One Outcome, Many Trends: Understanding National Data Sources for Road Traffic Fatalities in China

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Objectives. To better understand national data sources and evaluate time trends in road traffic fatalities (RTF) in China.

Methods. We reviewed national sources on RTF data. These included population-based report from the Ministry of Public Security (MPS), sample-based estimates from the Ministry of Health (MOH) and the Disease Surveillance Points System (DSP), as well as model-based estimates from the World Health Organization (WHO), and the Global Burden of Disease Study (GBD).

Results. All data sources have limitations in coverage, representativeness or overreliance on model specifications. Despite the discrepancies in methodologies and estimates, all sources indicated an increase in RTF before 2005. Since then, MPS and GBD indicated a decrease, DSP showed plateauing, and MOH and WHO suggested increasing fatalities. However, despite any recent decline, RTF remain high.

Conclusions. The divergent trends in RTF across data sets in China implies a challenge to understanding China's experience with addressing RTF. China needs to reconcile data sources and further improve road safety. (*Am J Public Health.* 2016;106:1793–1795. doi: 10.2105/AJPH.2016.303287)

Road traffic injuries are one of the leading causes of death in China.[1] An accurate assessment of the burden is critical for evidence-based policymaking for road safety. Existing data sources on road traffic fatalities (RTFs) indicate conflicting levels and trends, particularly after 2005. The discrepancy in trends has substantial implications for evaluating road safety policies and developing strategies for further action. For example, an increasing trend would suggest that road safety policies and efforts undertaken since 2005 may be insufficient to stem the health burden of motorization. A declining trend suggests the need to identify programs that may have lowered RTF.

In view of the United Nations Decade of Action for global road safety, such an understanding is important for other developing countries facing similar road safety challenges. Therefore, our objectives were (1) to review and compare national RTF data sources in China, and (2) to evaluate recent time trends in RTF in China.

METHODS

We examined and reviewed 5 data sources on RTF (Appendix A, available as a supplement to the online version of this article at http://www.ajph.org), defined as any person who was killed immediately or died within 30 days as a result of a road traffic accident.[2]

As the road traffic administrative authority, the Ministry of Public Security (MPS) collects data on deaths that occur within 7 days of a crash on a road. As legally defined in China, a road is a highway, an urban road, or an area that allows public motor vehicles to pass, including places the general public uses to pass, such as squares and public parking lots. This definition excludes roads constructed and maintained by subcounty level authorities; roads inside schools, factories, and closed residential districts; roads under construction; and roads where construction has finished but not been submitted to the management of local traffic police. This restricted definition of roads can lead to traffic police undercounting traffic deaths.[3,4]

The Ministry of Health (MOH) initiated the vital registration system in the 1980s on the basis of voluntary participation, resulting in annually changing, nonrepresentative coverage (Appendix B, available as a supplement to the online version of this article at http://www.ajph.org). For example, the 2012 report covered about 120 million people in 99 city districts and 73 counties, most of whom were in large cities and eastern rural areas. The unstable and nonrepresentative sample makes the data potentially unreliable for inferences about a defined population.[5]

Launched in 1978, the Disease Surveillance Points (DSP) system started with a voluntary participation-based sample; the surveillance sites were redrawn in 1991 and went through another substantial adjustment in 2004. Currently, the DSP system is grounded on a nationally representative

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This brief was accepted May 22, 2016.

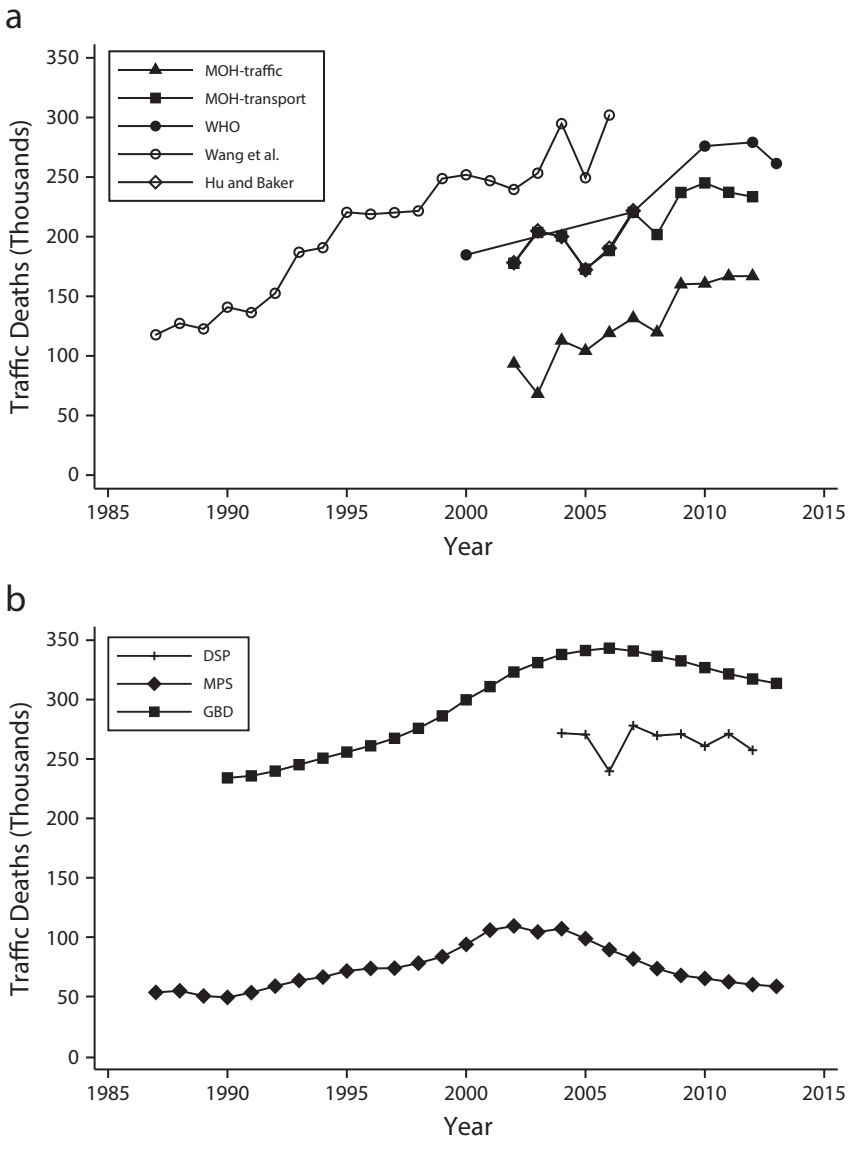
doi: 10.2105/AJPH.2016.303287

sample drawn using a multistage cluster sampling method and covering 10 million people in 161 sites.[6] One problem with the traffic fatalities estimates in the DSP is that they may include cases that actually are not RTF. The *International Classification of Diseases, 10th Revision* (*ICD-10*)[7] codes DSP uses to calculate RTF may cover deaths that are not RTF (Appendix C, available as a supplement to the online version of this article at http://www.ajph.org).

On the basis of reported data from member countries, the World Health Organization (WHO) used a negative binomial model with about 12 socioeconomic measures to generate estimates for countries without death registration data that were at least 80% complete, including China.[8] The model can adjust for underreporting of data between countries, lack of standard definitions of RTF, and the use of data of varying quality. But there are limitations, such as a lack of indicator variables for policy changes, potentially making these models inappropriate for countries with dramatic legislative changes. China's first road traffic law passed in 2004 may have substantially altered the RTF trajectory, but the WHO model would not be able to reflect that effect because policy changes are not accounted for another limitation in generating the estimate for China is overreliance on MOH data.

Model-based estimates from global burden of disease (GBD) project are grounded on sophisticated statistical models using data from surveys, censuses, official reports, administrative data, and systematic reviews.[1] The most recent GBD, from 2013, includes more than 10 000 site-years (defined as data for a specific location in a year). Synthesizing a large number of data sources reduced the reliance on any single data set and consequently potentially improved estimates of Chinese RTF. Like the WHO model, the GBD model does not adjust for policy.

We reviewed 2 frequently cited articles: Wang et al.[9] and Hu and Baker.[10] Both used MOH data. Wang et al. standardized fatality rates using age and gender composition in the census and inflated fatality rates by about 40%, assuming that the MOH system underreported deaths and covered a healthier sample than the national population. Hu and Baker made no such adjustments.



Note. DSP = Disease Surveillance Points system; GBD = global burden of disease; Hu = Hu and Baker[10]; MOH-traffic = traffic death data from the Ministry of Health; MOH-transportation = transportation death data from the Ministry of Health; MPS = Ministry of Public Security; RTF = road traffic fatalities; Wang = Wang et al.[9]; WHO = World Health Organization.

FIGURE 1—Related Model-Based Estimates of RTF with (a) Nonrepresentative Sample-Based Estimates and (b) Population- and Representative Sample–Based Estimates: MOH, DSP, MPS, WHO, GBD, China, 1987–2013

RESULTS

Figure 1 illustrates data from 5 sources showing that (1) the overlap of estimates from WHO and Wang et al.[9] indicates that the WHO model is almost equivalent with standardizing the age and gender structure and inflating the mortality rate by about 40%, as did Wang et al.; (2) DSP estimates are substantially higher than are MPS and MOH estimates, possibly because traffic deaths in DSP include *ICD-10* codes that are not RTF; (3) the ratio between MPS and MOH deaths has been declining—as of 2013, its value of 0.4 is still reasonable from an international perspective[11,12]—and (4) the trend illustrated by GBD is largely consistent with the trajectory shown by MPS reports and DSP estimates.

GBD provided the highest estimate, 313 676 RTF, in 2013 in China, whereas the WHO estimated 261 367 and DSP

257 390. Conversely, the MOH estimate (without adjustment for age, gender, and representation) is much lower at 166 911, and the MPS report of 58 539 is the lowest (only 19% of the highest).

DISCUSSION

We have attempted to better understand the data sources for China, and our study results expose the diversity of estimates for RTF. The RTF trends implied by WHO estimates may contain a bias stemming from their heavy reliance on nonrepresentative MOH data and the absence of policy variables in the model. GBD estimates that include DSP and other data collected from national and subnational samples indicate a declining trend in RTF that is consistent with the trend in MPS reports. This divergence is challenging for both road safety researchers and policymakers.

We suspect that the MPS data may be an underestimation of RTF. In addition to the restricted definition of roads and short follow-up time on traffic victims, the current road safety administration system rewards local officers for reducing RTF and thus might affect the police's reporting of RTF.[13] Further efforts are needed to improve this data source because MPS data are used for road safety administration and policymaking in China. Measures such as extending follow-up days from 7 to 30 in counting RTF, expanding data collections to all roads, and reforming the police performance evaluation system may improve the quality and credibility of MPS data. Scaling up MOH's vital registration system to universal coverage or a nationally representative sample can make this source more reliable and, subsequently, improve the WHO and GBD model estimates, because both models use MOH estimates as input data. Finally, and perhaps most importantly, is that despite the differences in levels and trend, all data sources indicate that RTF still impose an unacceptable burden in China and policymakers urgently need to take action to reduce RTF. AJPH

CONTRIBUTORS

Q. Li devised the study and wrote the article. H. He and H. Liang reviewed the literature. H. He, D. M. Bishai, and A. A. Hyder interpreted the results and revised the article.

ACKNOWLEDGMENTS

This work was conducted as part of the Global Road Safety Program, which was funded by Bloomberg Philanthropies.

HUMAN PARTICIPANT PROTECTION

No protocol approval was necessary because no human participants were involved in this study.

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