ICoRSI

Independent Council for Road Safety International

International Symposium

Road Safety Around the World: Future Concerns

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Effect of Road Safety Interventions on Road Traffic Injuries Globally

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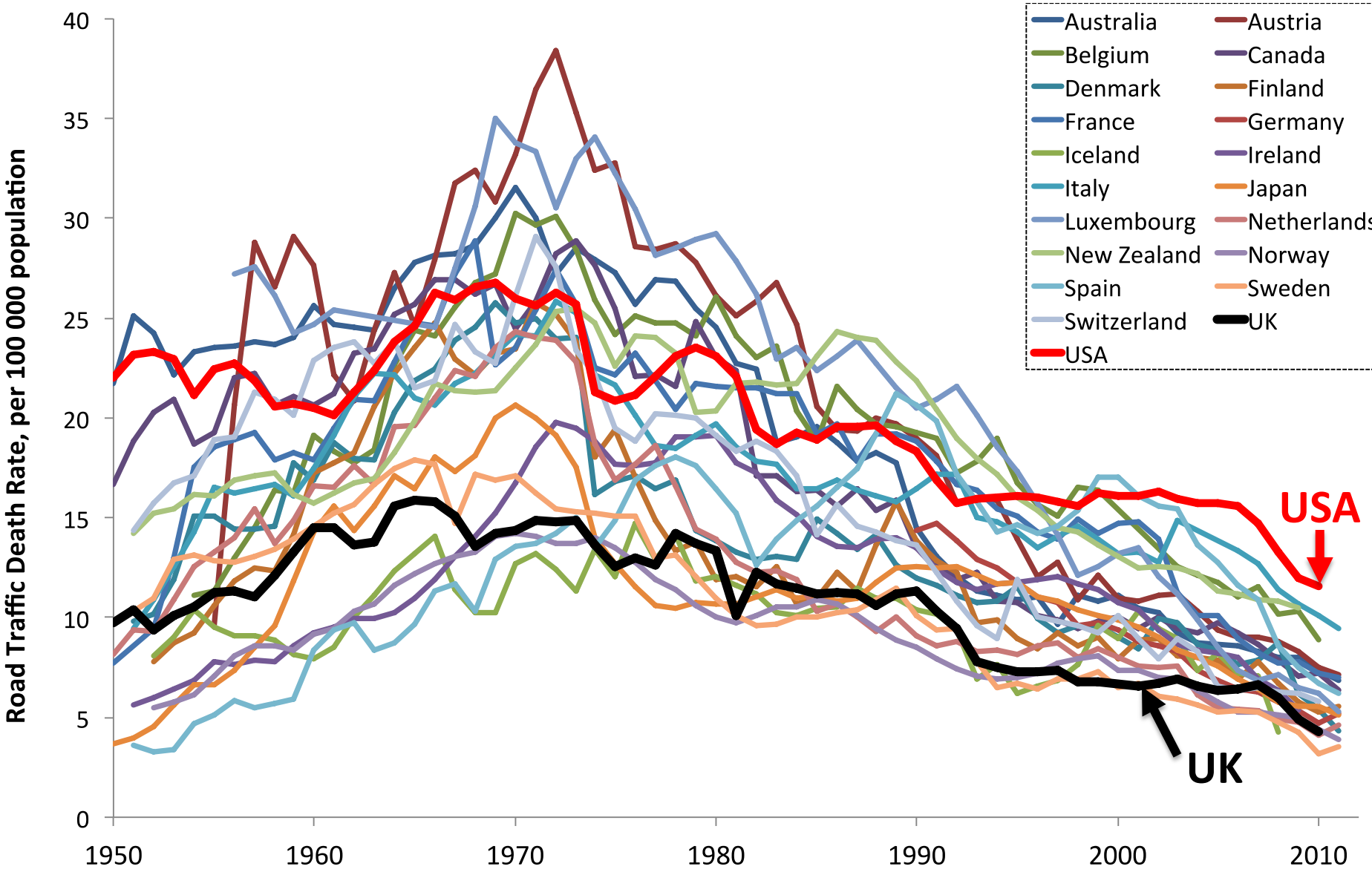
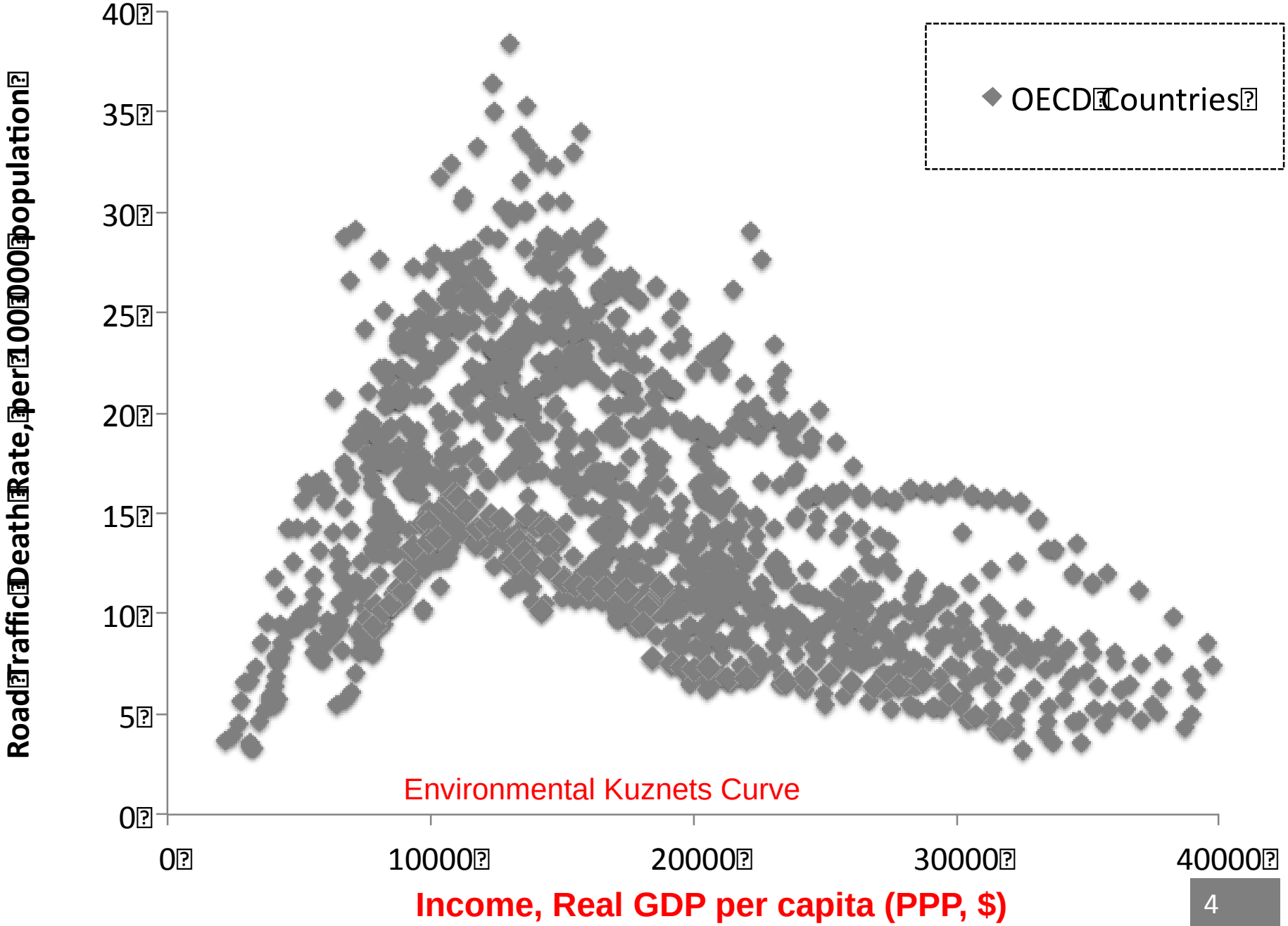
Traffic Death Rates in OECD countries



Traffic Death Rates & GDP



Kuznets Hypothesis: Road Safety Literature

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- **Kopits E, Cropper M. Traffic fatalities and economic growth. *Accident Analysis and Prevention*. 2005;37(1):169–178.**
- Garg N, Hyder A. Exploring the relationship between development and road traffic injuries: a case study from India. *The European Journal of Public Health*. 2005;16(5):487–491.
- Bishai D, Quresh A, James P, Ghaffar A. National road casualties and economic development. *Health Economics*. 2005;15(1):65–81.
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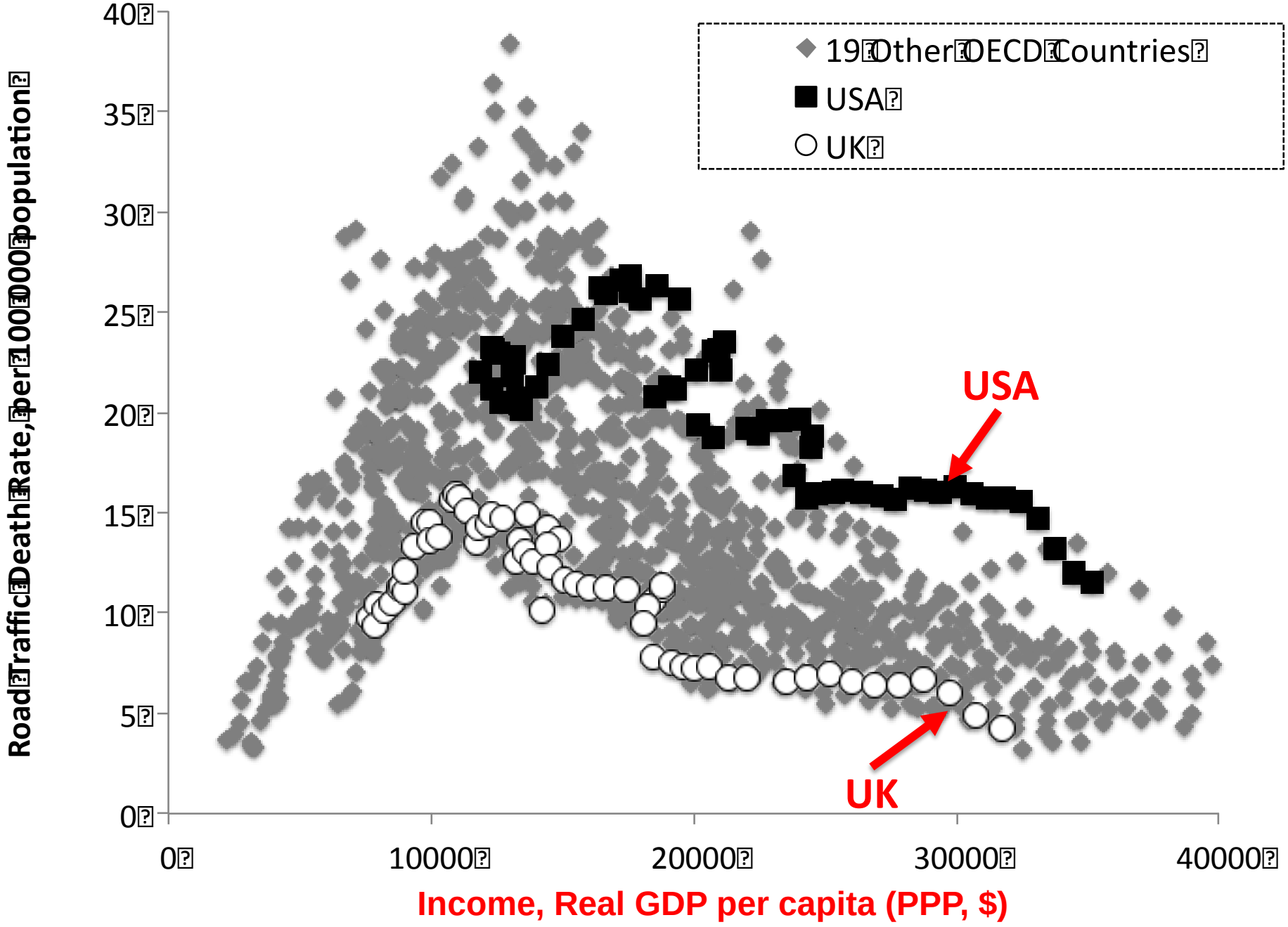
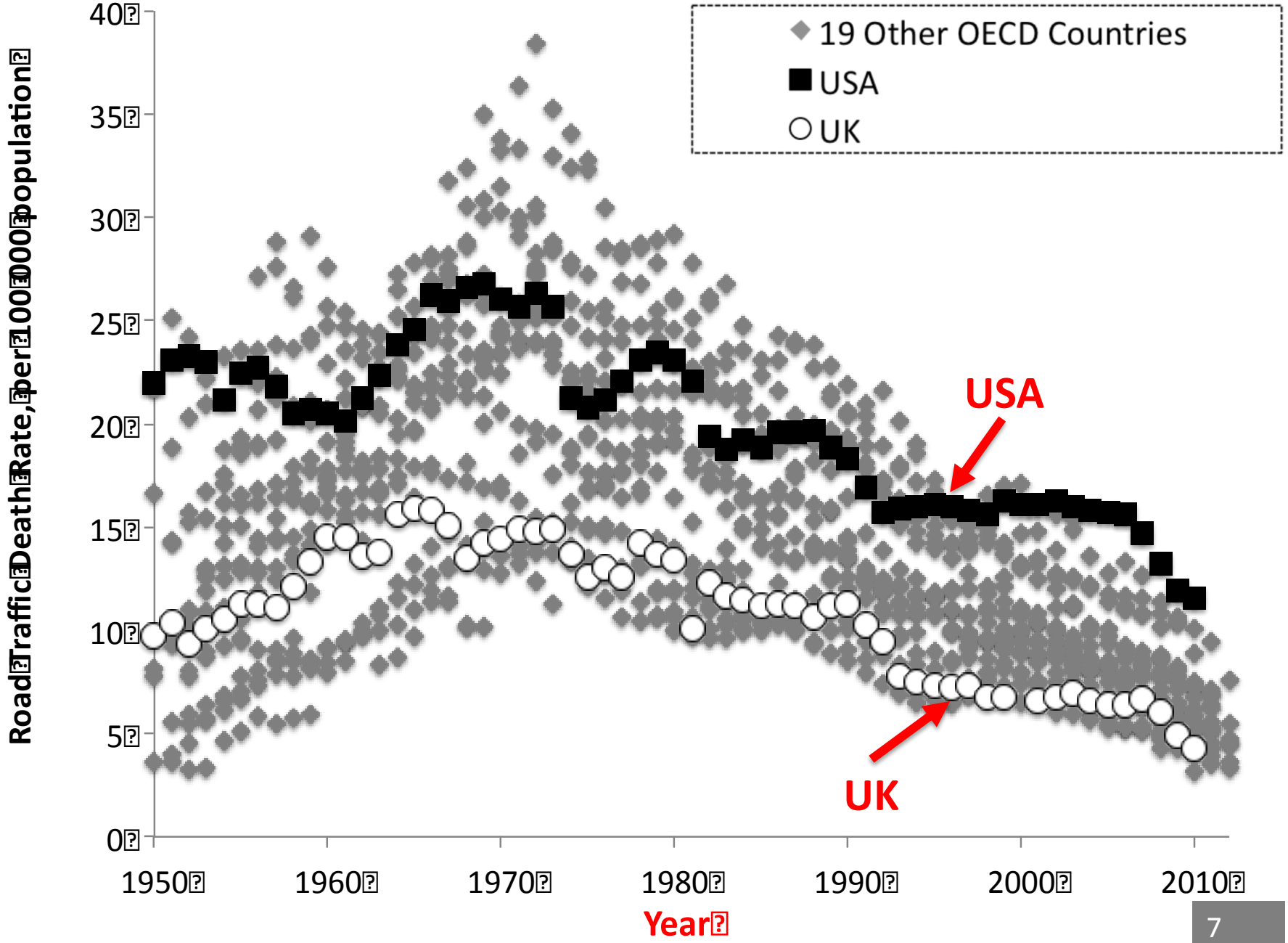
Road Death Rates & GDP



Road Death Rates in Time



What happened in time?

Time-Series Cross-Sectional Analysis

$$\left[\ln(dr_{it}) = a + b_1 \cdot gdp_{it} + b_2 \cdot gdp_{it}^2 + b_3 \cdot urb_{it} + b_4 \cdot popdensity_{it} + u_i + v_t + e_{it}\right]_{age\text{-}sex\text{-}gps}$$

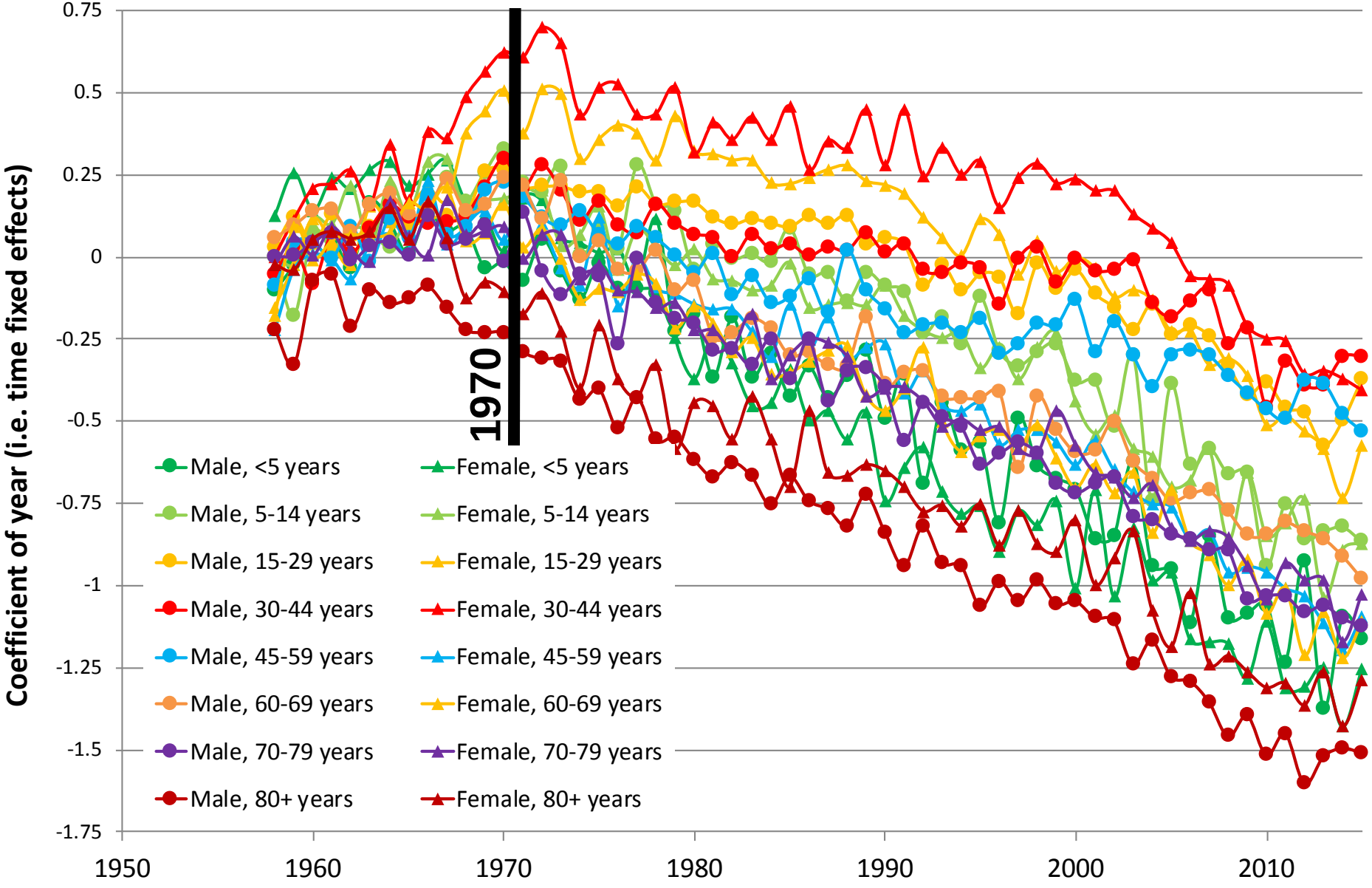
Kuznets Hypothesis

Country fixed-effects

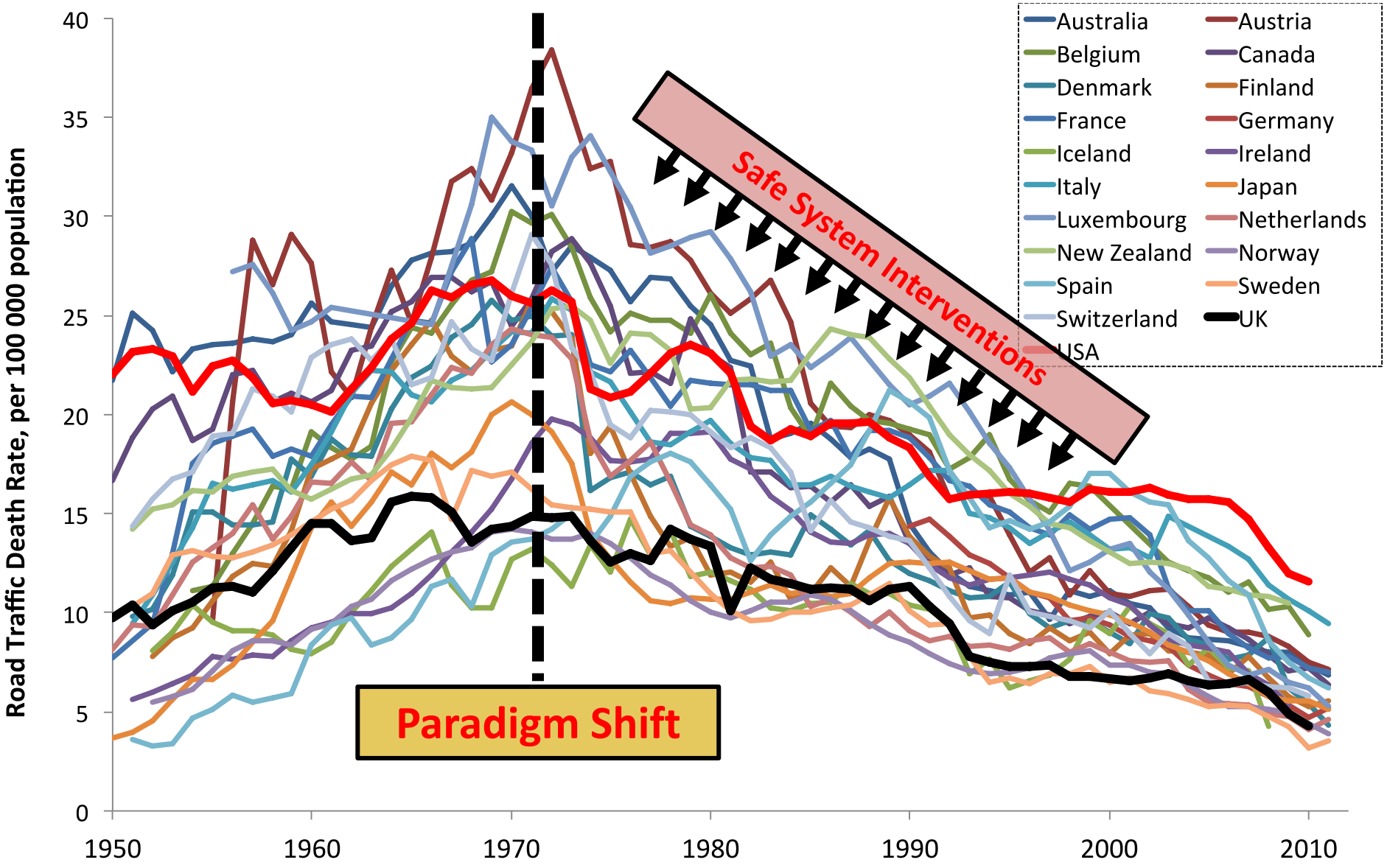
Time fixed-effects

- Time-Series Cross-Section Methods following Beck & Katz
- Lagged dependent variable to account for serial auto-correlation
- Validation: in-sample & out-of-sample
- 16 separate models for age- sex- groups

What happened in time?



Traffic Death Rates in OECD countries



Effect of Six Interventions

Helmet Use

Seatbelt Use

Speed Control

Drink Driving

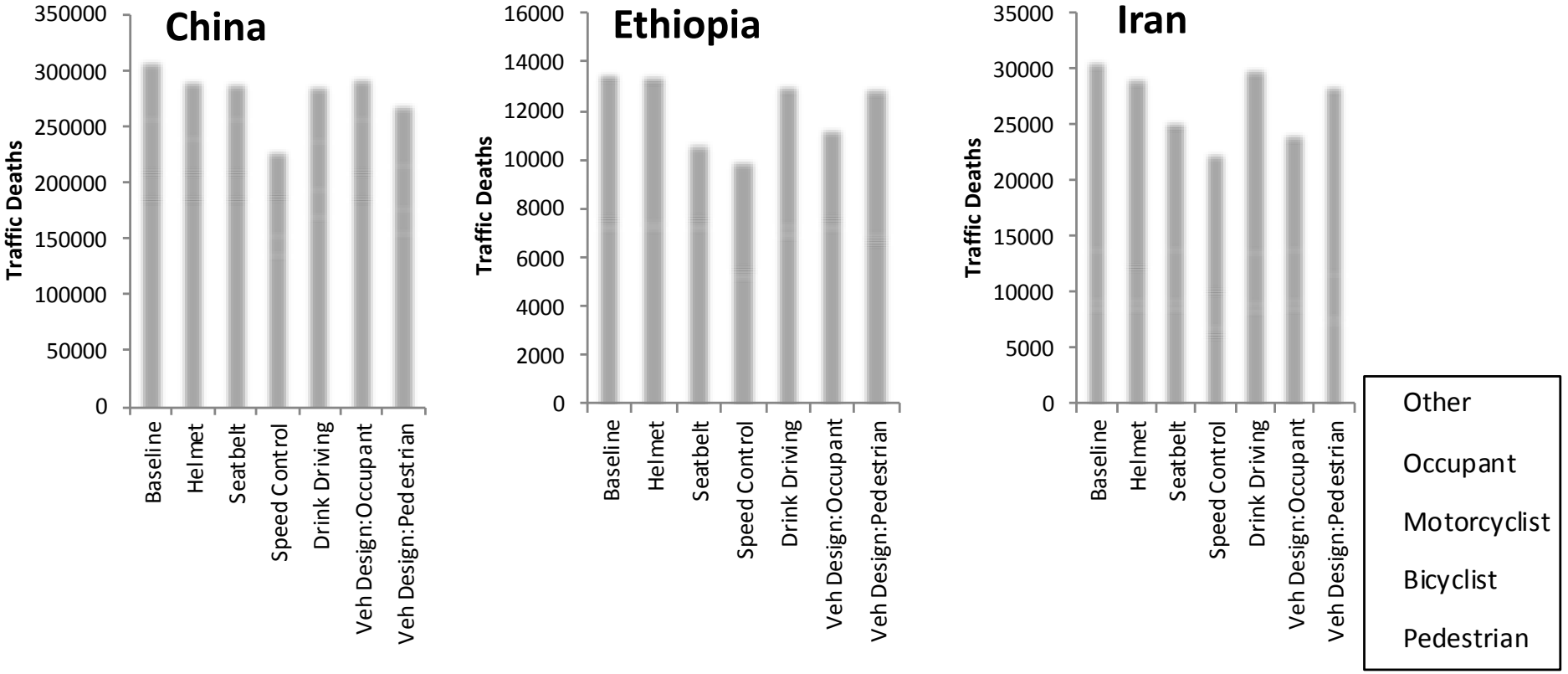
Design of cars: Occupants

Design of cars: Pedestrians

Table 1: Sources of information used for modeling effect of interventions

Intervention	Baseline & Target Exposure	Effectiveness of intervention
Helmet: Legislation and enforcement to increase helmet use	Baseline helmet use based on WHO GSRRS 2015*; Target: Increase to 100% helmet use	RR of death of helmeted vs unhelmeted = 0.58; RR of non-fatal = 0.31. Source: Cochrane Review.(Thompson, 2009)
Seatbelt: Legislation and enforcement to increase seatbelt use	Baseline seatbelt use based on WHO GSRRS 2015; Target: Increase to 100% seatbelt use	RR of death of belted vs unbelted = 0.5; RR of non-fatal = 0.55. Source: Handbook of Road Safety Measures.(Elvik, Vaa, Erke, & Sorensen, 2009)
Speed Control: Implementation of speed control	Baseline impact speed 55 km/h; Target: Reduce impact speed by 5%.	Non-linear relationship between speed and probability of crash (Nilsson, 2004) and probability of death in event of crash.(Elvik, 2012)
Drink Driving: Legislation and enforcement to reduce drink driving	Avertable mortality based on GBD-2015 estimate of % deaths involving alcohol	Based on a review of effectiveness of drink driving programs, (Shults, 2001) (Chisholm, Naci, Hyder, Tran, & Peden, 2012) combined effect of legislation and enforcement is to reduce avertable mortality by 25% and non-fatal injuries by 15%.
Car Design: Occupant Improving crashworthiness of vehicles for occupants	Baseline availability of high quality cars is based on status of regulations (Source: WHO GSRRS) and active NCAP program	Based on studies (Farmer & Lund, 2015; Glassbrenner, 2012; Kahane, 2015) that compare reduction in occupant risk in newer US cars, RR of driver death in newer vs older vehicle is 0.6.
Car Design: Pedestrian Improving crashworthiness of vehicles for pedestrians	Baseline availability of high quality cars is based on status of regulations (Source: WHO GSRRS) and active NCAP program	Based on studies evaluating effect of EU regulations (Pastor, 2013; Strandroth, Sternlund, & Lie, 2014) that compare reduction in pedestrian risk, RR of pedestrian death in newer vs older vehicle is 0.65

Sample Results



- Interventions for speed control are most important
- The relative importance of interventions varies by country

Conclusions

- Developing countries do not need to wait to get rich enough to invest in road safety

- They should act now and start deploying evidence-based interventions