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CHARACTERISTICS AND AVAILABILITY OF FATAL ROAD-CRASH DATABASES WORLDWIDE

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16. Abstract <p>This study examined the characteristics and availability of fatal road-crash databases worldwide. The study involved two parts. In the first part, the major international road databases were briefly reviewed. These databases included IRTAD, IRF, UNECE, WHO, and CARE. In the second part, the national databases in 20 selected countries were examined. The countries included the 14 European countries in CARE, plus Germany, China, India, Japan, Republic of Korea, and the U.S.</p> <p>The main results were as follows: (1) The available international databases of fatal road crashes typically include aggregated data. (2) There is a national database of fatal road crashes in each country examined. (3) All countries provide aggregated crash data, but there are substantial restrictions on the availability of disaggregated data. (4) Overall, the crash data at the accident level are relatively similar, but there are substantial differences in the information at the person level.</p> <p>The results of this study imply that international road safety research would greatly benefit from expanded availability of disaggregated fatal crash data worldwide.</p>					
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Introduction

Road traffic injuries are a major global public health problem (Peden et al., 2004). Without increased efforts, road crashes are predicted to result in 2.3 million fatalities worldwide by 2020 (compared to 1.2 million in 2002).

The major increase in predicted fatalities will not occur in the developed countries. Indeed, in those countries it is predicted that there will be a decrease in fatalities (Murray and Lopez, 1996). Instead, the situation is likely to get substantially worse primarily in the countries with steep increases in motorization. For example, Murray and Lopez (1996) estimated that road fatalities in India will jump from 174,000 in 1990 to 546,000 in 2020. The analogous predicted increase for China is from 135,000 in 1990 to 409,000 in 2020.

A prerequisite for making progress in traffic safety is an assessment of the current situation and identification of associated factors. Consequently, the availability of a reliable and comprehensive national crash database is critical for understanding the pattern of accident causation in a particular country and for identification of potentially viable country-specific countermeasures. From this perspective, disaggregated data (the data that include specific information for each accident, vehicle, and person involved) are clearly preferable to aggregated data. This is the case because disaggregated data allow the examination of unique interactions in a way that is not possible with aggregated data.

In this study, we documented the characteristics and availability of road-crash databases in selected countries worldwide. The focus was on fatal crashes, because it is well established that crashes involving nonfatal injuries are reported less reliably (e.g., Evans, 2004), although there are substantial differences in recording of fatal crashes as well (Jacobs et al., 2000).

The study involved two parts. In the first part, the main international road databases were briefly reviewed. In the second part, the nature of national databases in selected countries was investigated.

Both parts of this study relied on national databases of fatal crashes, because such databases provide the most comparable crash data. However, it is acknowledged that in addition to the national crash databases, there are other crash databases (e.g., those that

include all reportable traffic crashes, and those based on in-depth investigations) that may also provide important information about road safety (see e.g., Jahl et al., 2006).

Method

International databases

Information about international crash databases was collected online. We used the following keywords in our search: *international, road, traffic, fatal, accident, crash, and database*.

National databases

The following countries were selected for the survey of national databases: Australia, Brazil, China, Germany, India, Japan, Republic of Korea, and the U.S. These countries include examples of (1) highly-motorized and (2) developing countries worldwide with expected rapid increase in motorization. A survey form and a cover letter that requested voluntary completion of the survey were sent by e-mail to a traffic safety expert in each country. Consequently, not all of the information came from official sources. The U.S. data came from NHTSA (2004) and Tessmer (2002). The survey form and cover letter are reproduced in the appendices.

We excluded the Australian data from the final set because the content and production of the database were under revision. In addition, we received no response from Brazil. On the other hand, we supplemented our sample with the 14 European countries in the CARE database (see below). Consequently, our final sample included information on 20 countries: 14 countries in CARE, Germany, China, Japan, India, Republic of Korea, and the U.S.

The survey data are presented in tabular form. The tables cover the following areas: starting year of the data collection in the current form and organization responsible for maintaining the database, availability of the data and type of crashes included, accident-related factors, vehicle-related factors, driver-related factors, other-road-user-related factors, and occupant-related factors.

International databases

IRTAD

IRTAD (International Road Traffic and Accident Database) is maintained by the Federal Highway Research Institute in Germany (BAST) and overseen by the Joint OECD/ECMT Transport Research Committee (IRTAD, 2006). The following 30 countries currently participate in IRTAD: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxemburg, New Zealand, Norway, Poland, Portugal, Republic of Korea, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, the Netherlands, Turkey, the United Kingdom, and the U.S.

The database includes the following *aggregated* data by country (for 1965 and for every year since 1970):

- fatalities by gender and age group
- fatalities by road user group
- fatalities by road type/environment and vehicle type (e.g., passenger cars, heavy goods vehicles, light goods vehicles)
- fatalities by month
- car fatalities by driver/passengers and age group
- area of country
- population by age group
- number of vehicles by vehicle type
- distance driven by vehicle type and road type/environment area

There are three different groups of active IRTAD members (with access to the data through various subscription fees): (1) national coordinating institutions representing the country, (2) other institutes of a participating country, and (3) international organizations.

IRF

IRF (International Road Federation) World Road Statistics is the only global compilation of road and vehicle statistics. The 2000 edition is based on national statistics from 189 countries (IRF, 2000). The *aggregated* data include, for example, information about the total number of crashes, injuries, and deaths; corresponding rates per distance driven; and percentage of injury crashes in built-up areas and at night. In addition, the data include number of vehicles and distance driven per vehicle type.

UNECE

UNECE (Economic Commission for Europe) publishes *aggregated* statistics of road crashes in 56 countries in Europe and North America. The report contains the basic statistics provided by the government members of the UNECE.

There are three parts in the current UNECE report (UNECE, 2004). First, charts and summary tables show the overall situation and developments regarding road traffic crashes and casualties. Second, somewhat more detailed statistics are presented, including location, time of occurrence, road condition, personal injuries and deaths, as well as alcohol-related crashes. Third, background statistics on vehicle fleets, estimates of vehicle-kilometers driven, and population by age group are presented.

WHO

The WHO (World Health Organization) Mortality Database contains *aggregated* mortality data officially reported by WHO member states (WHO, 2006). Currently there are 192 members. The database includes cause-of-death statistics coded according to the 9th and 10th revision of the ICD (International Classification of Diseases). Therefore, the data presented here refer to the years 1979 and later.

Number of deaths at different ages and age-sex-specific death rates per 100,000 inhabitants are presented in tabular form by country and year. One category is motor vehicle traffic crashes.

CARE

CARE (Community Road Accident Database) is a database on road crashes resulting in death or injury (CARE, 2006). CARE includes the following 14 European countries: Austria, Belgium, Denmark, Finland, France, Greece, Ireland, Italy, Luxembourg, Portugal, Spain, Sweden, the Netherlands, and the United Kingdom. Access is currently restricted to a maximum of three organizations from member states of the European Union (Sanz Villegas, 2006). The major difference between CARE and most other existing international databases is the high level of *disaggregation*, i.e., CARE contains data on individual crashes as collected by the member states from 1991. This structure allows flexible and versatile data analyses.

National databases for selected countries

The results of the survey are shown in Tables 1 through 7. Specifically, these tables summarize the findings on starting date of the data collection in the current form and organization responsible for maintaining the national database (Table 1), availability and type of crashes included (Table 2), accident-related factors (Table 3), vehicle-related factors (Table 4), driver-related factors (Table 5), other-road-user-related factors (Table 6), and occupant-related factors (Table 7).

Table 1

Starting year of the data collection in the current form and organization responsible for maintaining the national database.

Country/region	Starting year	Organization responsible for maintaining the database
CARE	1991	DG TREN in European Commission, unit E3
Germany	1968 ¹	Federal Statistical Office
China	N/A	Ministry of Security
India	2001	Ministry of Shipping, Road Transport, and Highways
Japan	1966	National Police Agency
Korea	2003	Police Department
USA	1975	National Highway Traffic Safety Administration

¹ No data for 1986 through 1990.

Table 2
Availability of data and types of crashes included (“-” indicates no data).

Country/region	Availability of data		Definition of fatality	Type of crashes included			
	Disaggregated	Aggregated		Private roads/areas	No motor vehicle	Suicides	Diseases
CARE	Limited ¹	Pre-selected	30 days ⁵	Yes ⁸	Yes ¹²	Yes ¹³	Varies ¹⁴
Germany	No access	Pre-selected ²	30 days	No	Yes	No	No
China	No access	Pre-selected ²	-	-	-	-	-
India	No access	Pre-selected ³	30 days	-	-	-	-
Japan	No access	Limited ⁴	24 hrs ⁶	Yes ⁹	Yes	No	Yes
Korea	No access	Pre-selected ²	30 days ⁷	Yes ¹⁰	Yes	No	No
USA	Unlimited	Unlimited	30 days	Yes ¹¹	No	No	No

¹ Each external organization from the participating countries can create its own reports based on disaggregated data. There is a separate fee for each connection by an external organization (through web intelligence software).

² Regularly produced reports (typically annually).

³ Information on number of road crashes, persons killed and injured (see <http://morth.nic.in/mts.htm>).

⁴ Selected cross-tabulations by variables such as age, sex, vehicle type, etc. A fee for any additional request.

⁵ 7 days for Italy, 6 days for France, 3 days for Austria (before 1992), and 24 hours for Spain, Greece, and Portugal.

⁶ The data using 30 days are also available.

⁷ 3 days until 1999.

⁸ If there is public access (except for Belgium, the Netherlands, and Portugal).

⁹ If there is public access.

¹⁰ If there is public access, but not areas such as parking places and closed areas.

¹¹ If traffic access is customarily open to the public.

¹² Crashes include those with animal-drawn vehicles for Denmark, Spain, Finland, Great Britain, Italy, Ireland, the Netherlands, Portugal, and Sweden; horses with rider for Denmark, the United Kingdom, the Netherlands, and Sweden; and trains or trams for Denmark, Spain, Finland, the United Kingdom, Italy, the Netherlands, Portugal, and Sweden.

¹³ Data only for Denmark, France, and Spain.

¹⁴ Sudden illness for Denmark, Spain, and the Netherlands.

Table 3
Accident-related factors in the database.

Factor	CARE	Germany	China	India	Japan	Korea	USA
year of accident	√	√	√	√	√	√	√
date	√	√	√		√	√	√
time of day	√	√	√		√	√	√
number of vehicles	√	√	√	√	√	√	√
number of person killed	√	√	√	√	√	√	√
number of persons injured	√	√	√	√	√	√	√
type of vehicles	√	√	√	√	√	√	√
number of pedestrians	√	√	√	√	√	√	√
number of bicyclists	√	√	√	√	√	√	√
accident type		√	√	√	√	√	√
road class	√	√		√	√	√	√
environment (rural/urban)	√	√		√	√	√	√
road type	√		√	√	√	√	√
road condition	√	√	√	√	√	√	√
light condition	√	√	√	√	√	√	√
weather	√	√ ¹	√	√	√	√	√
traffic control	√		√	√	√	√	√
posted speed limit	√	√			√	√	√

¹ If a contributing factor.

Table 4
Vehicle-related factors included in the database.

Factor	CARE	Germany	China	India	Japan	Korea	USA
vehicle identification number					√	√	√
vehicle model year	√	√ ²	√		√	√	√
vehicle type	√	√	√	√	√	√	√
travel speed estimate			√		√	√	√
maneuver	√	√	√		√	√	√
pedestrian action	√ ¹		√		√	√	√
total number of people killed in vehicle		√	√	√	√	√	√
total number of occupants in vehicle		√	√		√	√	√

¹ Only pedestrian crossing road.

² First registration year.

Table 5
Driver-related factors included in the database.

Factor	CARE	Germany	China	India	Japan	Korea	USA
license compliance	√ ¹	√	√		√	√	√
alcohol test result	√	√		√	√	√	√
violation	√	√	√		√	√	√
gender	√	√	√	√	√	√	√
age or date of birth	√	√	√	√	√	√	√
seat belt use	√				√	√	√
medical cause of death					√		

¹ Only 'no license required' and 'individual driving license age.'

Table 6
Other-road-user-related factors included in the database.

Factor	CARE	Germany	China	India	Japan	Korea	USA
alcohol test result		√		√	√	√	√
violation		√	√		√	√	
gender	√	√	√	√	√	√	√
age or date of birth	√	√	√	√	√	√	√
use of helmet, retroreflector, etc.	√ ¹		√		√		√ ¹
medical cause of death			√		√		

¹ Use of helmet.

Table 7
Occupant-related factors included in the database.

Factor	CARE	Germany	China	India	Japan	Korea	USA
gender	√	√ ¹	√	√	√	√	√
age or date of birth	√	√ ¹	√	√	√	√	√
seat belt use	√		√		√	√	√
seat location of person killed	√		√		√		√
medical cause of death			√		√		

¹ If injured.

Discussion

The goal of this study was to document the characteristics and availability of fatal road-crash databases worldwide. First, the main international road databases were briefly reviewed. Second, the national databases in selected countries were examined.

The results indicate that the available international databases of fatal road crashes include aggregated data only, except for the CARE database which includes disaggregated fatal and injury crash data for 14 European countries. This implies that worldwide comparisons generally must rely on using aggregated data. This situation substantially limits the possibilities for detailed analyses. Moreover, it poses a challenge to worldwide road safety research because there is an obvious need for internationally comparable information to increase our understanding of road safety and subsequent countermeasures in different countries.

The survey results of the national databases showed that there is a national database of fatal road crashes in each included country. However, the starting year of the data collection varies substantially, which limits the possibilities of examining yearly trends.

Importantly, there are substantial restrictions to the access of disaggregated data. Specifically, the U.S. is the only country that provides unlimited access to the disaggregated fatal crash data. The access to the disaggregated CARE data for 14 European countries is currently limited to participating countries. There is no access to the disaggregated data for any other country included in this study.

All examined countries provide aggregated crash data. However, the nature of aggregation is typically pre-determined by the organization responsible for maintaining the database.

Our findings are consistent with the well-known fact that there are differences in the definition of road death by country (e.g., Elvik and Vaa, 2004). Most of the

examined countries use the so-called “30-day rule,” but there are exceptions that should be taken into account when comparing international crash data. In addition, the definition of “road accident” is not the same across all countries.

The accident-related factors included in the databases were similar, except for the following information that was missing in at least one country: date and time of day, accident type, road class and environment, road type and traffic control, and posted speed limit. Despite these differences, the overall similarity suggests that meaningful comparative analyses would be possible if there were access to the databases.

In contrast to the similarities at the accident level, there were substantial differences at the vehicle, driver, other road user, and occupant levels. Specifically, while each database includes information about the gender and age of people involved in the crash, each of the other examined variables was missing from the database in at least one country. The limited number of common variables suggests that much database harmonization is needed before detailed worldwide road-safety comparisons would be possible.

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Appendix 1: The cover letter for the survey

The cover letter and survey form sent to participants.

Dear Sir,

In relation to one of our ongoing studies, I am contacting you as an expert on crash databases.

This study is focusing on the worldwide crash trends. An important aspect of this study is our assessment of the nature and accessibility of national crash databases. Therefore, we would be very appreciative if you would be willing to assist us by completing the attached brief questionnaire.

Thank you very much for your assistance.

Sincerely,

Juha Luoma, Ph.D.
Visiting Research Scientist
Human Factors Division
University of Michigan Transportation Research Institute
2901 Baxter Road, Ann Arbor, MI 48109, USA
Phone: (734) 647-5812

Appendix 2: The survey form

Country? WRITE HERE

Is there a national database of fatal road accidents in your country?

- Yes
- No (if no database exists, there is no need to respond to other questions, however, please describe what kind of accident information your country uses for describing and evaluating the traffic safety). WRITE HERE

From which year have those data been collected (approximately) in the current form? WRITE HERE

Which organization is responsible for maintaining the database in your country?
WRITE HERE

Is the accident data available for other organizations to conduct traffic safety research?

- Unlimited access to disaggregated data (the data includes specific information of *each* accident, vehicle, and person, encoded so that individuals cannot be identified; see FARS in the U.S., for example)
- Unlimited access to aggregated data (no information about individual accidents) selected by the above (or some other) organization; please explain what kind of aggregated data are available. WRITE HERE
- Limited access to annual disaggregated data
 - No costs
 - Fee by request, year, or by other basis? WRITE HERE
- Limited access to disaggregated data based on individual requests (e.g., proportion of different road users involved in road fatalities in given years)
 - No costs
 - Fee by request or by other basis? WRITE HERE

If there are disaggregated data available, in which format(s) are they available?
WRITE HERE

In case we would like to receive (a) the database or (b) information from the database, whom should we contact?

(a) Database

- Name: WRITE HERE
- Address: WRITE HERE
- Phone: WRITE HERE
- Fax: WRITE HERE
- E-mail: WRITE HERE

(b) Selected information from the database

- Name: WRITE HERE
- Address: WRITE HERE
- Phone: WRITE HERE
- Fax: WRITE HERE
- E-mail: WRITE HERE

Approach for retrieving data

- Internet, please provide the site: WRITE HERE
- Request sent by e-mail: WRITE HERE
- Other: WRITE HERE
- No approach

Does your country use the definition of road death as defined by the Convention of Road Traffic (Vienna, 1968) “a road death is deemed to have occurred when a person injured dies within 30 days of the crash (and as a result of the crash)”

- Yes
- No, please provide here the definition used in your country, WRITE HERE

In addition to the above definition, the definition of ‘road accident’ can vary. Do you include the following in fatal traffic accidents:

- Accidents occurred in private roads or areas
- Accidents with no motor vehicle
- Suicides
- Diseases (e.g., heart attack)

Please tick which of the following information the database includes (please check each item):

Accident:

- year of accident
- date
- time of day
- number of vehicles in accident
- number of person killed in accident
- number of person injured (but not killed) in accident
- type of vehicles in accident (e.g., car, motorcycle, truck)
- number of pedestrians in accident
- number of bicyclists in accident
- accident type (e.g., single vehicle, head-on, vehicle-pedestrian)
- road class (e.g., limited access highway, main road, secondary road)
- environment (rural/urban)
- road type (divided, two-lane)
- road condition (e.g., dry, wet, snowy, icy)
- light condition (e.g., daylight, dusk, dawn, darkness but lighted, darkness not lighted)

- weather (e.g., clear, raining, snowing, fog)
- traffic control (e.g., stop sign, yield sign, railroad gate/flasher)
- posted speed limit

Vehicle

- vehicle identification number
- vehicle model year
- vehicle type (e.g., sedan, station wagon, bus, taxi, motorcycle)
- travel speed estimate
- maneuver (e.g., stopped, parked, going straight ahead, changing lanes, passing, making turn)
- pedestrian action (e.g., crossing at intersection, crossing not at intersection, walking with traffic, walking against traffic, standing in road)
- total number of killed in vehicle
- total number of occupants in vehicle

Driver

- license compliance (no license required, valid license, no valid license)
- alcohol test result (e.g., no alcohol, more than the legal limit, not tested)
- violation (e.g., no violation, alcohol, yield, stop sign, traffic signal, exceeding speed limit)
- gender
- age or date of birth
- seat belt use
- medical cause of death

Other road user (pedestrian, bicyclist)

- alcohol test result (e.g., no alcohol, more than the legal limit, no tested)
- violation (e.g., no violation, alcohol, yield, stop sign, traffic signal, exceeding speed limit)
- gender
- age or date of birth
- use of helmet, retroreflector, etc.
- medical cause of death

Occupant

- gender
- age or date of birth
- seat belt use
- seat location of person killed
- medical cause of death

Thank you for your assistance.