Comparison of 2013 VMT Fatality Rates in the States and in High-Income Countries

Transportation Research Board
96th Annual Meeting
Session 536 – Analysis of International Road Safety Data
January 10, 2017

Author: Charles J. Kahane, Ph.D.
Bowhead Logistics Solutions LLC,
under contract to:
National Center for Statistics and Analysis,
National Highway Traffic Safety Administration
Presenter: John Kindelberger

This is a U.S. Government work and may be copied and distributed without permission.

NHTSA
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Objective and issues

- Objective: compare highway safety performance in the United States to other comparable (high-income) countries

- Issues:
  - Most high-income countries are more densely populated and urbanized than the U.S.
    - Also, fewer young drivers
  - Great variety of demographics and fatality rates among our States

Approach: compare recent VMT fatality rates in the individual States to other similar high-income countries

Analysis method

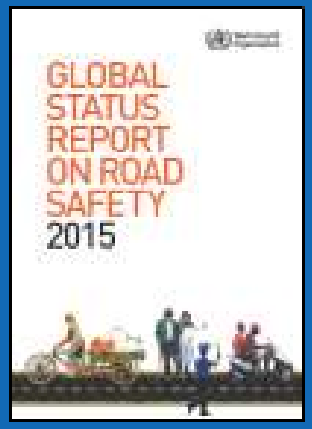
- Analyze fatality rates in the individual States rather than in the U.S. as a whole
- Categorize the States and comparison countries into demographically more homogeneous groups
- Rank the 2013 VMT fatality rates of States and countries within each group

Published paper:

Kahane, C. J. (2016, October). Comparison of 2013 VMT fatality rates in U.S. States and in high-income countries. (Report No. DOT HS 812 340). Washington, DC: National Highway Traffic Safety Administration.

Database

- All 43 high-income countries outside U.S. with population > 1,000,000
  - As defined by World Bank
    - 17 in Western, Northern, or Southern Europe
    - Australia, Canada, and New Zealand
    - 9 former Eastern Bloc
    - 4 in East Asia
    - 6 in Middle East
    - 3 in Latin America
- 44 States with population > 1,000,000 (all high-income)



Factors affecting fatality rates

- Urbanization - rural fatality rate almost double of urban
- Road type – Interstates and freeways lower than local roads
- Driver's age
  - Fatality rate 2.5 times as high at 17 as at 35
  - Youthful population → higher fatality rates
- Driver's gender
  - 65% higher for 35-year-old male than 35-year-old female
  - Predominantly male drivers → higher fatality rates
- Driving experience
  - Twice as high in 1st year of driving as after 3 years
  - Newly affluent country → higher fatality rates

Other factors affecting fatality rates

- Vehicle type
  - Motorcycle VMT rate over 25 times as high as cars and LTVs
  - Motorcycles popular → higher overall fatality rates
- Climate
  - Large decrease in VMT fatality rate during cold winters
    - Motorcycles stay in garage
  - Cold climates → lower overall fatality rates

Behavioral:

- Seat belts - Unrestrained approximately double risk
- Alcohol - Impaired drivers have 10 to 40 times higher fatality risk
- Not used for grouping, because high-income countries tend to have high belt rates and similar BAC laws

4 comparison groups of States/countries

1. Densely populated: > 150 inhabitants per square kilometer
   - e.g., Japan, Netherlands, U.K., Massachusetts, New Jersey

2. Cold winters, some large cities:
   < 150 people/sq km; > 20% of population lives in metro areas ≥ 500,000
   - e.g., Canada, Estonia, Sweden, Minnesota, New Hampshire

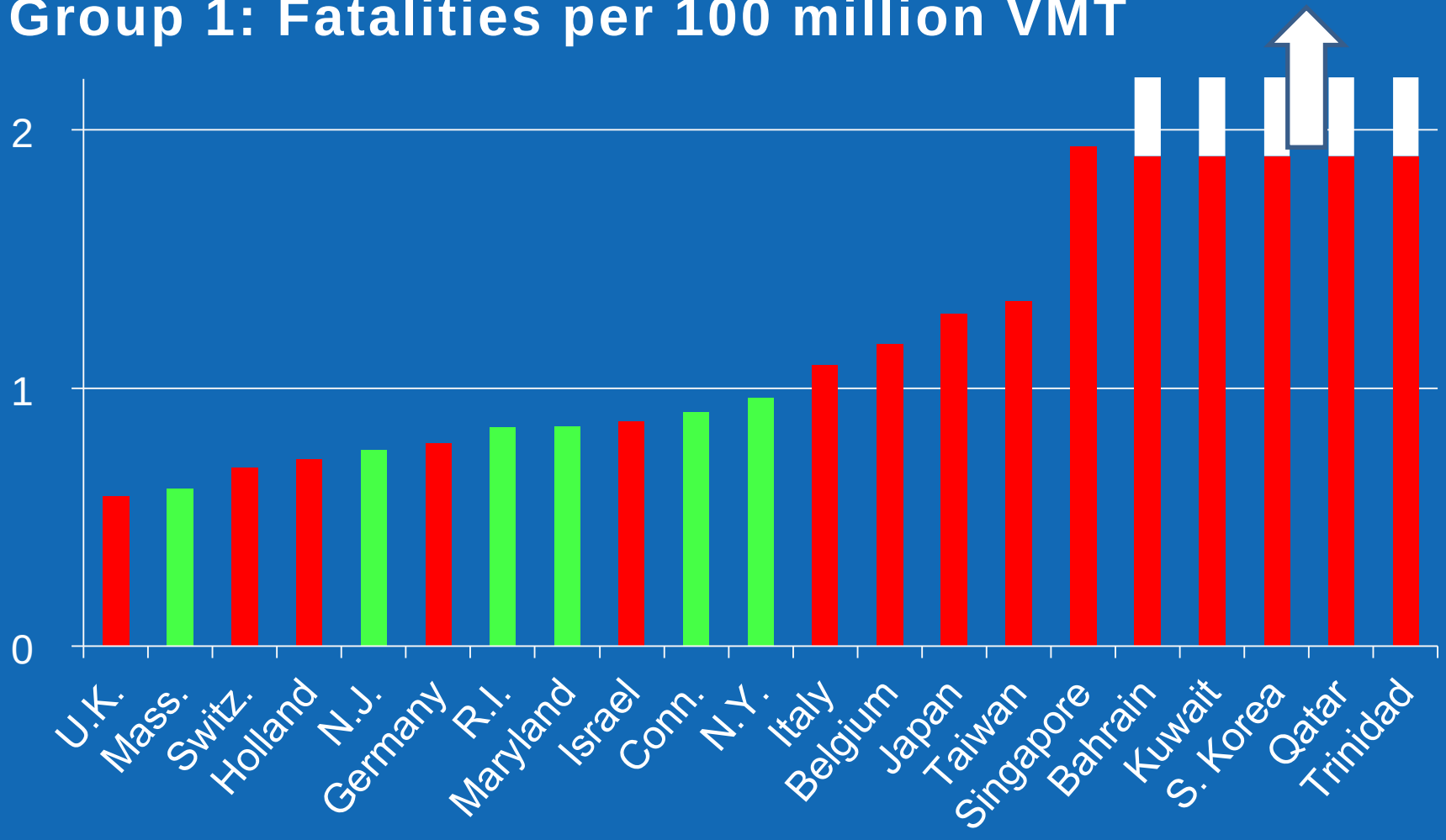
3. Temperate, urbanized but not too densely:
   < 150 people/sq km; high % of population lives in metro areas ≥ 500,000
   - e.g., Australia, France, Uruguay, California, Illinois

4. Least dense, least urbanized:
   < 150 people/sq km; low % of population lives in metro areas ≥ 500,000
   - e.g., Cyprus, Ireland, Slovakia, Iowa, Kentucky

Group 1: Densely populated

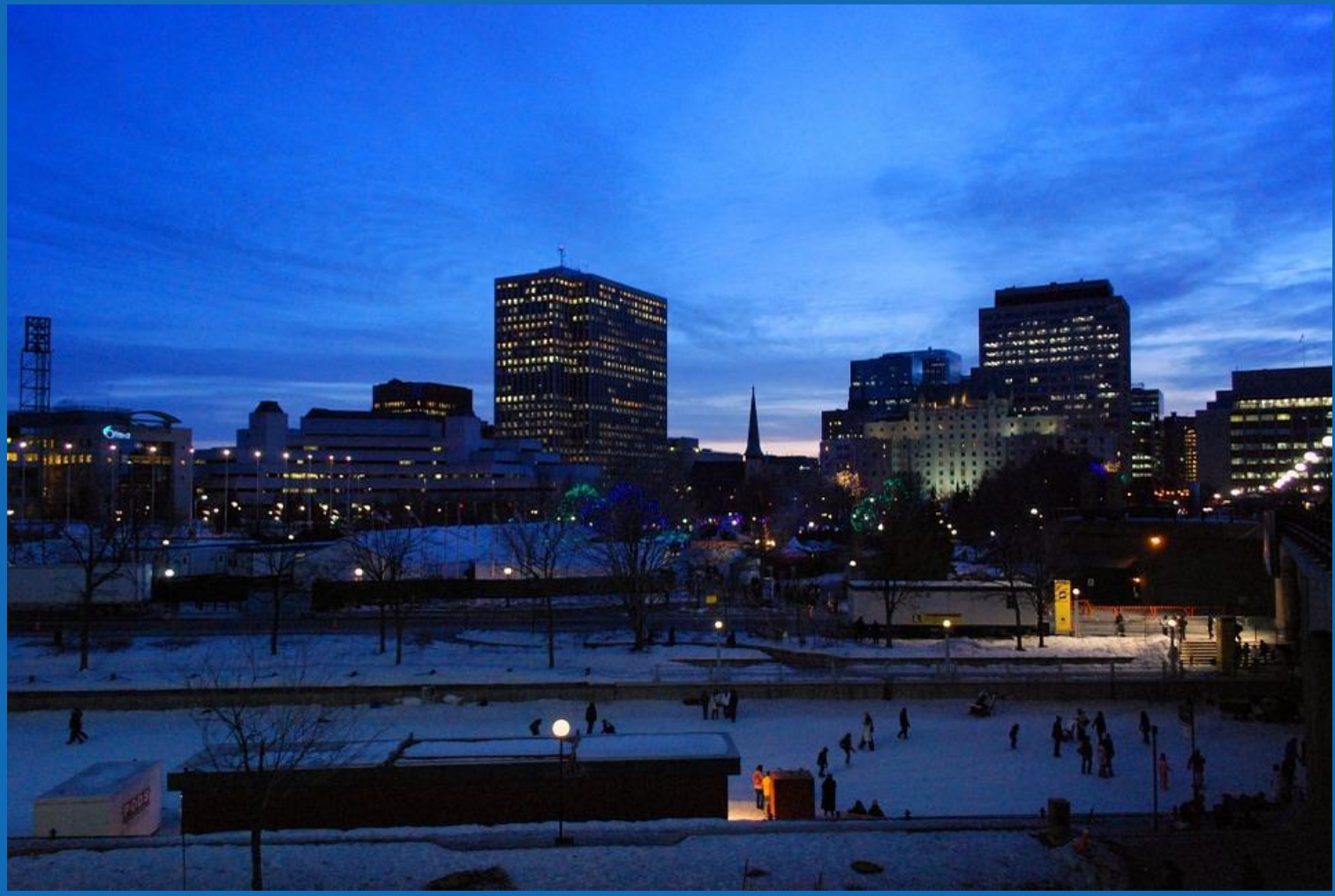
NHTSA

Group 1: Fatalities per 100 million VMT

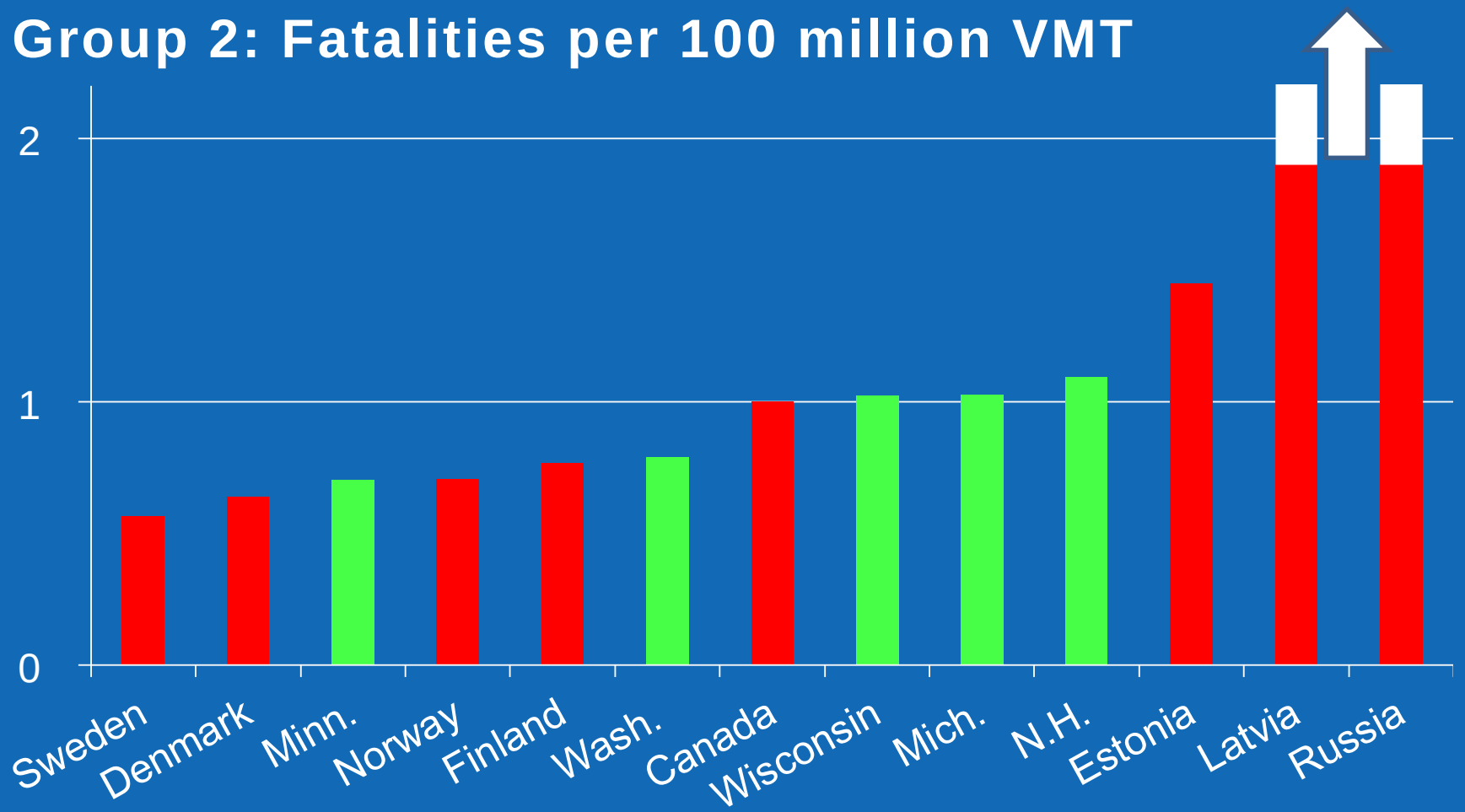


NHTSA

Group 2: Cold winters, some large cities



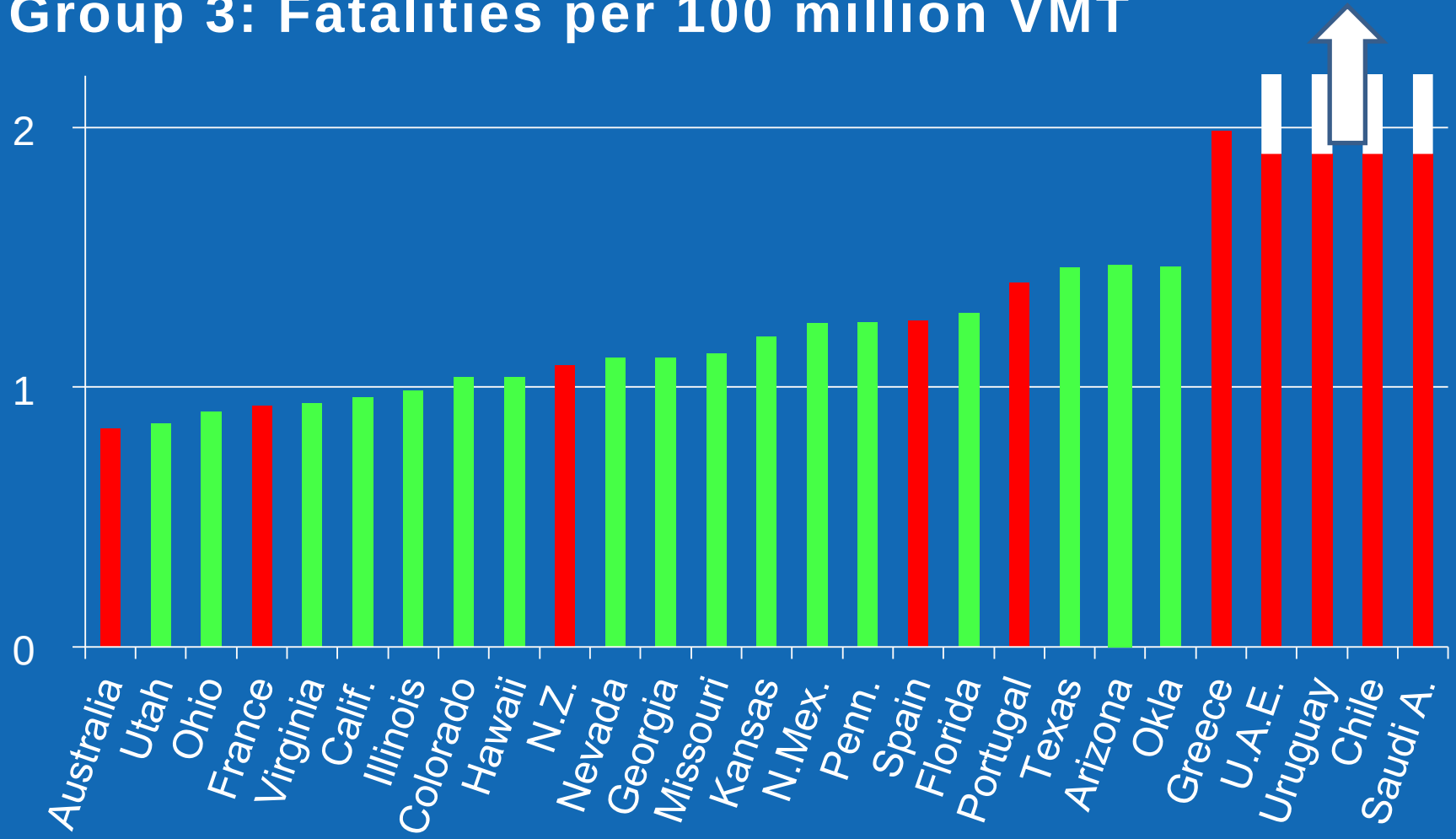
Group 2: Fatalities per 100 million VMT



NHTSA

Group 3: Temperate, urbanized but not too densely

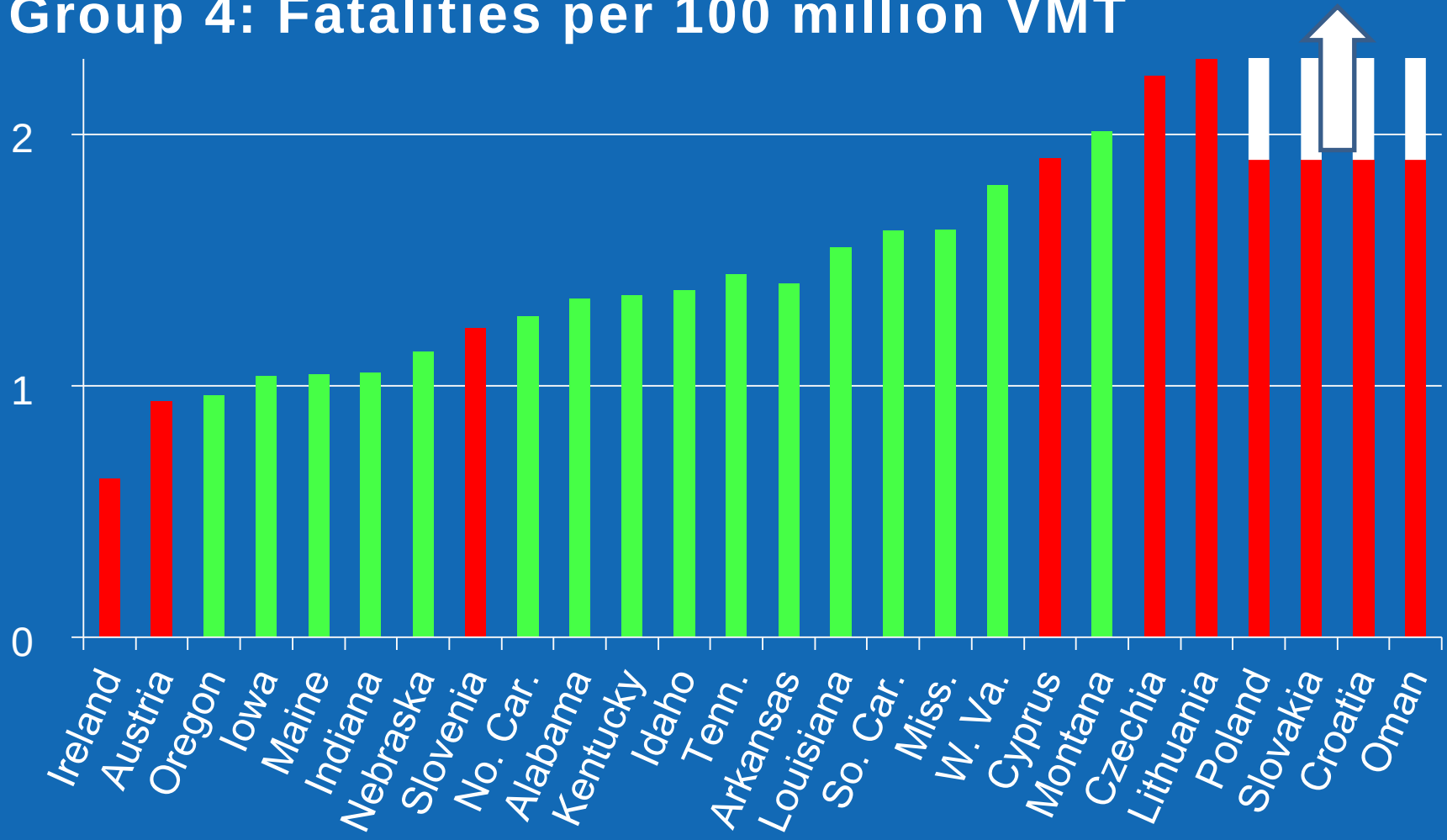
Group 3: Fatalities per 100 million VMT



NHTSA

Group 4: Least dense, least urbanized

Group 4: Fatalities per 100 million VMT



NHTSA

Statistical tests of rank orderings

- U.S. States are significantly safer than comparison countries of the same group, when all countries are included
- No significant difference when comparison countries are limited to:
  - Western/Northern/Southern Europe, Canada, Australia, and New Zealand
  - Countries with per capita income > $30,000 (comparable to United States)
- Statistical tests are consistent with “eyeball” impressions of preceding tables

Some caveats and limitations

- Data
  - Some data elements may be inconsistent across countries
    - VMT, income, urbanization, % of crashes involving alcohol, belt use
  - VMT estimated from number of registered vehicles in 13 countries
  - Some VMT or fatality data for 2011 or 2012, not 2013

- Analysis method
  - The number of comparable State/country groups for this type of analysis was limited
  - Large demographic differences still exist within each group

Summary

- Many high-income countries, especially in Western Europe and East Asia are densely populated and highly urbanized; much of the United States is not
- 2013 VMT fatality rates in the U.S. States are similar to countries with comparable demographics in Western, Northern, and Southern Europe as well as Australia, New Zealand, and Canada
- These findings point to an international commonality in safety challenges and underline the importance of global collaboration in identifying and sharing techniques for improving road safety.

Published Paper

Kahane, C. J. (2016, October). Comparison of 2013 VMT fatality rates in U.S. States and in high-income countries. (Report No. DOT HS 812 340). Washington, DC: National Highway Traffic Safety Administration.

https://crashstats.nhtsa.dot.gov/Api/Public/Publication/812340

NHTSA

THANK YOU

FOR FURTHER INFORMATION
JOHN.KINDELBERGER @DOT.GOV
WWW.NHTSA.GOV

This is a U.S. Government work and may be copied and distributed without permission.