Road traffic mortality

What can we learn from international comparisons of social inequalities in road traffic injury mortality?

T H Lu, T L Chiang, J W Lynch

Some contextual effects can be discovered only through international comparisons

In contrast with the plethora of studies concerning the social inequalities in health that have been conducted since the 1980s, there are relatively few related to injuries.[1 2] There are even fewer studies comparing the influence of these inequalities in different countries. So, the publication of Borrell *et al*'s study on social inequalities in transportation injury mortality across European countries[3] is most welcome and timely ***[see page 138]***. Their study elucidated the effect of differing national contexts on the influence of social disparities on road traffic injury (RTI) mortality.

In this commentary, we will first explain what a so-called ''contextual effect'' is and then illustrate that many such effects can be discovered only through international comparisons. We contend that ''dissimilarities'' may provide more useful information than ''similarities''. Because the contextual determinants of social inequality in RTI mortality *between* and *within* countries are different, they have different implications for injury prevention.

WHAT IS A CONTEXTUAL EFFECT?

In linguistics, context refers to the text surrounding a word, giving a better understanding of what the word means. In art, contextualism refers to the way a work of art may only be understood by knowing the historical, political, or cultural circumstances when it was produced. In health research, context similarly refers to the wider situation surrounding the association between an exposure and outcome and how this wider situation may confer meaning on that association.[4]

The study of the effects of collective or group characteristics on individual level outcomes is termed contextual or multilevel analysis. The effects of group level properties on individual level outcomes are contextual effects.[5] Incorporating group level variables in contextual analysis is important because this approach provides information not captured by individual level data.[6] For example, national income level gives information different from individual level income. The national income level may be a marker for countrywide factors potentially related to RTI, such as road conditions, user patterns, or medical care. Such factors affect everyone in the country regardless of their income. Similarly, the national unemployment level may be a marker of the effects of globalization, which affects everyone in a country, employed or unemployed.

Macro level variables, such as political regime, urban planning, road design, regulations, population density, traffic volume, and so on, affect individuals directly and also constrain the choices they make.[6] Only through international comparisons can these contextual RTI risk factors in any one country be revealed. This kind of information could not be derived from individual level studies conducted within a country. If everyone in a country was exposed to the same contextual risk factors, there would be no interpersonal variation among study subjects.[7–9]

''SIMILARITIES'' OR ''DISSIMILARITIES''?

In their international comparisons, Borrell *et al* concentrated mostly on ''similarities''—for example, in all countries less educated men had higher death rates compared with better educated men. More might have been learned had they examined why the magnitude of social inequalities differed in different countries. However, a better understanding of ''dissimilarities'' between countries could provide more information for injury prevention. Each country has its own historical and cultural context that shapes social inequalities in health and this is why Kunitz argued for ''particularism'' to understand the social determinants of population health.[10]

For example, a recent study revealed that in China, higher socioeconomic position (SEP) was related to a less healthy lifestyle, whereas in the United States, higher SEP was related to a healthier lifestyle.[11] The contrast was partially due to cultural factors and partially to level of economic development.

Using Borrel *et al*'s data, we found the magnitude of relative inequality in RTI mortality between countries to be larger than the relative social inequality within a country.[3] The age adjusted death rate ratios (RR) among men with low, middle, and high educational achievement ranged from 1.09 in Spain (Madrid) to 1.66 in Switzerland. However, the RR between Madrid and Finland was about 3.0, regardless of educational level. Thus, in explaining inequalities in RTI mortality rates, social contextual differences between countries are more important than social group differences in any one country.

We have simplified and modified Borrel *et al*'s figure 1 to illustrate these differences. The figure shows that the slope of social inequality between countries was steeper than the slope within countries. Though country C has the lowest RTI mortality compared with country A or B, country C has the largest social inequality compared with A or B. Why?

Determinants of social inequality in RTI mortality *between* countries

To explain these findings, we used Macintyre's conceptualisation.[12] She suggested three explanations for geographical variations in health: (1) compositional explanations, which draw attention to the characteristics of individuals concentrated in particular places; (2) contextual explanations, which focus on structures in the local physical and social environment; (3) collective explanations, which concentrate on sociocultural and historical features of communities.

Macintyre gave an example relevant to injury prevention. Children in deprived areas may not play outdoors because their families do not have gardens or the resources to take them to parks (a compositional resource based explanation). Or they may not do so because too few parks are provided or there are no easy public transport links to parks that do exist (a contextual resource based explanation). She also suggests that within the prevailing culture either play is not seen as important to children or it is not considered safe for children to play with other (strange) children in public places (a collective explanation).

Analogously, high RTI mortality in a country might be because of a higher percentage of dangerous drivers (a compositional explanation); poorer road infrastructure or post-crash care (a

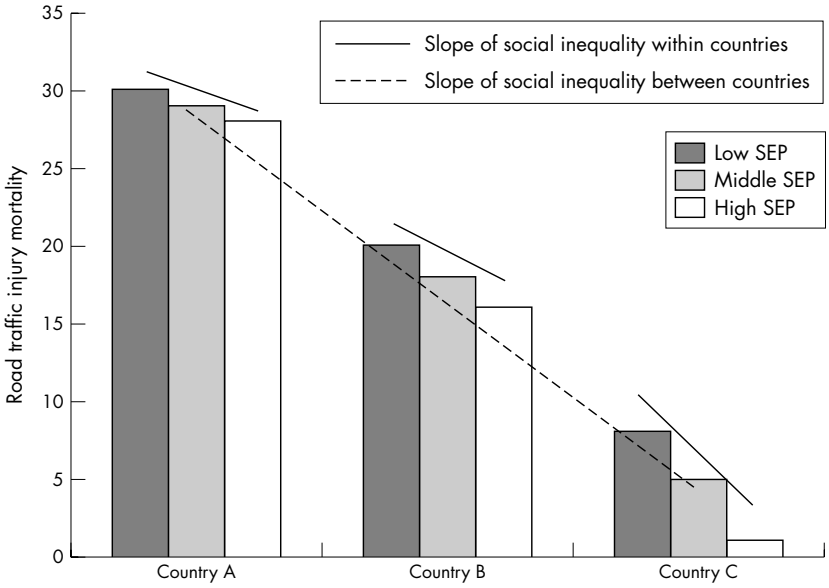

Figure 1 Hypothetical example to illustrate social inequality in road traffic injury mortality *between* and *within* countries (SEP, socioeconomic position).

contextual explanation); or lower standards of safety—that is, less thorough policy implementation and enforcement (a collective explanation).

Determinants of social inequality *within* countries

To explain social inequality in RTI within countries, Laflamme proposed a model that illustrates upstream (social context) and downstream (individual level) mechanisms.[1 13] At an individual level, the model depicts a pathway from social position, through exposure, to health hazards/risk factors, and on to health outcome. Two downstream mechanisms—differential exposure and differential susceptibility—may come into play in the relation between social position and health outcome. Contextual influences are highlighted by four entry points, each of which refers to different mechanisms on social stratification, on differential exposure, on different susceptibility, and directly on health.

Finally, Lynch and Kaplan propose a Marxian-Weberian view of how socioeconomic position affects health.[14] Some examples pertaining to RTI are seen in table 1 (see http://www.injuryprevention.com/supplemental for table 1). This framework reminds us not to overlook the unequal power relationships that affect the implementation or effectiveness of traffic safety policies. We combined both the above frameworks in table 2 to contrast the determinants of social inequality *between* and *within* countries.

CONCLUSIONS

International comparisons provide a prism through which the wider variations in inequalities between countries come into focus. These comparisons highlight the importance of contextual effects on social inequalities in RTI. Individual risky behaviors are embodied in the social context and the unequal power relationships that affect the adoption of countermeasures, as well as acting to shape different exposures and resources experienced across social groups. Clarifying the determinants of social inequality in RTI mortality *between* and *within* countries will help us develop better injury prevention strategies.

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Table 1 can be viewed on our website.

Authors' affiliations
T H Lu, T L Chiang, Institute of Health Policy and Management, School of Public Health, National Taiwan University, Taipei, Taiwan
J W Lynch, Center for Social Epidemiology and Population Health, University of Michigan, USA

Correspondence to: Dr T-H Lu, Institute of Public Health, College of Medicine, National Cheng Kung University, No 1 Dah Hsueh Road, Tainan 701, Taiwan; robertlu@mail.ncku.edu.tw

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Table 2 Scenarios explaining social inequality in road traffic injury (RTI) mortality between and within countries

	Determinants of social inequality in RTI mortality between countries	Determinants of social inequality in RTI mortality within countries
	Scenario 1: host and vector	
National social context	In face of global economic recession, country A had higher unemployment rate than country C	Less educated and manual workers were more likely to be fired during economic recession in country C
RTI related context	Unemployed families could not afford to buy protective devices, better cars, and health insurance	Unemployed families could not afford to buy protective devices, better cars and health insurance
Individual exposure and resources	More people in country A were vulnerable to severe injury in traffic crashes than country C	People with low socioeconomic position were more vulnerable to severe injury in traffic crashes
	Scenario 2: physical environment	
National social context	Country C had higher income than country A	Country C had larger income inequality than county A
RTI related context	Country C invested more on better road infrastructure than country A	Distribution of resources in maintaining better road infrastructure in country C was unequal
Individual exposure and resources	All people living in country C had exposure to safer road conditions than people live in country A	People living in deprived areas of country C had exposure to more unsafe road infrastructure
	Scenario 3: social environment	
National social context	Country C had higher safety standards than county A	The quality of governance in country C was unequal
RTI related context	Country C adopted speed limits and alcohol impairment laws, but not in country A	Speed limits and alcohol impairment laws were more strictly enforced in better-off areas
Individual exposure and resources	All people living in country C have less exposure risk than people living in country A	People living in deprived areas have higher exposure risk than their counterparts in better-off areas in country C

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Table 1 Exposure resources framework to explain the relations between socioeconomic position* (SEP) and road traffic injury

Thesis	Scenarios pertaining to road traffic injury
1. The social and structural relations between groups in any particular society have a broadly defined material basis that is determined by productive relations to economy. These relations are characterized by the effective control of resources. Exercise of this control exploits, dominates, alienates, and excludes other less advantaged groups.	1. A low SEP driver (host) of heavy cargo (vehicle) spent several hours on a high speed highway (environment) in the rural area (place) where most factories were located. Many of his colleagues were fired by the company because of economic recession. He thus became overworked and was tired and sleepy while driving.
2. The inevitable realities of exploitative production relations impose a set of systemic priorities and characteristics independent of the individuals who fill those roles. Thus, socioeconomic position, while observable in individuals, should also be conceptualized as extra-individual.	2. In most countries, road networks are laid out and most roads are designed largely from the perspective of drivers. The presence of pedestrians and cyclists (many of lower socioeconomic status) adjacent to cars capable of traveling at high speed is an important road safety problem.
3. Productive relations are important in determining lifestyles and are reflected in the socioeconomic patterning of risk factors, health	3. An unemployed man was more likely to indulge in drinking alcohol and drove while impaired. Similarly, many excluded, isolated

behaviors, and psychosocial attributes. These individual behavioral and psychosocial characteristics can be considered the embodiments of particular structural locations in society.	minority adolescents and young adults might be more likely to drive dangerously as an expression of their hopelessness and anger.
4. Effective control of material, economic, social, political, symbolic, and cultural resources is differentially distributed within any society, so those who are exploited, dominated, or excluded have less resources and less control over them.	4. People of lower SEP could not afford to buy safer cars and live only in places with poorer road conditions, less rigid law enforcement, and had little influence on the traffic related public policy decision making process and had poor access to medical care.

*Lynch & Kaplan use SEP instead of SES (socioeconomic status) because of different sociological traditions.[14]