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Traffic fatalities of drivers who visit urban and rural areas: An exploratory study

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ABSTRACT

Traffic fatalities are considerably higher on rural roads than in cities. However, little research has considered where crash victims reside relative to the location of the crash. This study examined the fatalities of drivers who were visiting from different urban and rural areas, compared to local residents. There was an overall greater risk on rural roads, and this risk was even higher for city residents visiting these roads, one of the few instances that document a greater risk to drivers from urban (versus rural) areas. When looking at crashes occurring in cities, visiting rural residents had a higher fatality risk than city residents. Overall, these disparities could not be explained by motorists journeying any place far from their home—it was travel between urban and rural areas that accounted for the elevated mortality. The results show that the excessive fatalities in rural areas are not just a rural health problem—visitors from cities are in at least as much danger when driving on these roads. Understanding the excess fatalities of visitors has implications for how, and toward whom, driving safety messages might target.

1. Introduction

One of the lesser publicized health crises in the developed world is the disproportionate number of motor vehicle fatalities on rural roads (Clark & Cushing, 2004). For example, although less than one quarter of Americans resides in rural regions, these regions account for more than half of all traffic fatalities (U.S. Department of Transportation, 2008). This pattern is by no means culturally specific: the greater rural driving risk has been documented in many countries (Zwerling et al., 2005). Several features of rural roads may explain the greater crash mortality, including faster speeds, road design features, larger vehicles, and delayed response of emergency medical services (National Highway Traffic Safety Administration, 1996; Zwerling et al., 2005). In contrast, urban road conditions tend to be safer and more predictable, with lower speed limits, more explicitly-posted rules and vigilant law enforcement (Quiros & Shaver, 2003). In addition to road conditions, the urban/rural discrepancy has also been explained in terms of person-level factors due to different "safety cultures" between urban and rural regions (e.g., driving while intoxicated, seat-belt use; Rakauskas, Ward, & Gerberich, 2009; Ward, 2007).

One approach to understanding the crash disparity has been to examine subgroups of drivers based on characteristics such as age, gender, or type of vehicle driven. One seemingly important factor, which has only received scant attention thus far, is a driver's place of residence relative to where the crash occurred. In one study, Blatt and Furman (1998) found that urban residents accounted for 27% of all crash fatalities in rural areas, while rural residents made up 27% of the fatalities

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in urban areas. Additionally, Donaldson, Cook, Hutchings, and Dean (2006) assessed the likelihood that crashes resulted in death (the crash fatality rate). In urban areas, the crash fatality rate was higher for visiting rural residents than for urban residents, whereas on rural roads the risk was greater for urban residents. Thus, although most fatalities in a region consist of that region's residents, fatality risk was higher among drivers traveling *between* urban and rural conditions. Donaldson et al. raised the possibility that visiting drivers had a greater likelihood of crashing because they were less familiar with the different urban/rural road environments than local residents. Such a hypothesis is consistent with prior work showing that crash risk increases when people drive in unfamiliar conditions, such as extreme weather or foreign roads (Claret et al., 2003; Walker & Page, 2004; Wilks & Coory, 2002; Wilks, Watson, Johnston, & Hansen, 1999; Yannis, Golias, & Papadimitriou, 2007).

Unlike driving in unfamiliar weather or on the opposite side of the street, though, many rural road hazards (e.g., narrow shoulders, hills that reduce sight distance, high speed limits) may not seem dangerous to the untrained eye. Hence, city drivers might not *perceive* their personal risk to be higher while traveling on rural roads, and thus may fail to respond with more cautious driving. For example, although city dwellers may feel confident in their ability to drive safely at high speeds, this optimism can be dangerous when encountering obstacles with which they have little experience, such as large animals that suddenly appear on the highway, or trying to pass other cars on two-lane roads. Thus, as much as rural road hazards increase the likelihood of serious crashes (Zwerling et al., 2005), we expect rural road conditions may be even more dangerous for drivers who lack experience with them (urban residents visiting these roads).

Despite the few studies on visitors to urban/rural regions (Blatt & Furman, 1998; Donaldson et al., 2006), an important question that remains unanswered is whether crash risk is elevated: (1) only when drivers switch between urban/rural roads, or (2) more generally, when people drive any significant distance from home on *stretches of road* they are less familiar with. To answer this question, we would want to distinguish whether motorists driving in their *own* urban/rural region crashed close to their home (e.g., rural residents inside their home county) or whether they were driving in similar conditions farther from home (e.g., rural residents visiting a *different* rural county). This is a critical distinction if we are to understand the reasons for the increased casualties when drivers venture significant distances from home, and to formulate appropriate protective measures to reduce these casualties.

One reason for the dearth of research on visiting drivers may be that most traffic crash databases do not provide an easy way to test how far a crash occurred from the victim's residence. We sidestepped this problem by using data from United States death certificates, which although they do not record extensive details about the traffic fatalities, they do provide information on both the county of occurrence and county of residence for all decedents. We examined all motor vehicle fatalities in the U.S. over a recent 21-year period, comparing cases that occurred in the driver's home county to those occurring outside of their own county, both in and out of their own urban/rural region. To date, no research has tracked whether drivers traveling far from home were inside or outside their own urban or rural area.

2. Methods

2.1. Description of population and regions

We used data from all fatalities in the United States from 1990 to 2010, which amounted to over 49 million decedents total. Information from death certificates are compiled and made available by the Division of Vital Statistics of the National Center for Health Statistics (NCHS, 2014). In addition to basic demographic information (e.g., age, race, gender), the records include each person's cause of death, county of death, and county of residence. Data with county identifiers were obtained with special permission from the NCHS.

Urban/rural status was determined using the six-level urban–rural classification scheme created by the NCHS for U.S. counties (Ingram & Franco, 2012), with lower numbers given to more urban counties and higher numbers to more rural counties. In order to differentiate urban and rural regions from other parts of the U.S., we designated urban counties as those assigned "1" in the scheme, which was defined as a central county in a metropolitan area with a population over 1 million. We categorized counties as rural if they were "nonmetropolitan" (coded as 5 or 6); these counties do not contain any population center having more than 50,000 people. We used the NCHS's 1990 coding scheme to categories counties for the early years of our dataset (1990–1998), and the updated 2006 NCHS coding scheme for the remaining years (1999–2010).

Cause of death was coded in accordance with the ninth and tenth revisions of International Classification of Diseases (ICD-9 [1990–1998] and ICD-10 [1999–2010]) for fatalities due to motor vehicle traffic crashes. Because the number of passengers in a vehicle may differ depending on the location and destination of the vehicle, we focused only on the fatalities of *drivers* of motor vehicles and motorcycles (ICD-9 codes 810–819(.0,.2); ICD-10 codes V20.4–V29.4, V30.5–V38.5, V39.4, V40.5–V48.5, V49.4, V50.5–V58.5, V59.4, V60.5–V68.5, V69.4, V70.5–V78.5, V79.4, V86.0). This excluded all passengers in vehicles, as well as all pedal cyclists and pedestrians who were victims of traffic crashes, none of whom were operating motor vehicles. Our analysis also excluded all *non*-traffic crashes, which did not occur on public roads (Table 1 summarizes key data components).