don't know which one to use for my model. I need help!

And how in the world am I supposed to know which variables to use



Data sources on road traffic injuries and fatalities

- Data sources

- Police records
- Health facility records
- Vital registration / death certification
- Combine sources
- Insurance

- Definitions used

- Died at scene of crash
- Died within 24 hours of crash
- Died within 7 days of crash
- Died within 30 days of crash
- Died within a year of crash
- Unlimited time period following crash

Difference between Police and VR data

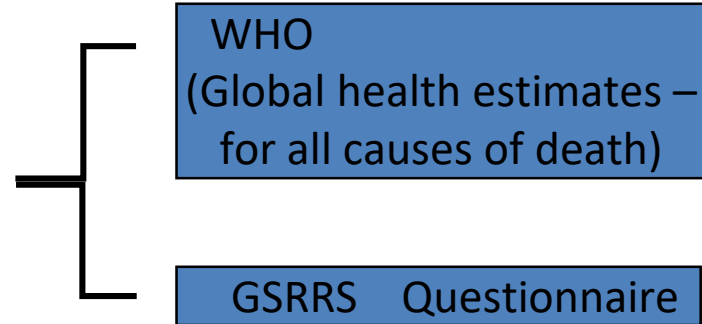
Country	Police data	Vital registration data	Prop
Belgium	724	1014	40.1
Chile	1623	2116	30.4
Italy	3385	4192	23.8
Japan	4373	5971	36.5
Netherland*	570	650	14.03
Republic Korea	5092	6374	25.2
Spain*	1680	1915	13.9
Egypt	6700	11000	64.2

Difference between Police and VR data

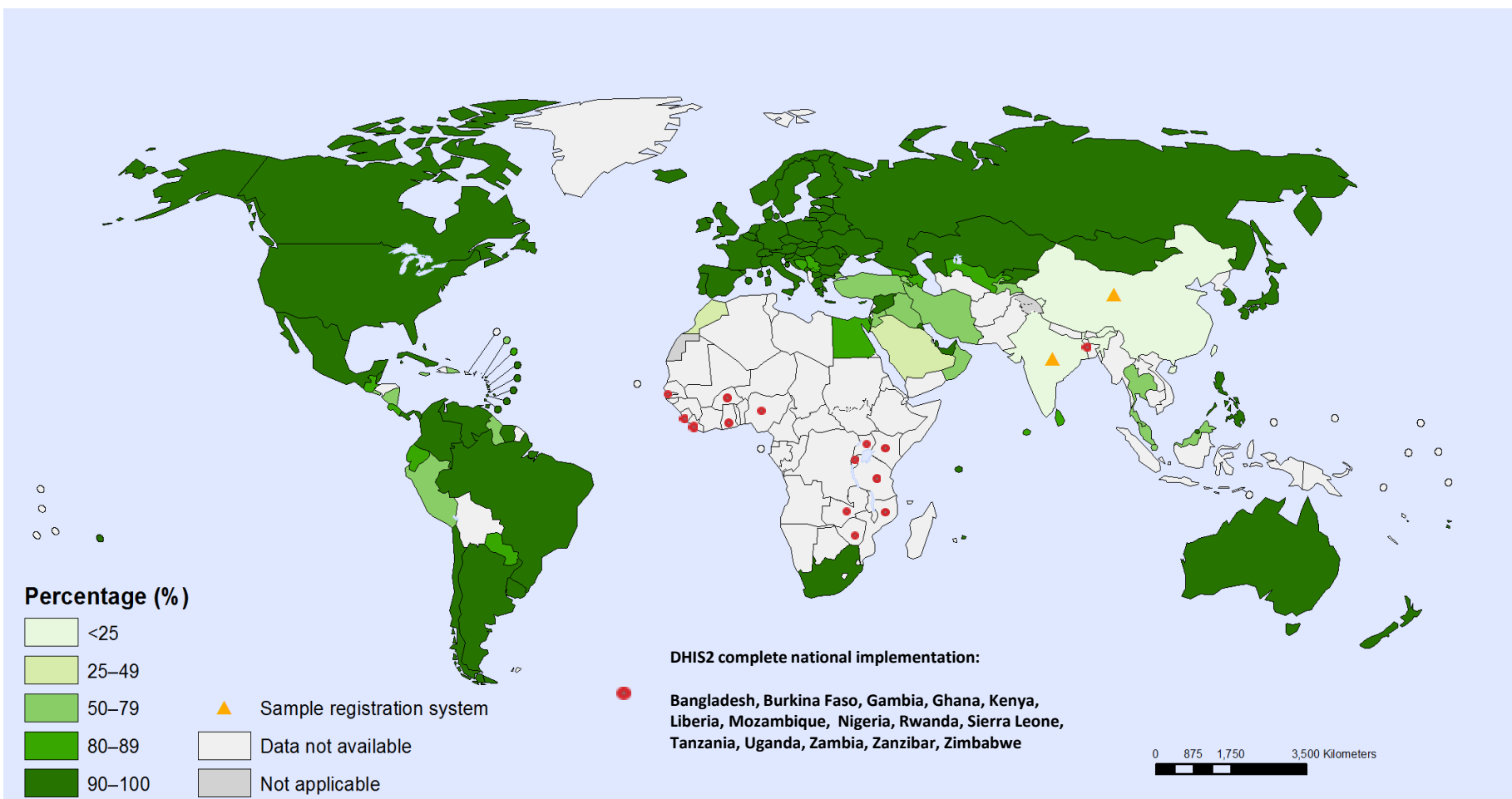
Years	Morocco/ Health	Police data/ministry of transport
2015		3776
2014		3489
2013		3832
2012	781	4167
2011	589	4222
2010	514	3778
2009	519	4042
2008	477	4162

Sources of road traffic fatality data

- Reported health data
Vital Registration
(VR)
- Reported data –
through questionnaire
- Estimated to generate
comparative
estimates



Civil registration coverage of cause of death (%), 2005–2011



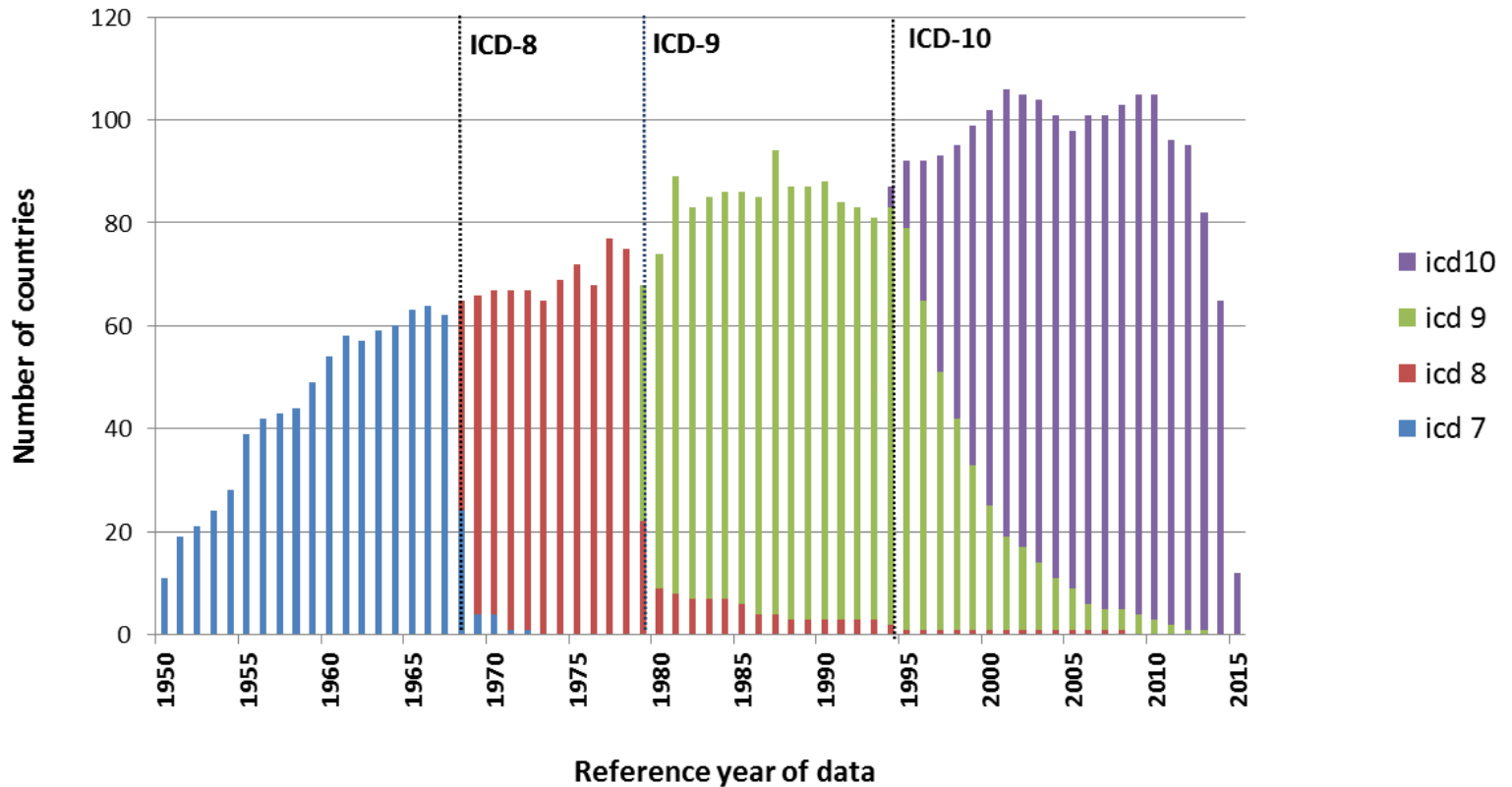
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Data Source: World Health Organization
 Map Production: Public Health Information and Geographic Information Systems (GIS)
 World Health Organization



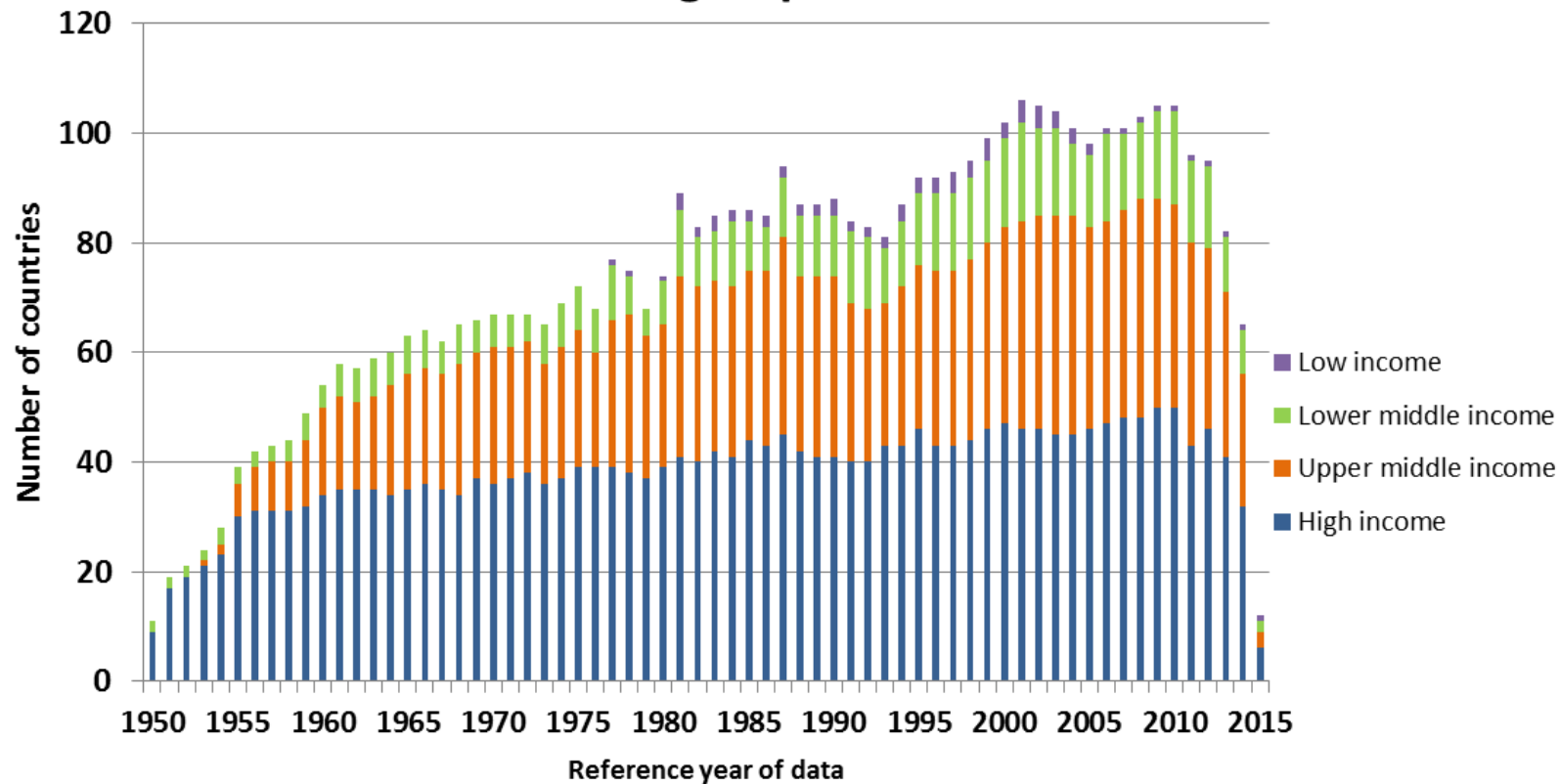
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Trends in cause-of-death reporting by ICD revision



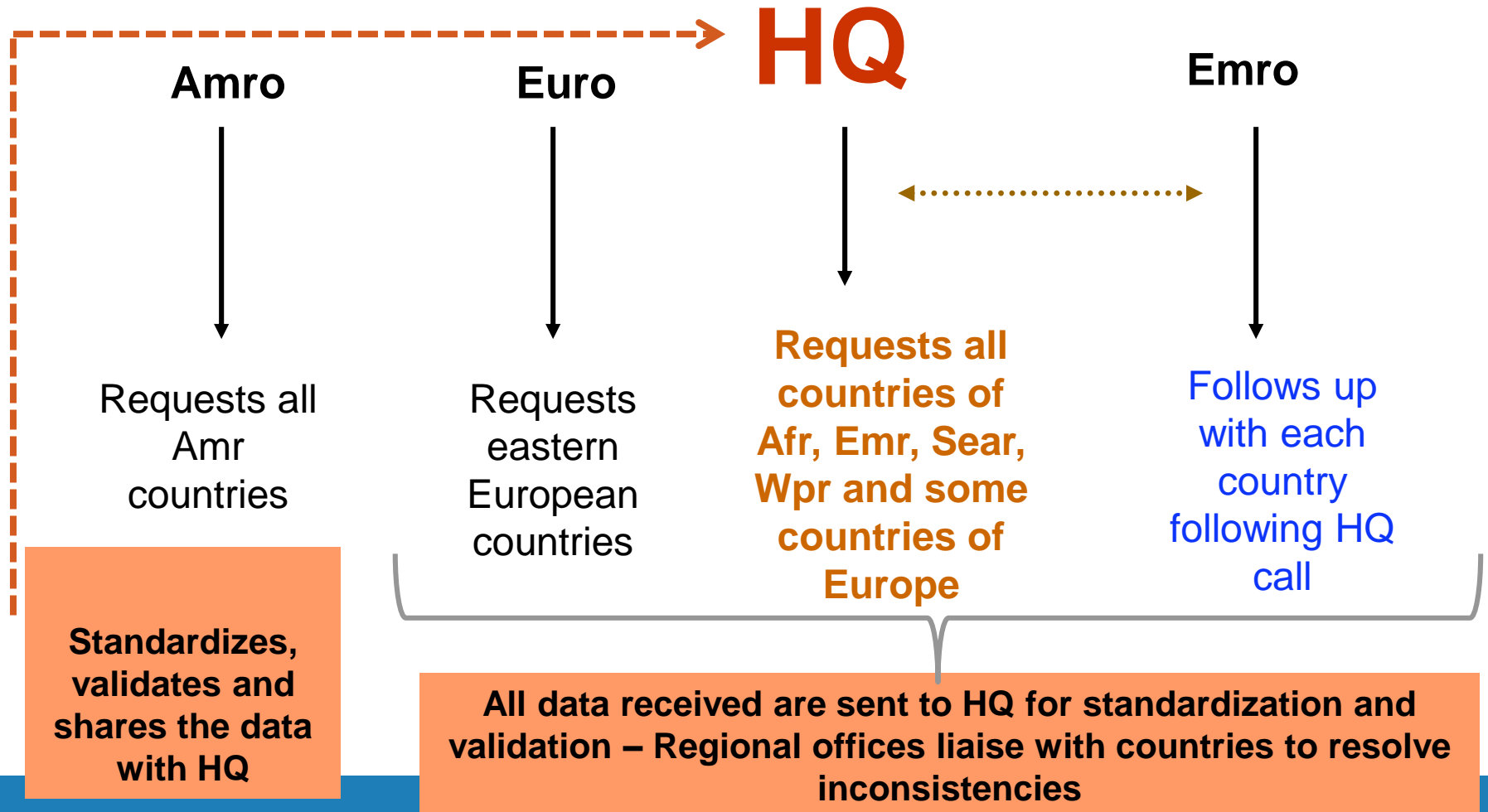
Because of the typically observed lag of 18-14 months before countries report finalized latest data, it should not be inferred from these charts that reporting for the most recent years has decreased

Trends in cause-of-death reporting, by country income group



Because of the typically observed lag of 18-14 months before countries report finalized latest data, it should not be inferred from these charts that reporting for the most recent years has decreased

Mechanism for cause-of-death data standardization and validation



Improved coverage in countries

- **South Africa:** ~ 50% in 1990s → ~ 90% in 2014
- **Turkey:** ~ 50% in 2007 → ~ 85% in 2013
- **Iran:** ~ 40% in 2001 → ~ 70% in 2014
(*exclude Teheran province in 2014*)

Improved reporting format in countries, but still.....

- Kazakhstan now reports in detailed ICD-10
- Uzbekistan resumes reporting in detailed ICD-10

Russian Federation, Ukraine and Belarus still continue to report using the aggregated mortality list which show only deaths from "Transport accidents"

List of ICD-10

- ICD-10 uses the victim's mode of transportation as the main axis of classification and ends up with 9 categories:
- *Pedestrian injured in transport accident (V01-V09)*
- *Pedal cyclist injured in transport accident (V10-V19)*
- *Motorcycle rider injured in transport accident (V20-V29)*
- *Occupant of three-wheeled motor vehicle injured in transport accident (V30-V39)*
- *Car occupant injured in transport accident (V40-V49)*
- *Occupant of pick-up truck or van injured in transport accident (V50-V59)*
- *Occupant of heavy transport vehicle injured in transport accident (V60-V69)*
- *Bus occupant injured in transport accident (V70-V79)*
- *Other land transport accidents (V80-V89)*

Data comparability: issue with various coding lists, e.g. road traffic accident

- **ICD10 – 4 character:**

V011:V019 , V021:V029 , V031:V039 , V041:V049 , V061:V069 , V092 , V093 , V103:V109 , V113:V119 ,
V123:V129 , V133:V139 , V143:V149 , V154:V159 , V164:V169 , V174:V179 , V184:V189 , V194:V199 , V203:V209 ,
V213:V219 , V223:V229 , V233:V239 , V243:V249 , V253:V259 , V263:V269 , V273:V279 , V283:V289 , V294:V299 ,
V304:V309 , V314:V319 , V324:V329 , V334:V339 , V344:V349 , V354:V359 , V364:V369 , V374:V379 , V384:V389 ,
V394:V399 , V404:V409 , V414:V419 , V424:V429 , V434:V439 , V444:V449 , V454:V459 , V464:V469 , V474:V479 ,
V484:V489 , V494:V499 , V504:V509 , V514:V519 , V524:V529 , V534:V539 , V544:V549 , V554:V559 , V564:V569 ,
V574:V579 , V584:V589 , V594:V599 , V604:V609 , V614:V619 , V624:V629 , V634:V639 , V644:V649 , V654:V659 ,
V664:V669 , V674:V679 , V684:V689 , V694:V699 , V704:V709 , V714:V719 , V724:V729 , V734:V739 , V744:V749 ,
V754:V759 , V764:V769 , V774:V779 , V784:V789 , V794:V799 , V803:V805 , V811 , V821 , V828 , V829 , V830:V833
, V840:V843 ,
V850:V853 , V860:V863 , V870:V879 , V892 , V893 , V899 , V99 , Y850;

- **ICD10 – 3 character:**

V01:V04, V06, V09:V80, V87, V89, V99

- **ICD10 – Mortality List 1 (condensed list)**

– 1096 (V01:V99) Land transport accidents)

BANG!

Wha---? Who are you? Where did you come from

I'm Model man, I provide advice to statisticians in need. Don't be afraid.

How did we go about with the estimation?

Table 1. ECMT standardized 30-day road crash fatality adjustment factors

	30-DAY TOTAL	ADJUSTMENT FACTOR
ON THE SCENE/1 DAY	77%	1.30
3 DAYS	87%	1.15
6 DAYS	92%	1.09
7 DAYS	93%	1.08
30 DAYS	100%	1.00
365 DAYS	103%	0.97

Classification of countries

- Group 1:** Countries with good vital registration/ death registration data
- Group 2:** Countries with other sources of information or causes of death
- Group 3:** Countries with population less than 150,000
- Group 4:** Countries without eligible death registration data

Group1: Countries/areas with good VR data

- Completeness for the year estimated at 80% or more
- Average completeness for the decade including the country-year was 80% or more.

Group1: Countries/areas with good VR 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 information

- For India, Iran, Thailand and Viet Nam, data on total deaths by cause were available for a single year or an earlier recent single year or group of years.

Group 3 : Countries with population less than 150 000

- Andorra, Antigua and Barbuda, Cook Islands, Dominica, Kiribati, Marshal Islands, Micronesia (Federated States of), Monaco, Palau, Saint Vincent and Grenadines, San Marino, Seychelles, Tonga

Group 4: Countries without eligible death registration data

- Negative binomial regression

$$\ln N = C + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \ln Pop + \varepsilon$$

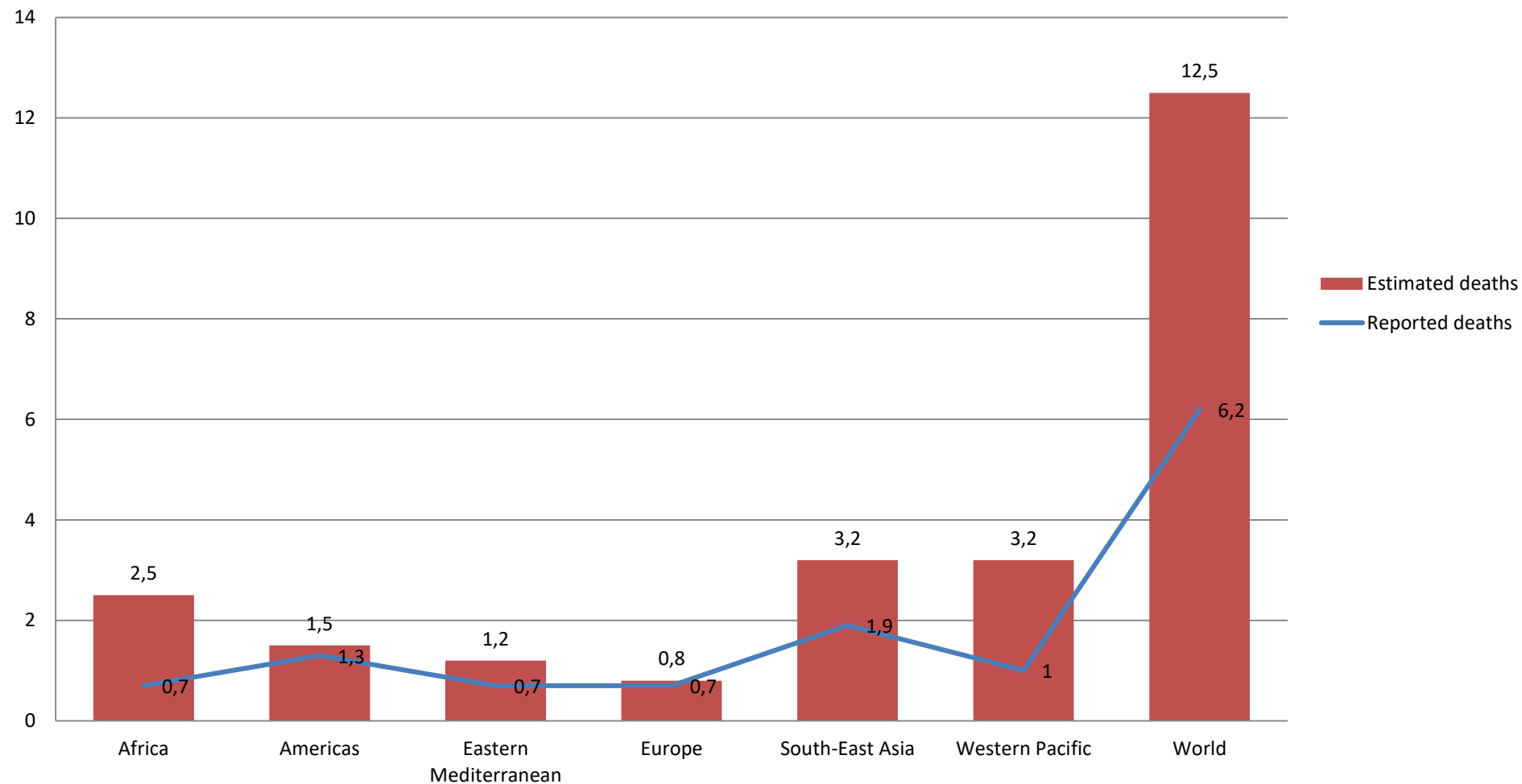
Group 4: Countries without eligible death registration data

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

Independent variables used

Independent variables	Description	Included in models
ln(GDP)	WHO estimates of Gross Domestic Product (GDP) per capita (international dollars or purchasing power parity dollars, 2011 base)	Models A, B, C
ln(vehicles per capita)	Total vehicles per 1000 persons	Models A, B, C
Road density	Total roads (km) per 1000 hectares	Models A, B, C
National speed limits on rural roads	The maximum national speed limits on rural roads (km/h) from WHO questionnaire	Models A, B, C
National speed limits on urban roads	The maximum national speed limits on urban roads (km/h) from WHO questionnaire	Models A, B, C
Health system access	Health system access variable (principal component score based on a set of coverage indicators for each country)	Models A, B, C
Alcohol apparent consumption	Liters of alcohol (recorded plus unrecorded) per adult aged 15+	Models A, B, C
Population working	Proportion of population aged 15-64 years	Models A, B, C
Percentage motorbikes	Per cent of total vehicles that are motorbikes	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)	Model B
National policies <i>for walking /cycling</i>	Existence of national policies that encourage walking and / or cycling	Model C
Population	Total population (used as offset in negative binomial regression)	Models A, B, C

Reported deaths VS estimated deaths (per 100 000), 2013



Health statistics and information systems

Health statistics and information systems

[Topics](#)[Classifications and indicators](#)[Data collection tools](#)[Data analysis tools](#)[Statistics](#)[Country monitoring and evaluation](#)[Monitoring universal health coverage](#)[Publications](#)

Estimates for 2000–2015

CAUSE-SPECIFIC MORTALITY

The latest global, regional and country-level cause-specific mortality estimates for the year 2000, 2005, 2010 and 2015 are available for download below.

Recommended citation: Global Health Estimates 2015: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2015. Geneva, World Health Organization; 2016.

A summary of data sources and methods is available below. Due to changes in data and some methods, the 2000–2015 estimates are not comparable to previously-released WHO estimates.

Related links

– [WHO methods and data sources for global causes of death, 2000–2015](#)

GLOBAL AND BY REGION

Summary tables of mortality estimates by cause, age and sex, globally and by region, 2000–2015

↓ Global summary estimates ↓ xls, 1.12Mb	↓ WHO regions ↓ xls, 2.61Mb	↓ World Bank income groups ↓ xls, 2.12Mb
↓ World Bank regions ↓ xls, 2.86Mb	↓ SDG regions ↓ xls, 2.15Mb	↓ MDG regions ↓ xls, 2.43Mb



Health statistics and information systems

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Topics

Classifications and indicators

Data collection tools

Data analysis tools

Statistics

Country monitoring and evaluation

Monitoring universal health coverage

Publications

WHO Mortality Database

The WHO Mortality Database is a compilation of mortality data by age, sex and cause of death, as reported annually by Member States from their civil registration systems.

– [Access the online database](#)

Number of deaths and age-standardized death rates by country, year, cause, sex and age are presented in a user-friendly application. Cause-of-death data coded according to the ICD-9 and ICD-10 are provided since 1979 to date. Population and live births are provided.

– [Query the online database](#)

Cause of Death Query Online (CoDQL) is a user-friendly tool that allows users to extract easily cause-of-death data by country, year, sex and age. Data since 1950 to date as coded according to the ICD-7, 8, 9 and 10 are available. The tool also enables detailed causes of death to be aggregated to form broader cause-category according to the users' need.

– [Download raw data files](#)

Basic underlying raw data files, together with the necessary instructions, file structures, code reference tables, etc. These data can be used by institutions and organizations which need access at this level of detail, mainly for research purposes, AND have the required information technology (IT) resources to use this information.





WHO Mortality Database



 Select parameters  Graphs  Tables  Definitions  Help

Follow these steps:

Click on "Select parameters" to open dialogue window for selecting countries, indicators and time points. Click on a box with sign+ in front of indicator group title to access the list of indicators. Select required indicators, countries and years by ticking appropriate boxes in front of their titles and then click on OK.

Select required graphical or tabular data display option from the menu.

Repeat the above steps to select and display data on other indicators, countries or time points.

Click on Definitions to view definitions and notes on data quality and sources for selected indicators.

Check Help for more detailed instructions. Make sure that your browser allows popup windows from this web site.

Search indicators:

 Include metadata

Search the text



Search

Clear search

Indicators

- Total deaths by ICD chapter and population
 - No. of deaths - Certain infectious and parasitic diseases
 - No. of deaths - Neoplasms
 - No. of deaths - Diseases of blood and disorders of immune mechanism
 - No. of deaths - Endocrine, nutritional and metabolic diseases
 - No. of deaths - Mental and behavioural disorders and diseases of the nervous system
 - No. of deaths - Diseases of the circulatory system
 - No. of deaths - Diseases of the respiratory system
 - No. of deaths - Diseases of the digestive system
 - No. of deaths - Diseases of the genitourinary system
 - No. of deaths - Pregnancy, childbirth and the puerperium
 - No. of deaths - External causes
 - No. of deaths - Transport accidents, both sexes
 - No. of deaths - Falls, both sexes
 - No. of deaths - Accidental drowning and submersion, both sexes
 - No. of deaths - Exposure to smoke, fire and flames, both sexes
 - No. of deaths - Accidental poisoning by and exposure to noxious substances, both sexes
 - No. of deaths - Intentional self-harm, both sexes
 - No. of deaths - Assault, both sexes
 - No. of deaths - All other external causes, both sexes
 - Age-standardized death rates per 100 000 world standard population
- TEMPORARY INDICATORS

Selected indicators:

Load

Clear

<< Ok >>

Cancel

Total reporting countries

- Albania
- Anguilla
- Antigua and Barbuda
- Argentina
- Armenia
- Aruba
- Australia
- Austria
- Azerbaijan
- Bahamas
- Bahrain
- Barbados
- Belarus
- Belgium
- Belize
- Bermuda
- Bolivia
- Bosnia and Herzegovina
- Brazil
- British Virgin Islands
- Brunei Darussalam
- Bulgaria
- Canada
- Cabo Verde
- Cayman Islands
- Chile
- Colombia
- Costa Rica
- Croatia
- Cuba
- Cyprus
- Czech Republic
- Denmark
- Dominica
- Dominican Republic
- Ecuador
- Egypt
- El Salvador
- Estonia

Load

Clear

Years

Total reporting countries

- Last available
- 2015
- 2014
- 2013
- 2012
- 2011
- 2010
- 2009
- 2008
- 2007
- 2006
- 2005
- 2004
- 2003
- 2002

Clear



Single Explore Compare

Settings [Use advanced settings](#)

Display Cause Risk

Cause C.1.1 Road injuries

Measure Deaths YLDs DALYs

Year 2013

Age All <5 5-14
15-49 50-69 70+

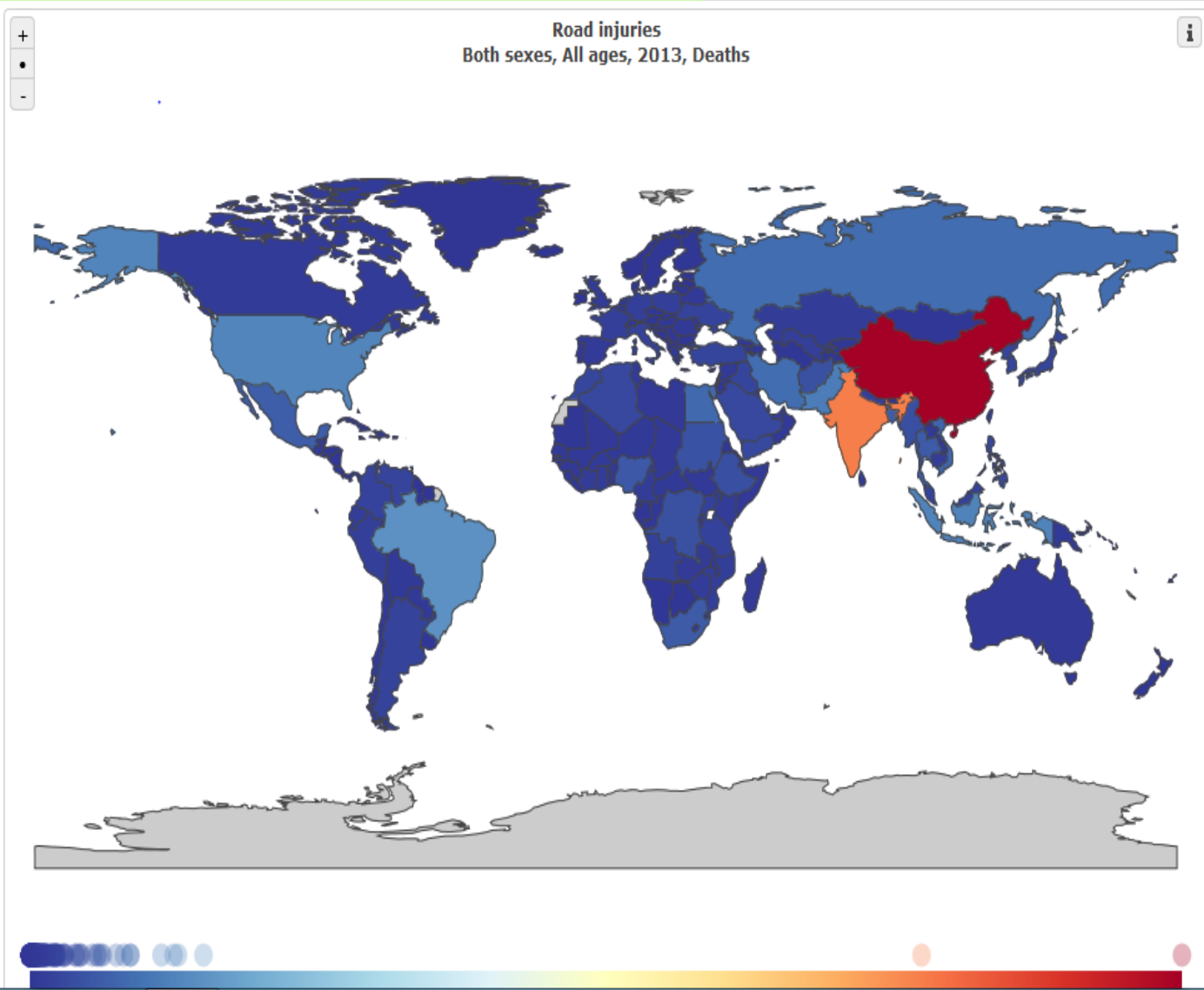
Sex Male Female Both

Units # Rate %

Rate of change Off

Detail 1

Take tour ▶



Conclusion

- This multi-method approach has been used for three reports
- It is continuously being improved
- We welcome your feedback on how to make it better

References

- **Global Status Report on Road Safety**
http://www.who.int/violence_injury_prevention/road_safety_status/2015/en/
- **Global Health Estimates**
http://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html
- **WHO Mortality Database**
http://www.who.int/healthinfo/mortality_data/en/

Thank you for your attention

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http://www.who.int/violence_injury_prevention/en/



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