

Global disparities in child passenger safety practices and associated perceptions of risk

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Abstract: This paper explores international differences in child passenger safety practices and regulations, highlighting not only the disparities across countries, but also the resulting differences in public perceptions of risk. Child passenger safety practices and regulations vary greatly across the world. For instance, children ride in rear-facing safety seats until age four in Sweden, while children in China are not even required to ride in safety belts or safety seats. Standards for child restraints also show great variation, as Canada and many European nations have far stricter minimum standards for crash tests than does the United States. Not surprisingly, regional variation in morbidity and mortality are inversely related to advances in safety practices. Restraint use laws not only differ, but when they do exist, they often do not support best practice recommendations. As an example, safety advocates in the United States are currently working to increase booster seat use, but child restraint legislation in most states does not adequately protect booster-age children. Given such global differences in child passenger safety practices and regulations, the question is raised whether a call for universal minimum standards is necessary and sensible. Varying needs of developing countries are considered and likely preclude the application of universal minimum standards. Differences in risk priorities between low- and high-income countries, as well as differences in the process of safety improvement, are discussed.

Global burden of road traffic injury

Road traffic injury is the leading cause of global injury death and the 9th leading cause of disease burden (World Health Organization [WHO], 2003). Traffic-related injuries account for 1.26 million annual deaths in the world and as many as 50 million injuries a year. Every day, 3242 people die from a crash-related injury (Peden et al., 2004). By the year 2020, road traffic injuries are predicted to be the 3rd leading cause of disease burden (Murray & Lopez, 1996).

Unfortunately, this burden falls disproportionately on low- and middle-income countries. Despite the fact that the majority of the world's vehicles are in high income countries, 90% of motor vehicle related deaths occur in low- and middle-income countries (Peden et al., 2004; United Nations [UN], 2003). For instance, one-third of the world's annual crash deaths occur in Southeast Asia (UN, 2003). Furthermore, the worst road death rate is in Africa, which has very few cars relative to the rest of the world. Consider that Africa has 100 deaths per 10,000 vehicles, while Sweden (a high-income country) has a rate of 1.3 deaths per 10,000 vehicles (UN, 2003).

In wealthy countries, fatality rates are decreasing despite increases in motorization (SAFE KIDS Worldwide, 2004). In most high-income countries, slow increases in motorization have allowed safety practices to develop in concert with increased traffic volume. In Finland for instance, 30 years of road safety campaigns have led to a 50% decrease in fatalities, despite tripling of the country's traffic volume (UN, 2003).

Conversely, in low- and middle-income countries fatality rates are increasing. For instance, child traffic deaths increased by a third in China and sub-Saharan Africa during the 1990s (SAFE KIDS Worldwide, 2004). Unlike the development of traffic safety practices in high-income countries, developing nations are becoming motorized at such a rapid pace that appropriate safety measures and regulations are lagging (UN, 2003). Many low- and middle-income countries contend with poor roads, lax enforcement of driving rules, multi-use roadways, and too few controlled intersections (SAFE KIDS Worldwide, 2004).

Global disparities in road traffic injuries are expected to worsen. By the year 2020, road traffic injuries are predicted to increase by 83% in low- and middle-income countries and decrease by 27% in high-income countries. The resulting global increase in traffic-related injuries is expected to be 67% (Peden et al., 2004).

Despite the growing magnitude of the problem in developing countries, road traffic injuries are often neglected in these countries' research and policy (Peden et al., 2001). Crucial risk factors for children in developing countries include poor implementation of road safety measures and underutilization of safety devices such as seat belts, child restraints, and helmets (WHO, 2003).

Global differences in child passenger safety regulations and practices

Use of child restraints varies considerably among nations and is mainly confined to high-income countries (WHO, 2003). For example, child seat use rates are as high as 95% in the United Kingdom and Sweden, but child restraints are rarely used in low- and middle-income countries (Anund et al., 2003; Peden et al., 2004).

Even among high-income countries, child passenger safety practices and regulations vary greatly. Sweden, Australia, the United States, and the United Kingdom have large differences in recommendations and regulations for children's safe travel (Anund et al., 2003). Child occupant regulations can be described as existing on a continuum, where some nations' laws maximally protect children, others do not have regulations governing children's safe travel at all, and the majority of countries fall somewhere in between.

One of the most advanced nations in this regard, perhaps, is Sweden. In Sweden, best practice recommendations place children in rear-facing seats until 4 years of age and then they transfer directly to booster seats (CP Safety, 2003). Compare this with China, where children are not required to be buckled at all (SAFE KIDS Worldwide, 2004). Examples of countries that fall somewhere in between these two extremes include Brazil, South Africa, and the United States. In the United States, all 50 states have a child restraint law, but requirements vary substantially by state and rarely reflect best practice. That is, most states' regulations fail to adequately protect booster-age children (i.e., approximately 5 to 8 years of age). Children in South Africa are not required to use child restraints, but are required to use safety belts (SAFE KIDS Worldwide, 2004). In Brazil, children are required to ride in the back seats of vehicles, but no specific restraint system is required (SAFE KIDS Worldwide, 2004).

In addition to the variability in recommendations and regulations for use, child restraint standards vary considerably among high-income countries. For instance, Canada, Australia, and many European nations have far stricter minimum performance standards for crash tests than does the United States (Safety Forum, 2003). The United States only uses four child-sized crash test dummies ranging in age from 1 to 10 years (National Highway Traffic Safety Administration, 2004), while many European nations use six child-sized crash test dummies ranging in age from newborn to 10 years (Fitzgerald, 2000). Canada goes a step further by using a premature dummy in crash tests (Fitzgerald, 2000). The greater variability in dummy size allows for more sensitive crash performance analysis. Unlike Europe, the United States tests car seat performance in frontal collisions only and thus is not able to test side-impact, rear-impact, or rollover crashworthiness (Fitzgerald, 2003). Perhaps as a result, the United States does not require side-impact padding in safety seats as do many European nations (Fitzgerald, 2003). Further, the crash test bench used in the United States is modeled after the back seat of a 1975 Chevy Impala, which is clearly dated (Fitzgerald, 2003). Although the United States is far advanced compared to developing countries, its crash-worthiness regulations and crash test procedures are lagging in comparison to some other high-income countries. It should be noted that the United States is moving forward in efforts to update performance standards, as recent legislation highlights some of these very issues.

High-income countries also disagree on best practice recommendations. Best practice recommendations represent the current knowledge of safety experts regarding the best method for protecting a child in a crash. Because legislation usually lags behind knowledge given the slow process of policy change, best practice recommendations are used to guide caregivers in the interim. In the United States, seats are not routinely tethered when in the rear-facing position (CP Safety, 2003). However, throughout Europe, Australia, and Canada, seats are tethered in the rear-facing position (CP Safety, 2003). Proponents of each practice argue for superior crash protection. That is, the United States argues for superior crash performance when rear-facing seats are not tethered, while European nations argue for superior protection when they are tethered. While contradictory, each argument is strong depending upon the type of crash considered (i.e., front- versus rear-impact) (CP Safety, 2003). Among countries that do tether rearward-

facing seats, there is dissention regarding the best method of tethering. Seats are tethered to the rear dash area when following the Australian method, while seats are tethered to the floorboard when following the Swedish/European method (CP Safety, 2003).

The point of this discussion is to underscore the variability and dissention across the world in child passenger safety practices and regulations. Given all of these differences, and the need for global intervention on behalf of road traffic injuries, it seems a logical step to call for universal standards and regulations. There is precedent for adoption of international safety standards, as such global standards have been set for environmental and chemical risks such as air pollutants and agricultural chemicals (WHO, 2002). However, is this goal feasible for child passenger safety, considering that countries and localities have drastically differing risk priorities (SAFE KIDS Worldwide, 2004)?

Viewing global road traffic risk in context

Developing countries struggle with a number of unique road traffic risks. For instance, a primary problem in many countries is that pedestrians and motor vehicles share the road. In low-income countries, most fatalities are among pedestrians, while most are among vehicle occupants in high-income countries (UN, 2003; SAFE KIDS Worldwide, 2004). Consider that 84% of traffic deaths in Ethiopia are pedestrians, while almost the opposite is true in the United States, with 75% of traffic deaths occurring among vehicle occupants (UN, 2003).



Figure 1. Road sharing in India

Like pedestrians, small vehicles such as motorbikes are vulnerable road users as many developing nations have multi-use roadways and lack load-limit or oversized vehicle standards (see Figure 1). Roadway crowding can be a problem in some areas, and the density is further complicated by unclear or absent lane markings.

Roadways may be unpaved or in otherwise poor condition in many areas (see Figure 2). Other localities struggle with vehicle scarcity. Vehicle scarcity presents a problem when getting to a destination overrides the need for safe travel. It is not uncommon in Mali, Africa, for instance, to witness vehicles overloaded with occupants to the point that passengers catch a ride by hanging onto the back of a vehicle. Figure 3 depicts two gentlemen in Mali, Africa holding onto the back of a vehicle while traveling at a speed of about 45 miles per hour.

Clearly, road traffic injury risks need to be viewed in their local context (WHO, 2002) as each nation has its own unique needs for intervention. Also, traffic-related risks in developing countries may be occurring alongside epidemics of potentially deadly diseases such as tuberculosis, malaria, and HIV/AIDS. Residents may be struggling with the uncertainty that comes with war, poverty, or food and shelter insecurity. It is naïve to expect, for instance, that a global standard for the use of child safety seats would be well-received if citizens are stressed about feeding their families. The cost of child restraint systems is a barrier even in high-income countries (Peden et al., 2004).



Figure 2. A roadway in poor condition in India.

Because of unique needs, risks are likely prioritized differently from nation to nation. Consider, for instance, that half of child injury deaths in China are due to drowning (SAFE KIDS Worldwide, 2004). Therefore, China would likely list drowning as its top area of need for child safety intervention. Familiarity with a hazard also reduces perception of risk (Sandman, 1991; Slovic, 1991); therefore, what seems highly risky to a high-income country may be viewed with relative complacency in a developing country. For example, in localities where the type of travel depicted in Figure 3 is common, associated perceptions of inherent risk are likely low.

In addition to having varying risk priorities, countries are at differing levels of need regarding child passenger safety interventions. In Sweden and the United Kingdom, restraint usage is at 95% (Anund et al., 2003). Therefore, these countries' main concern is misuse, as research indicates that 90% of child safety seats are installed improperly (Anund et al., 2003). In contrast, the goals of intervention in low and many middle-income countries would be increased use of child restraints, irregardless of proper installation. Once use is increased, intervention agents can begin to focus upon installation issues. While related, the methods for increasing use versus correct use are quite different.

Conclusions, uncertainties, and future directions

Clearly, child passenger safety interventions must be adapted for low- and middle-income countries, not adopted. Both the World Health Organization and the United Nations recognize this and are working toward that goal (Peden et al., 2004; UN, 2003). Much work is needed in order to understand the manner in which interventions can be adapted.



Figure 3. Catching a ride in Mali, Africa.

It is unclear, for instance, whether developing countries will follow the same model of safety improvement that has occurred in high-income countries. Because of the historically slow increases in traffic volume in high-income countries, there has been a slow evolution of traffic safety practices. Regulations have changed with increased knowledge in a cycle as depicted in Figure 4. As knowledge and safety science has advanced, legislation supporting that knowledge has been enacted. Over time, and with public health campaigns, normative practices have changed. With more knowledge came additional legislation and additional changes in normative practices. For instance, high-income countries first required lap belts in vehicles to prevent ejection; with increases in knowledge the shoulder belt was added for increased control of head and torso movement.

Given the current state of global knowledge regarding safety, does the process of change need to be iterative in developing countries as it has been in high-income countries? We know, for instance, that a minimum standard of safety belt use for all children seems insufficient given that safety belts fail to adequately protect children less than approximately 80 pounds and 4 foot 9 inches in height. However, a minimum standard requiring safety seats is impractical for reasons already noted. It seems imprudent for low-and middle-income countries to follow a similar iterative process of change. Could there be a universal minimum standard at some level? And if so, which level is appropriate given the distinct needs of developing countries?

Instead of a universal minimum standard, a small wins approach (Weick, 1984) may be necessary, focusing first on the leading risk priority for each county. For instance, Ethiopia would likely focus first on creating safe pedestrian facilities given their high pedestrian fatality rate, while China may choose to focus on water safety efforts given the high drowning rate. Countries will also likely differ regarding their first mode of intervention. Educational efforts may be warranted in some localities, whereas others may focus on engineering improvements. Some countries will need to pass legislation, whereas others are only lacking in enforcement of existing legislation.

In the push toward global intervention on behalf of road traffic injury, ample logistical questions are yet to be answered. The United Nations and World Health Organization note a number of pertinent research needs that are important for the

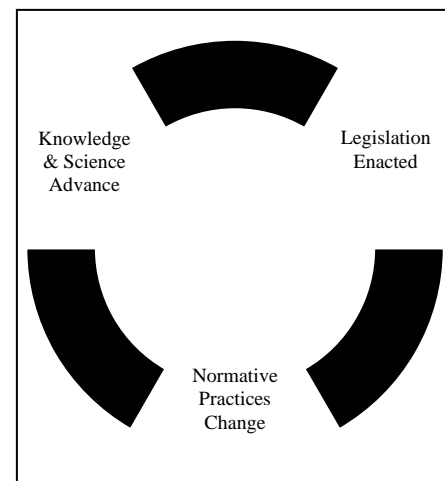


Figure 4. The cycle of change in high-income countries

advancement of global efforts (Peden et al., 2001; Peden et al., 2004; UN, 2003). First, standards for quality assessment should be established, as data among nations is sometimes scarce, unreliable, and does not lend itself to international comparison. Second, improved information and data sharing are needed. For many developing nations it is difficult to obtain information regarding road traffic safety efforts, normative practices, and legislative efforts. Finally, international discussions regarding acceptable interventions and minimum standards are needed. Above all, international cooperation will be necessary in order to best adapt interventions that have been successful in high-income countries and ultimately work toward decreasing the global burden of road traffic injury.

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