

The Correlation between Governance Quality and Road Fatalities

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Abstract

As part of the effort to stabilise worldwide road fatality rates the World Health Organization has highlighted the need for comprehensive in-country laws addressing five key risk factors: speed, drink driving, motorcycle helmets, seatbelts and child restraints. However, the effectiveness of laws covering these five key factors may be dependent on the governance of the country implementing these laws.

This study sought to determine if there is a correlation between governance and road fatality rates. To do this, data on six governance indices from the World Bank and road fatality rates from the World Health Organization covering over 176 countries was obtained. A Pearson's correlation analysis was performed on this data. The findings indicate that there is a negative correlation between key governance indices and road fatality rates. The finding from this study highlights the importance of good governance as part of the effort to reduce worldwide fatality rates.

Background

Road trauma is the eighth leading cause of mortality worldwide claiming the lives of approximately 1.25 million people per year (World Health Organization, 2015). Given the current trends, road injury has been projected to become the fifth leading cause of fatalities by 2030 unless action is taken to change this trajectory (World Health Organization, 2015). As part of the effort to stabilise road fatality rates, the World Health Organization (WHO) has highlighted the need for comprehensive in-country laws on key risk factors – speed, drink driving, motorcycle helmets, seatbelts and child restraints (World Health Organization, 2009). Between 2008 and 2011, the WHO reported that 35 countries, representing approximately 10% of the world's population, passed legislation addressing at least one of these five key risk factors. These countries are in addition to the 28 countries, representing 7% of the world's population, which already have laws that addresses all five risk factors (World Health Organization, 2015). Although there has been an increase in the number of countries which have laws addressing the aforementioned five risk factors, a question that needs to be addressed is how effective are governments at implementing and managing these laws.

The term “governance” is widely used amongst scholars and policy makers in relation to societies' way of making decisions regarding collective problems. A single and widely accepted definition of “governance” has yet to be agreed (Hufty, 2011; Kaufmann, Kraay, & Mastruzzi, 2011). Kaufmann et al. (2011) has drawn on the existing notions of governance and defined governance as, “the traditions and institutions by which authority in a country is exercised.” They further break this definition down into three key areas and provide two indices of governance corresponding to each of these three areas. These three key areas and their associated indices are listed below:

- (1) The process by which governments are selected, monitored and replaced:

- (a) Voice and Accountability (VA) - Capturing the perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association and a free media.
 - (b) Political Stability and Absence of Violence/Terrorism (PV) - capturing perceptions of the likelihood that the government will be destabilised or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism.
- (2) The capacity of the government to effectively formulate and implement sound policies:
- (a) Government Effectiveness (GE) - capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
 - (b) Regulatory Quality (RQ) - capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
- (3) The respect of the citizens and the state for the institutions that govern economic and social interactions among them:
- (a) Rule of Law (RL) - capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
 - (b) Control of Corruption (CC) - capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

The World Governance Indicators (WGI) (Kaufmann & Kraay, 2013) was established in 1996 and is based on the six aforementioned indices. The indices are based on variables obtained from multiple data sources which capture governance perceptions as reported by survey respondents, non-government organisations, commercial business information providers and public sector organisations in each country (Kaufmann et al., 2011). They were developed as broad cross-country indicators to allow governance to be compared for over 170 countries. Readers are referred to the report published by Kaufmann et al. (2011) for more detail on how data is obtained and the indices are calculated for the WGI.

The effectiveness of a country's governance and its relationship with road safety is an area that has not received much attention over the years despite Rodrik (2002) and Licht et al. (2005) having shown that institutions exert a profound influence on economic performance and other measures of development.

Gaygisiz (2010) hypothesised that the quality of governance of institutions is related to the level of a country's road infrastructure, traffic control and road user behaviour. She sought to determine if there is a relationship between the quality of governance, culture and road fatalities in 46 countries. The findings from her study indicate that there is indeed a negative correlation between each of the six indices developed by Kaufmann et al. (2011) and road fatalities per million registered vehicles.

One of the limitations of the study performed by Kaufmann et al. (2011) is that only 46 countries were included in the study due to the limited availability of road fatality figures from a number of countries. This study seeks to overcome that limitation and extend the previous research by determining if there is a correlation between each of the six governance indices and road fatality rates in 176 countries where data for both the six indices and road fatality rates are now available.

Method

The WGI provides a governance score for each of the six aforementioned indices. The governance score for the six indices was obtained for year 2013 for all available countries (n=215) (Kaufmann & Kraay, 2013). The governance score range from -2.5, indicating a low level of governance, to +2.5, indicating a high level of governance (Kaufmann et al., 2011). Data on road fatality rates, measured in road fatalities per 100,000 population, was then obtained from the WHO for year 2013 for all available countries (n=179) (World Health Organization, 2013). Although 2014 WGI data is available, the latest WHO road fatality rates data is only available for 2013. Of the 179 countries with data from both sources, governance data for three countries were not complete and were therefore removed for the analysis. A list of countries with complete data (n=176) is provided in Appendix A.

Pearson's correlation coefficient was used to assess the associations between the governance indicators and the natural logarithm of the road fatality rates. All analyses were performed using R Studio (RStudio Team, 2015).

Results

A correlation matrix of the governance indices and the log road fatality rate is presented in Table 1 and scatterplots of road fatality rates and each of the governance indices is presented in Figure 1. There is a negative correlation between road fatality rate and each of the six indices. That is, the road fatality rate decreases as the governance score increases.

Table 1.
Pearson's Correlation Matrix for WHO Road Fatality Rates and WGI Indices.

Variable	1	2	3	4	5	6	7
1. Log Road Traffic Death/100,000 Population	–						
2. Voice and Accountability	-0.65	–					
3. Political Stability and Absence of Violence/Terrorism	-0.58	0.72	–				
4. Government Effectiveness	-0.68	0.78	0.69	–			
5. Regulatory Control	-0.62	0.77	0.61	0.93	–		
6. Rule of Law	-0.71	0.82	0.77	0.94	0.89	–	
7. Control of Corruption	-0.68	0.77	0.74	0.92	0.84	0.94	–

* $p < 0.001$ in each case

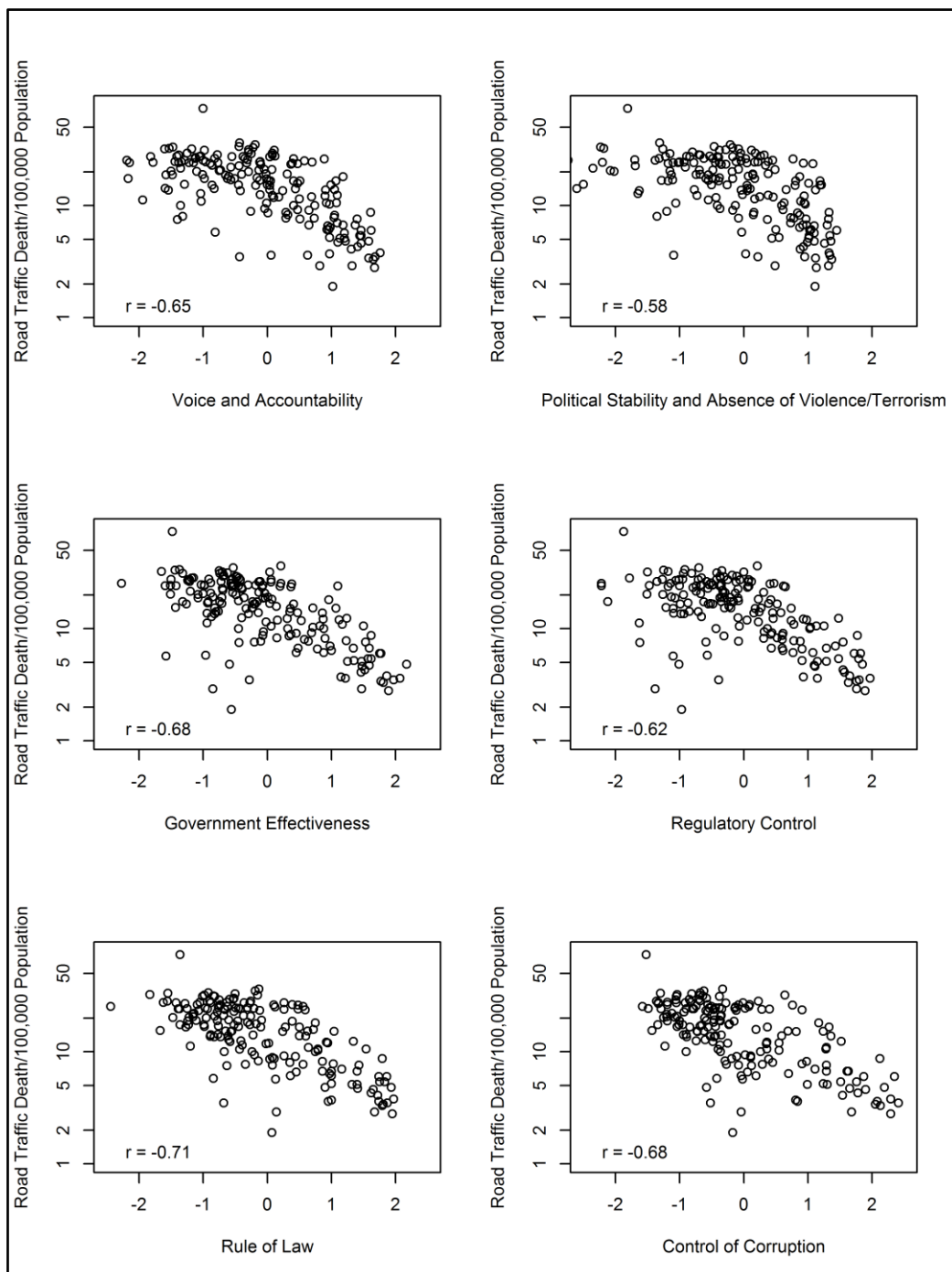


Figure 1.

Scatter plot of the log road fatality rate and each of the 6 governance indices.

Discussion

The results from this study indicate that a country with a government that is stable and responsive to the population has a lower fatality rate compared to a country with an unstable and ineffective government. This finding is similar to that of Gaygisiz (2010) who also found a negative correlation between road traffic fatality rate and all six governance indices. A brief

explanation of the associations between road fatality rates and each of the governance indices is provided below.

In this study, voice and accountability was found to have a negative correlation to road fatality rates. Voice and accountability has been identified as a feature in good governance programs by Licht et al. (2007). In essence, it obliges the holder of power to give an account of their decisions or actions to citizens and extends power to citizens to hold officials accountable for their actions (Adserà, Boix, & Payne, 2003; Licht et al., 2007). From a road safety perspective, Bliss and Breen (2012) have found that in the absence of responsible and accountable road safety leadership at country, state and city level, the effort aimed at decreasing road fatality rates will often be unsustainable. A similar view is also shared by Roberts (2004) who found that holding those that build and operate the road system accountable has had a great impact on road safety. The results from this study support the findings by Bliss and Breen (2012) and Roberts (2004). That is, voice and accountability is an important factor in road safety.

Political stability has been identified to have a substantial effect on the quality of government (Adserà et al., 2003), the quantity of existing and new investment and the effectiveness of institutions to govern (Aron, 2000). Further, Bliss and Breen (2012) have found that achieving road safety goals require long-term government ownership, leadership and political will. The findings from this study indicate that political stability is associated with a lower fatality rate thus supports the claim by Bliss and Breen (2012).

Our knowledge on governments and its association with efficiency and effectiveness is still rather limited (Adserà et al., 2003). However, Bliss and Breen (2012) have suggested that an effective government is important to road safety as they are able to identify interests that are competing against road safety thus potentially reducing the effectiveness of road safety programs. Although the results from this study indicate that an effective government is correlated with improved road safety outcomes, the currently available literature does not provide much more of an insight as to how an effective government affects road safety.

Regulatory quality, as defined by the WGI, relates to a government's ability to formulate, develop and implement policies that permit and promote private sector development. It is not clear from the currently available literature as to how regulatory quality relates to road safety. It is suggested that poor regulatory quality of private sector development of infrastructure, such as highways and roads, may result in the design and construction of infrastructure that does not take into account or achieve appropriate safety standards. As such, that piece of infrastructure may unnecessarily expose its users to a higher probability of injury or fatality than if the appropriate safety standard had been implemented.

The willingness of individuals to comply with the rule of law has been found to have a positive effect of road fatalities by Vereeck and Vrolix (2007). Further, their study indicates that the willingness to comply matters more than legal specificity. However, Licht et al (2005) and Gaygisiz (2010), whose studies were based on Schwartz's (1992) and Hofstede's (1984) cultural value dimensions, offers a different view. Their studies suggest that the rule of law is viewed differently by each culture thus compliance with the rule of law is based on culture. Although this study has found a negative correlation between the rule of law and road fatalities, this index might be also be a reflection culture. Gaygisiz (2010) provides a detailed discussion on both culture and corruption and their effects on road safety.

This current study has found a correlation between road fatality rates and corruption. It has been previously suggested that corruption is antithetical to the rule of law and that widespread corruption encourages disrespect for the law (Fisman & Miguel, 2006). Further, corruption results in law enforcement agencies and judiciary becoming ineffective (Herzfeld & Weiss, 2003). Previous studies have cited corruption as a factor that negatively affects road safety (Lagarde, 2007; Nantulya & Reich, 2002; World Health Organization, 2004). Thus the finding from this current study supports these claims. However, a recent study by Hua et al. (2010) have indicated that this is not necessarily true for all countries. They found that for less developed countries a higher level of corruption is associated with a lower number of road fatalities and hypothesised that reducing corruption is likely to help countries improve their economy but could also increase road fatalities. The claim that a higher level of corruption is associated with a lower road fatality rate is a reflection on the low motorisation levels, and thus exposure to road hazards, of the population in less developed countries (Ameratunga, Hajar, & Norton, 2006; Nantulya & Reich, 2002). As less developed countries improve their economy a greater proportion of its population become motorised. This increase in motorisation rate increases the population's exposure to road hazards resulting in a corresponding increase in road fatality rates (Ameratunga et al., 2006; Nantulya & Reich, 2002). That is, it cannot be claimed that reducing corruption increases road fatality rates without taking into account the significance of motorisation rate and exposure levels of the population. The discussion on how corruption is associated with road fatality would not be complete without taking into account culture. A study conducted by Licht et al. (2007) found culture to be a major determinant of corruption thus culture needs to be considered in the context of road safety. However, as with the rule of law, culture may be a confounding variable in this analysis and future research should be directed to explore this complex relationship further.

The limitations of this study should be noted. Firstly, the WGI is an aggregate of multiple data sources and, as such, can only provide a proxy for estimating governance quality. Secondly, the cultural aspects of road safety have not been evaluated in detail. Thirdly, the six governance indices are inter-related thus cannot be treated as completely independent to each other. And fourthly, the WHO data used in this study may not adequately address the issue of under reporting of road fatality rates in some countries.

Conclusions

The findings from this study indicate that there is a negative correlation between road fatality rates, measured in fatality per 100,000 population, and the following governance indices: voice and accountability, political stability, governance effectiveness, regulatory quality, rule of law and control of corruption.

This study also highlights the importance of having good governance as part of the global effort to stabilise and then reduce road fatality rates. Future research should be directed to this area as this current study, and those conducted by Gaygisiz (2010), have indicated that there is a correlation between governance and road fatalities.

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Appendix A – List of countries included in this current study.

Afghanistan	Djibouti
Albania	Dominica
Algeria	Dominican Republic
Andorra	Ecuador
Angola	Egypt
Antigua and Barbuda	El Salvador
Argentina	Eritrea
Armenia	Estonia
Australia	Ethiopia
Austria	Fiji
Azerbaijan	Finland
Bahamas	France
Bahrain	Gabon
Bangladesh	Gambia
Barbados	Georgia
Belarus	Germany
Belgium	Ghana
Belize	Greece
Benin	Guatemala
Bhutan	Guinea
Bolivia (Plurinational State of)	Guinea-Bissau
Bosnia and Herzegovina	Guyana
Botswana	Honduras
Brazil	Hungary
Bulgaria	Iceland
Burkina Faso	India
Cote d'Ivoire	Indonesia
Cabo Verde	Iran (Islamic Republic of)
Cambodia	Iraq
Cameroon	Ireland
Canada	Israel
Central African Republic	Italy
Chad	Jamaica
Chile	Japan
China	Jordan
Colombia	Kazakhstan
Congo	Kenya
Costa Rica	Kiribati
Croatia	Kuwait
Cuba	Kyrgyzstan
Cyprus	Lao People's Democratic Republic
Czech Republic	Latvia
Democratic Republic of the Congo	Lebanon
Denmark	Lesotho

Liberia	Saint Vincent and the Grenadines
Libya	Samoa
Lithuania	Sao Tome and Principe
Luxembourg	Saudi Arabia
Madagascar	Senegal
Malawi	Serbia
Malaysia	Seychelles
Maldives	Sierra Leone
Mali	Singapore
Malta	Slovakia
Marshall Islands	Slovenia
Mauritania	Solomon Islands
Mauritius	Somalia
Mexico	South Africa
Micronesia (Federated States of)	Spain
Mongolia	Sri Lanka
Montenegro	Sudan
Morocco	Suriname
Mozambique	Swaziland
Myanmar	Sweden
Namibia	Switzerland
Nepal	Tajikistan
Netherlands	Thailand
New Zealand	The former Yugoslav republic of Macedonia
Nicaragua	Timor-Leste
Niger	Togo
Nigeria	Tonga
Norway	Trinidad and Tobago
Oman	Tunisia
Pakistan	Turkey
Palau	Turkmenistan
Panama	Uganda
Papua New Guinea	United Arab Emirates
Paraguay	United Kingdom of Great Britain and Northern Ireland
Peru	United Republic of Tanzania
Philippines	United States of America
Poland	Uruguay
Portugal	Uzbekistan
Qatar	Vanuatu
Republic of Korea	Viet Nam
Republic of Moldova	Yemen
Romania	Zambia
Russian Federation	Zimbabwe
Rwanda	
Saint Lucia	