

Understanding the WHO methodology for estimating the number of road fatalities

Dr. Kacem IAYCH
Athens 8 May



**World Health
Organization**

Road traffic fatality data available in WHO

- Reported data collected through GSRRS questionnaire
- Reported health data collected through Vital Registration (VR)
- Estimated figure produced comparative estimates based on GHE for all causes of death

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

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	Difference in %
Argentina	5209	6055	16.2
Canada	1954	2212	13.2
Chile	1623	2115	30.3
Cuba	687	884	28.7
Greece	879	1098	24.9
Hungary	591	762	28.9
Portugal	637	827	29.8

Difference between Police and VR data

Country	Latest year of health data	Health data (WHO)	Police / ministry of transports
Egypt	2015	7697	6203
Israel	2014*	322	279
Jordan	2012	611	608
Morocco	2014	865	3489
Tunisia	2013	296	1505

Sustainable Development Goals (SDG)

- SDG Target 16.9-by 2030, provide legal identity for all, including birth registration
- SDG Target 17.19 – Proportion of countries that have conducted at least one population and Housing Census in the last 10 years and have achieved:
 - 100 percent birth registration, and
 - 80 percent death registration

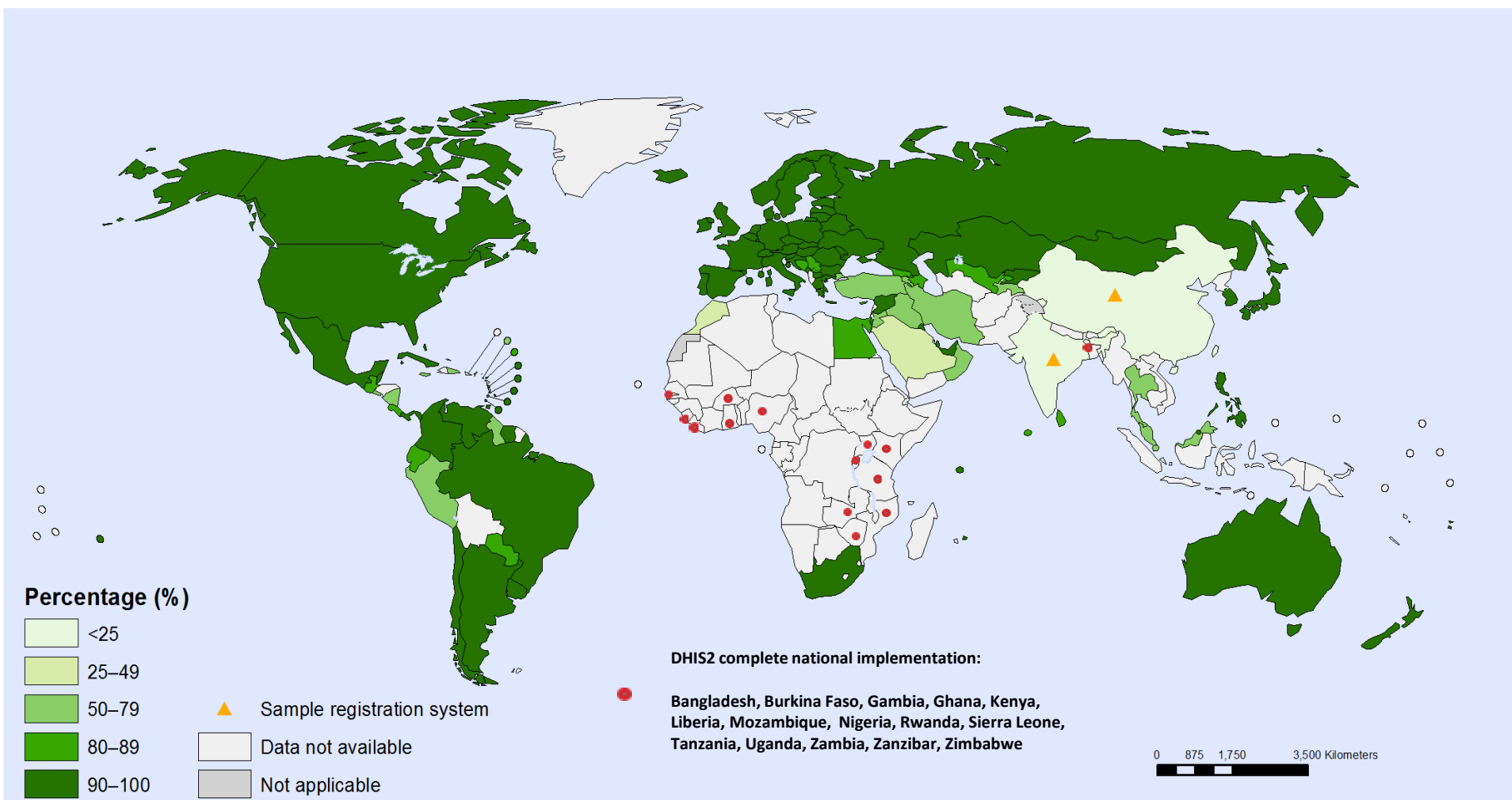
There are signs that both the international community and countries are increasingly committed to improving civil registration and vital statistics systems, including death registration with a reliable cause. For example, the Statistical Commission for Africa adopted a resolution

in January 2012 which prioritized the strengthening of civil registration and vital statistics for the coming decade. In addition, the United Nations Commission on Information and Accountability for Women's and Children's Health recommended in its 2011 report that, as a foundation of accountability for health:

...by 2015, all countries have taken significant steps to establish a system for registration of births, deaths and causes of death, and have well-functioning health information systems that combine data from facilities, administrative sources and surveys.

The focus of the Health Metrics Network (HMN) hosted by WHO (<http://www.who.int/healthmetrics/en/>) is on strengthening civil registration and vital statistics systems. A crucial development in this endeavor is the increasing number of countries that are beginning to review the current situation, and to invest in the systematic strengthening of their national systems.

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



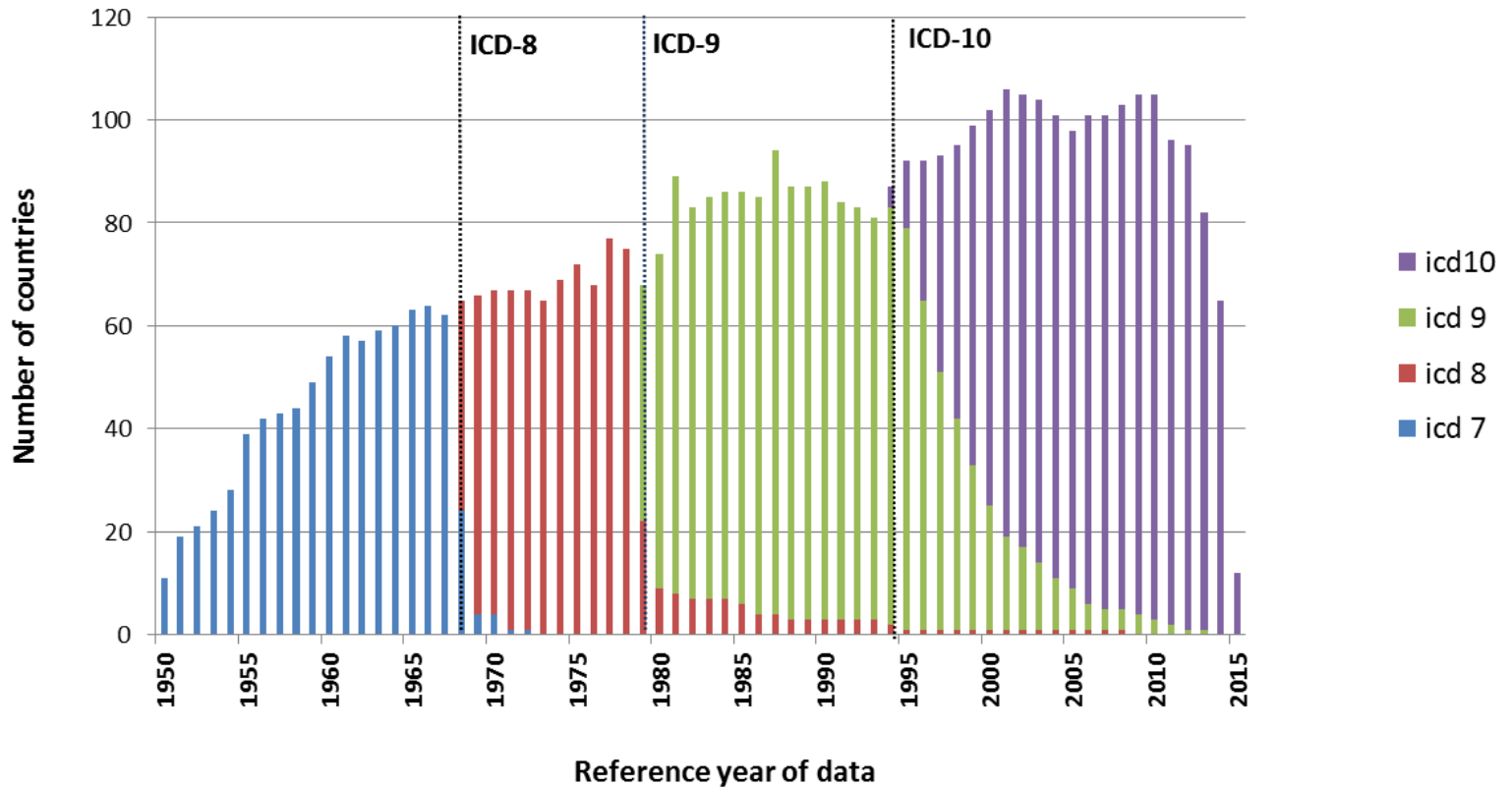
The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

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



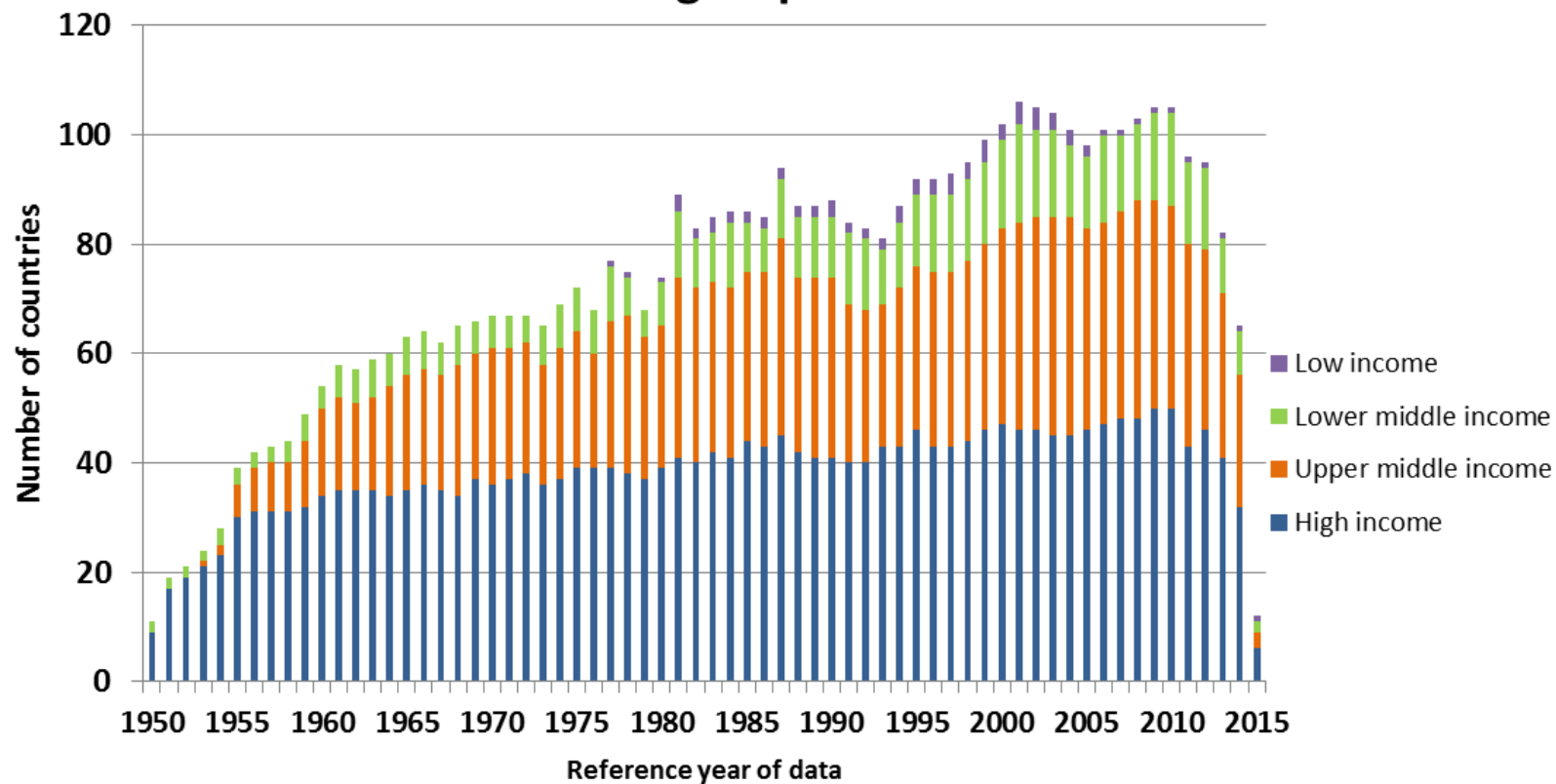
© WHO 2013. All rights reserved.

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

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)

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.

And

$(\text{Usability } (\%)) = \text{completeness}(\%) * (1 - \text{deaths assigned to a garbage code } \%)$

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

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

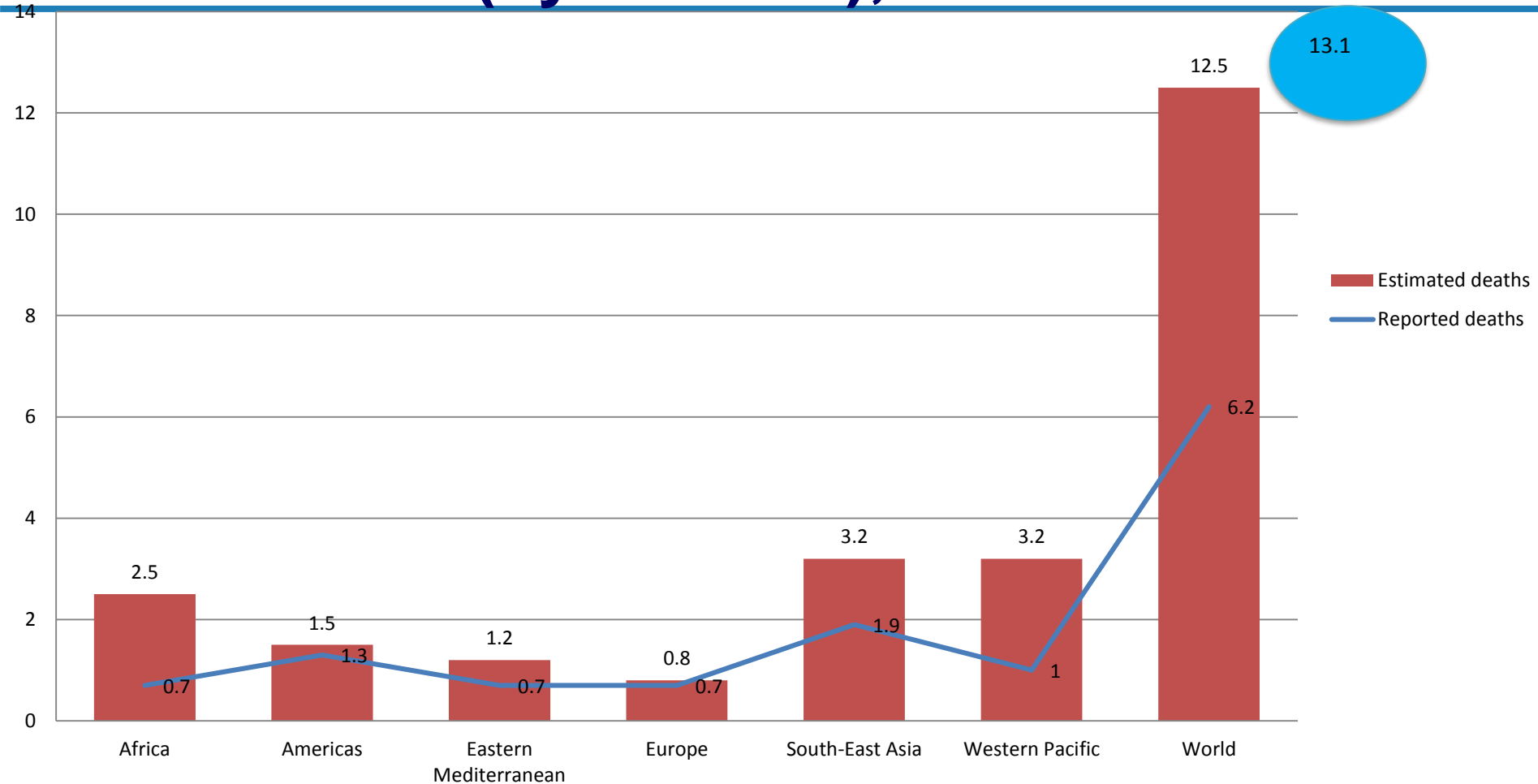
Group 4: Countries without eligible death registration data

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 (by 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](#)

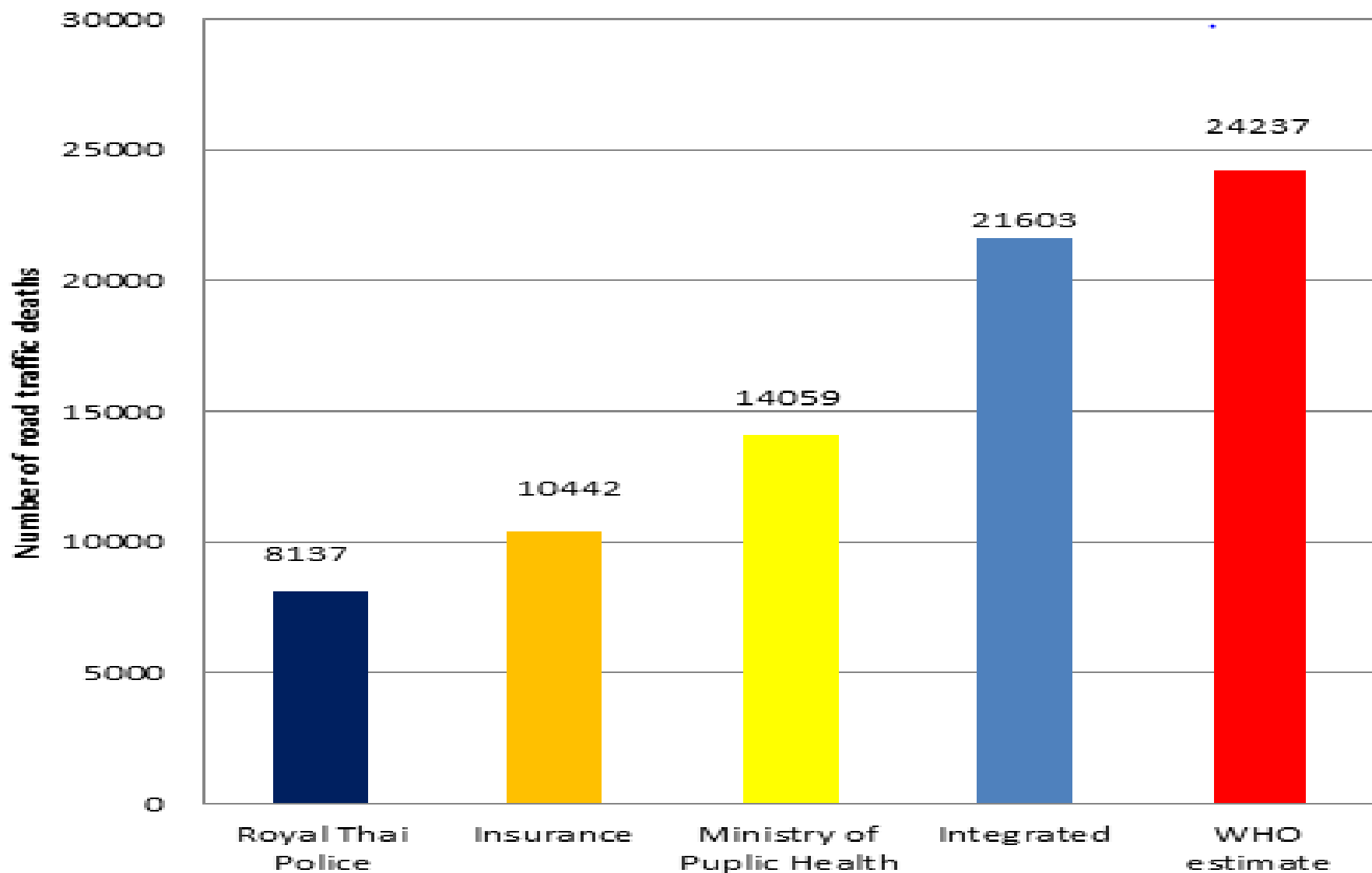
GLOBAL AND BY REGION

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




Figure 1. Improving road traffic death data collection in Thailand, 2013



1. Quality

- It is known that some level of data exists, it's the quality that's questionable,
- combination of key data variables that allow certain factors to be measured missing, e.g. exposure data
- Data Convergence: Compare MoH 16,000 vs Police/NTSA 3,000 data within the same year (2016)



**WHO Application of ICD-10 for
low-resource settings initial
cause of death collection**

**The Startup Mortality List
(ICD-10-SMoL)**

V2.0

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

The Startup Mortality List (ICD-10-SMoL)



ICD-10 for low-resource settings

The Start-Up Mortality List (SMoL) has been designed to be in line with the International Classification of Diseases (ICD), and informs setting public health priorities and tracking progress towards national and international targets and goals. This list is designed to be a first step towards standardized reporting of causes of death in low-resource settings where capacities to code causes of death to ICD 3- or 4-digits are lacking.

Download the Startup Mortality List

↓ Version 2.0
📄 pdf, 464kb

Training workshops reports

↓ Training of trainers workshop on improving cause-of-death statistics in health facilities, Geneva, Switzerland, 26-28 April 2017
📄 pdf, 202kb

↓ Multi-country workshop on improving cause-of-death statistics in health facilities, Dar es Salaam, Tanzania, 25-26 July 2016
📄 pdf, 196kb

↓ Workshop on on improving cause-of-death statistics in health facilities, Accra, Ghana, 21-22 April 2016
📄 pdf, 180kb

Request for help

If you need assistance in using the tool, please send an email to healthstat@who.int.

Health statistics and information systems

Analysing mortality levels and causes-of-death (ANACoD)

Analysing mortality level and cause-of-death data






The ANACoD electronic tool provides a step-by-step approach to enables users to quickly conduct a comprehensive analysis of data on mortality levels and causes of death. The tool automatically reviews the data for errors, tabulates the information, presents the results in the form of easy to use tables and charts, and provides the opportunity to compare the findings with those from other groups of countries.

The tool is an Excel-based application. Users are expected to have some basic skills in Excel.



— [Watch the tutorial](#) 

Download the tool

 [Version 1.01 \(Russian\)](#)
 zip, 5.68Mb

 [Version 1.1 \(English\)](#) |  [Version 1.1 \(French\)](#) |  [Version 1.1 \(Spanish\)](#)
 zip, 3.47Mb |  zip, 3.92Mb |  zip, 3.09Mb

This version, for users of Excel 2007, includes basic demographic and cause-of-death analyses.

 [Version 2.0 \(English\) - updated: 17 October 2014](#)
 zip, 8.81Mb

Version 2.0 offers a wider range of analyses and includes a special module for analysing external causes of injury deaths. This version has been designed with the flexibility to analyse any cause-of-death data set:

- a. **Basic:** basic demographic and cause-of-death analyses (Recommended for first-time users who should have both the population and mortality data)
- b. **Advanced:** basic demographic and cause-of-death analyses including detailed analyses of external causes of injury deaths (Users should have both the population and mortality data)
- c. **Lite:** only cause-of-death analyses including external causes of injury deaths (It is for users who wish to analyse a small set of cause-of-death data from as hospital or survey. No need to have the population data)

Recommendations

- Countries need to integrate data from health, transport, police and insurance sectors
- Countries need to make an effort to improve quality of data (CRVS data coverage & VA)
- Better coordination among international and national agencies

Upcoming publications

- Fourth Global Status Report on Road Safety (Nov 2018)
- Mobile application for GSRRS4 (Nov 2018)
- Data visualization (Nov 2018)
- Global Health Estimates (May 2018)

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
- Improving data is important as we work on SDGs
- Collaboration is key

Thank you for your attention

iaychk@who.int

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



**World Health
Organization**