

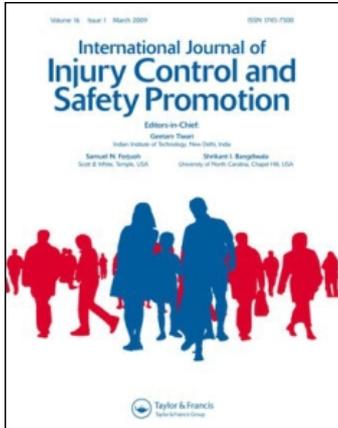
This article was downloaded by: [Bhalla, Kavi]

On: 18 April 2011

Access details: Access Details: [subscription number 936582442]

Publisher Taylor & Francis

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## International Journal of Injury Control and Safety Promotion

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713734346>

### The global injury mortality data collection of the Global Burden of Disease Injury Expert Group: a publicly accessible research tool

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First published on: 18 April 2011

**To cite this Article** Bhalla, Kavi , Harrison, James E. , Fingerhut, Lois A. , Shahraz, Saeid , Abraham, Jerry , Yeh, Pon-Hsiu and on behalf of the Global Burden of Disease Injury Expert Group(2011) 'The global injury mortality data collection of the Global Burden of Disease Injury Expert Group: a publicly accessible research tool', International Journal of Injury Control and Safety Promotion,, First published on: 18 April 2011 (iFirst)

**To link to this Article:** DOI: 10.1080/17457300.2011.561928

**URL:** <http://dx.doi.org/10.1080/17457300.2011.561928>

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## SHORT REPORT

### The global injury mortality data collection of the Global Burden of Disease Injury Expert Group: a publicly accessible research tool

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(Received 3 May 2010; final version received 24 January 2011)

#### Introduction

The Global Burden of Disease (GBD) Injury Expert Group (Bhalla & Harrison, 2009) has been actively collecting data to improve estimates of the burden of injuries produced as part of the GBD-2005 project (Murray & Lopez, 1996; Murray et al., 2007). We initiated data gathering in January 2009 with an open call for contributions (Bhalla et al., 2009) and have supplemented it with searches through the published literature, online databases and direct contact with researchers and government agencies. In this data hunt, we included all data sources that had the potential to be used to derive estimates of population-level incidence of fatal and non-fatal injuries in a country or a region. These data sources included data from national death registers, mortuary records, police reports, national health surveys and hospital registries.

The data from national death registers being collected as part of this project have the potential to be a particularly useful resource for cross-country comparative research on injury mortality trends because of a number of data characteristics. These data typically include causes coded to a common set of definitions [usually based on the International Classification of Diseases (ICD)]. They are collected by national agencies as part of national civil registration systems, whose primary function is to create legal documents related to births and deaths of individuals (Mahapatra et al., 2007). As a result, they can provide long-time histories of cause-of-death data that have high coverage and completeness.

The WHO mortality database (WHO, 2008) is the single largest publicly available collection of cause-

of-death data from national civil registration systems and is thus a key data source for estimating global injury mortality in the GBD-2005 study. As a first step towards making these data more useful for injury researchers, we have processed the WHO mortality database into a common set of external cause definitions and have made the data available on our website: [www.globalburdenofinjuries.org](http://www.globalburdenofinjuries.org). In the future, mortality data from other sources, as well as hospital and survey data collected as part of the GBD-2005 will also be made publicly available on this website.

The purpose of this article is to announce the existence of this public data collection, describe how the mortality data from the WHO mortality database were processed and provide an illustrative example of using the suicide data in injury research.

#### Data sources

At present, all of the cause-of-death data included in our collection are from the publicly available WHO mortality database (WHO, 2008). We only included country-years in the database for which data were available at a suitable level of detail. To qualify for inclusion, the data needed to be age–sex disaggregated, available in 5-year age groups, and the causes of death needed to be coded to detailed ICD-9 (four digit) and ICD-10 (three or four digit) codes. Thus, we have not included countries that report the causes of death using summary (condensed) tabulation lists of ICD-9 and ICD-10 because these tabulation lists do not provide sufficient detail for estimating injury deaths. Notably, this resulted in the exclusion of several countries from Central Asia, South-East Asia, Central

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Europe, Eastern Europe and North Africa and the Middle East.

It should be noted that the quality of the death registration data varies substantially based on coverage, completeness, misclassification and use of partially specified cause categories. We have conducted a systematic assessment of these quality characteristics of the WHO mortality database (Bhalla, Harrison, Shahraz, & Fingerhut, 2010). Furthermore, we show that data quality can vary substantially by cause of death. For instance, a dataset that has high specificity for estimating deaths from one injury mechanism (e.g. road injury deaths) could nevertheless have poor specificity for estimating deaths from another mechanism (e.g. homicide). Thus, we did not exclude individual countries or specific years from this data collection because of quality characteristics. Our analysis of suicide data in this paper provides an illustration of how countries can be excluded for estimating incidence of deaths from a particular cause (suicide).

In addition to the cause-of-death tabulations, the data collection also includes national population estimates derived from the United Nations World Population Prospects – 2006, which are publicly available from the UN Population Division website (UNPD, 2008).

The database includes data from 85 countries and a total of 703 country-years of data (Tables 1 & 2). These 85 countries include 17 of the 21 global regions, including all high-income regions and many low-income regions. Regions that are severely under-represented include Asia (particularly, South, South-East and East Asia) and the continent of Africa.

### Data processing

We aggregated ICD coded causes to two sets of external cause-of-injury definitions: the definitions of the GBD Injury Expert Group and those developed by the Injury Control and Emergency Health Services section of the American Public Health Association and the International Collaborative Effort (ICE) on Injury Statistics (McLoughlin et al., 1997). The GBD-Injury definitions aggregate ICD codes into 48 specified and 21 partially specified categories (Bhalla et al., 2010) and were developed for the GBD-2005 project. Similarly, the ICE external cause matrix (McLoughlin et al., 1997) aggregates ICD codes to a two-dimensional array of mechanism and intent. Because the ICE definitions require four-digit ICD-10 codes, countries that reported causes coded using three-digit ICD-10 were not processed to ICE definitions. These were processed only to the GBD-Injury definitions.

The database also includes results from two models for reapportioning or redistributing deaths

coded to partially specified causes. The redistributions are done pro rata within age–sex groups. Details of the redistribution methods are provided with the database.

### Illustrative example: suicide rates

As an illustrative example of the type of descriptive analysis possible using this data collection, we extracted data for countries that had good quality data for estimating suicide rates. Thus, we excluded countries for which the most recent data were prior to the year 2000. We excluded countries with completeness of death registration that was lower than 60%. And, finally, we excluded countries that had more than 20% of all injury deaths coded to undetermined intent or unspecified intent. Finally, we report incidence rates after redistribution (pro rata, within age–sex groups) of deaths coded to undetermined intent.

Figure 1 illustrates crude suicide rates by mechanism for the 64 countries of 85 countries that met our inclusion criteria. The excluded list of countries substantially reduced the number of countries available from Central Asia, South-East Asia, Central America, North Africa and the Middle East. In addition, South Africa, the only country from the sub-Saharan Africa regions, was excluded.

The results show many characteristics that should be of interest to a researcher interested in cross-country exploration in suicide. Countries in the Asia-Pacific region and in Central and Eastern Europe have among the highest recorded suicide rates in the world. At the other end of the spectrum, several countries (including Bahamas, Barbados, Cyprus and Kuwait) had suicide rates that are so low, according to this source, as to raise questions about completeness and quality of reporting.

In these 64 countries, hanging (included in threats to breathing – other) is the most common mechanism of suicide. Poisonings by drugs are common in Western and Central Europe, but pesticide poisoning is common in Central America.

### Discussion

This global mortality data collection is a research tool intended to enable cross-country comparative analysis of injury time trends. It is important to note that the country-level injury death estimates cannot be taken at face value without careful interpretation and analysis. In particular, researchers need to check the coverage and completeness of death registration and the quality of cause-of-death attribution. Thus, in our illustrative example of global suicide rates, we constructed a country inclusion criterion that was specific to suicides. Researchers interested in other external causes will

Table 1. Country-years included in this global injury mortality data collection.

Asia-Pacific, high income	Japan (1995–2007), Republic of Korea (1995–2006), Singapore (1991–2003)
Central Asia	Azerbaijan (2007), Georgia (1998–2001), Kyrgyzstan (2000–2006), Uzbekistan (2004–2005)
East Asia	Hong Kong (2001–2007)
South-East Asia	Maldives (2000–2005), Mauritius (1998–2007), Reunion (2001–2005), Thailand (1990–1992, 1994–2000, 2002)
Australasia	Australia (1997–2004), New Zealand (1997–2005)
Caribbean	Anguilla (2000–2001, 2003–2006), Antigua and Barbuda (2000–2006), Aruba (1987, 1990, 1995, 1999, 2002–2004), Bahamas (1999–2002), Barbados (2000–2003), Belize (1997–2001), Bermuda (1996–2002), British Virgin Islands (1996–2003), Cayman Islands (1998–2000, 2002–2004), Cuba (2000–2006), Dominica (2000–2004), Dominican Republic (1996–2001, 2003–2004), French Guiana (2001–2005), Grenada (2001–2005), Guadeloupe (2000–2005), Guyana (1991–1992, 1998–1999, 2001–2005), Haiti (1997, 1999, 2001–2003), Martinique (2000–2005), Montserrat (1995–2003), Netherlands Antilles (1988–2000), Puerto Rico (1999–2003, 2005), Saint Kitts and Nevis (1996–2005)
Central Europe	Croatia (1995–2006), Czech Republic (1994–2007), Hungary (1996–2005), Poland (1999–2006), Romania (1999–2007), Serbia (1998–2007)
Eastern Europe	Estonia (1997–2005), Latvia (1996–2007), Lithuania (1998–2007), Republic of Moldova (1996–2007)
Western Europe	Austria (1999–2007), Belgium (1994–1995, 1997–1999), Cyprus (1994, 1996), Denmark (1994–2006), Finland (1996–2007), France (1997–2006), Germany (1998–2006), Greece (1998–2006), Iceland (1996–2007), Ireland (1996–2005, 2007), Israel (1996–2005), Italy (1996–2003, 2006), Luxembourg (1998–2005), Malta (1995–2007), Netherlands (1996–2007), Norway (1996–2006), Portugal (1998–2000, 2002–2003), San Marino (1995–2000), Spain (1997–2005), Sweden (1996–2006), United Kingdom (1998–1999, 2001–2007)
Andean Latin America	Ecuador (1997–2006), Peru (1999–2000)
Central Latin America	Colombia (1997–2002, 2004–2005), Costa Rica (1997–2006), El Salvador (1997–2006), Guatemala (2000–2006), Mexico (1998–2006), Nicaragua (1997–2005), Panama (1998–2004, 2006), Venezuela (1996–2005)
Southern Latin America	Argentina (1997–2005), Chile (1997–2005), Uruguay (1997–2000, 2001, 2004)
Tropical Latin America	Brazil (1996–2005), Paraguay (1996–2004)
North Africa/Middle East	Bahrain (1997–2001), Egypt (2000), Kuwait (1995–2002), Qatar (1995–1995)
North America, high income	Canada (1997–2004), Saint Pierre et Miquelon (2005), United States of America (1997–2005)
Oceania	Fiji (1999), Kiribati (1991–2001)
Southern sub-Saharan Africa	South Africa (1996–2005)

Note: Numbers in parenthesis refer to the years for which data are available for each country.

need to modify their inclusion criterion appropriately. Furthermore, it should be noted that despite the quality screening, several countries in Figure 1 have suicide rates that we suspect are unrealistically low. Especially for suicides, issues such as misclassification of deaths to unintentional injuries are likely to be a substantial issue.

As is evident from Table 1, there are many countries and regions (e.g. Asia and Africa) that are under-represented in this data collection. While at present this collection only includes data from the WHO mortality database, the GBD-2005 study needs access to mortality data wherever it is available. For inclusion in this data collection: (1) a country needs to have a functioning death registration system that records the causes of death, (2) the causes need to be coded at an appropriate level of detail and (3) the data need to be available to researchers for public use.

Table 2. About this global injury mortality data collection.

Website	<a href="http://www.globalburdenofinjuries.org/">www.globalburdenofinjuries.org/</a>
File formats	Deaths data and population data can be downloaded in the following formats: Stata, comma separated values and Microsoft Excel
External cause definitions used	Two sets are provided: (1) GBD Injury Expert Group definitions (Bhalla & Harrison, 2009); (2) ICE-Injury matrix (McLoughlin et al., 1997)
Variables	The following variables are included in the deaths data: year, country code, country name, ICD code list, external cause code, age (5-year intervals) and sex. The following variables are included in the population data: year, country code, country name, age (5-year intervals) and sex.

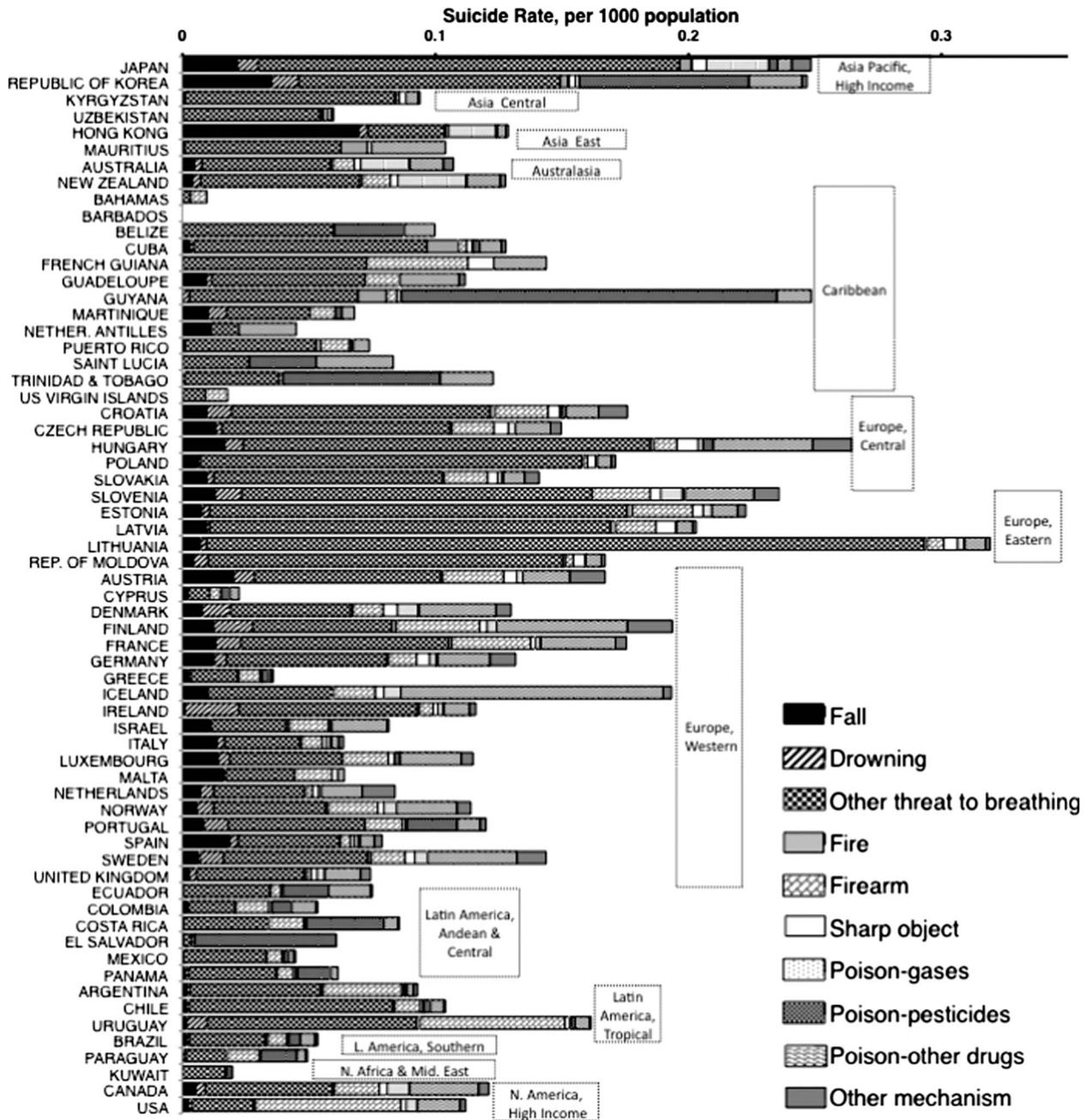


Figure 1. Suicide rates by mechanism in 64 countries.

Providing public access to this mortality data collection is only the first step towards sharing all of the data that are being collected by the GBD Injury Expert Group. In addition to data from vital registration systems, the GBD Injury Expert Group is also acquiring data from other sources of death registration (such as urban mortuaries and rural health and demographic surveillance sites), hospital registries, national health surveys and community injury surveys. These data will be processed to common project definitions and, to the extent allowed by providers, made available.

Our current work is driven by the needs of the GBD-2005 study and thus constitutes a one-time data gathering effort. However, it is important that the infrastructure for collecting and disseminating such data on an ongoing basis be established. Such data repositories provide injury researchers the opportunity to undertake cross-country comparative research and thus learn from the experience of other countries. Because maintaining and regularly updating such data infrastructure is beyond the capacity of most research groups, it is important that international health and

development agencies incorporate such research data collections as part of their ongoing data dissemination activities.

### Acknowledgements

The authors report no conflicts of interest. None of the members of the GBD Injury Expert Group derive any salary support from the GBD project. However, several members have ongoing funded research in closely associated areas. KB, SS, JA and P-HY are supported by a grant from the World Bank Global Road Safety Facility, but this funder has played no role in the study design, data analysis, decision to publish or preparation of the manuscript. Ethical approval is not required. Please note that the database contains tabulated results and cannot be used to identify individuals.

### References

- Bhalla, K., & Harrison, J. (2009). Home page of the Global Burden of Disease Injury Expert Group. Retrieved from <http://sites.google.com/site/gbdinjuryexpertgroup/>
- Bhalla, K., Harrison, J., Abraham, J., Borse, N.N., Lyons, R., Boufous, S., Aharonson-Daniel, L.; Global Burden of Disease Injury Expert Group. (2009). Data sources for improving estimates of the global burden of injuries: call for contributors. *PLoS Medicine*, 6(1), doi: 10.1371/journal.pmed. 1000001.
- Bhalla, K., Harrison, J., Shahraz, S., & Fingerhut, L. (2010). Availability and quality of cause-of-death data for estimating the global burden of injuries. *Bulletin of the World Health Organization*, 88(11), 831–838.
- Mahapatra, P., Shibuya, K., Lopez, A.D., Coullare, F., Notzon, F.C., Rao, C., Szreter, S., on behalf of the Monitoring Vital Events (MoVE) Writing Group. (2007). Civil registration systems and vital statistics: successes and missed opportunities. *Lancet*, 370 (9599), 1653–1663.
- McLoughlin, E., Annet, J.L., Fingerhut, L., Rosenberg, H., Kochanek, K., Pickett, D., & Berenholz, G. (1997). Recommended framework for presenting injury mortality data. *Morbidity and Mortality Weekly Report, Centers for Disease Control*, 46(RR-14), 1–30.
- Murray, C.J., & Lopez, A.D. (1996). *The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020*. Cambridge, MA: Harvard University Press.
- Murray, C.J., Lopez, A.D., Black, R., Mathers, C.D., Shibuya, K., Ezzati, M., ... Vos, T. (2007). Global burden of disease 2005: Call for collaborators. *Lancet*, 370(9582), 109–110.
- UNPD. (2008). *World Population Prospects: 2008 Revision* (publication from United Nations Population Division Department of Economic and Social Affairs). Retrieved from <http://esa.un.org/unpp>
- WHO. (2008). *WHO mortality database* (publication from WHO). Retrieved from <http://www.who.int/healthinfo/statistics/mortdata/>