
Road to Ruin: Road Traffic Accidents in The Developing World

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Abstract: Road traffic accidents (RTAs) are the leading cause of deaths in adolescents and young adults globally (Mohan and Romer 1991). The World Bank (1993) estimates that of the 865,000 traffic deaths occurring annually worldwide, 74% are in developing countries. While the RTA rates and related death and disability are decreasing in most industrialized countries, they are increasing rapidly in many less developed countries (LDCs). RTAs also exert a considerable economic burden on developing countries, estimated to cost 1-4% of a country's GNP per annum (Zwi 1993). In an effort to examine the underlying causes of this growing burden of premature death and disability developing countries are experiencing due to RTAs, the available epidemiological and anthropological literature has been reviewed. The concepts of risk and vulnerability have been employed in order to explore the complex web of socio-cultural and politico-economic factors influencing the rapidly increasing rates of RTAs in developing countries, as illustrated by cases of Nigeria and Kenya. It is argued that an approach which incorporates elements of epidemiological and anthropological concepts of risk and vulnerability, based on a mutual understanding about the limits of knowledge, while legitimizing different way of knowing, may well be the path to a comprehensive coverage of the issues. It is further argued that, beyond the theoretical and methodological issues being explored, the highest priority should be a focus on the more immediate concerns including the apparent lack of basic data and the complete absence of anthropological studies of any sort in relation to RTAs in developing countries.

Introduction

And the watchman told saying, He came even unto them and cometh not again; for the driving is like the driving of Jehu the son of Nimshi: for he driveth furiously.

2 Kings 9: 20

Many people are concerned about their likelihood of being killed or injured in road traffic accidents, and many more about the similar risk to their families and friends. People are also aware of the possibility that road traffic accidents may cause death, disability or injury to others. There is, therefore, concern about road safety among a high proportion of the world's population, and this concern is not

misplaced. Road traffic accidents (RTAs) are the leading cause of deaths in adolescents and young adults globally (Mohan and Romer 1991). The World Bank (1993) estimates that of the 865,000 traffic deaths occurring annually worldwide (an extremely conservative estimate by some accounts), 74% are in developing countries. Furthermore, while RTA rates and related death and disability are decreasing in most industrialized countries, they are increasing rapidly in many less developed countries (LDCs). Road traffic mortality increased by more than 200% in African countries and by 150% in Asian countries between 1968 and 1983, while they decreased by more than 20% in Europe over the same period (Ross 1991). RTAs also exert a considerable economic burden on developing countries, estimated to cost 1-4% of a country's GNP per annum (Zwi 1993). In an effort to examine the underlying causes of this growing burden of premature death and disability developing countries are experiencing due to road traffic accidents, the available epidemiological and anthropological literature will be reviewed. The concepts of risk and vulnerability will be examined in order to reveal the complex web of socio-cultural and politico-economic factors influencing the rapidly increasing rates of RTAs in developing countries, as illustrated by the cases of Nigeria and Kenya.

Magnitude of the Problem

The Dead ride fast.

G.A. Burger, *Leonore*

Global patterns of disease have frequently been characterized by their predominance in either the developed or developing world (Omran 1971). Communicable and nutrition-related diseases are thought to be common in developing countries while degenerative and "lifestyle" diseases (non-communicable) are described as occurring mostly in industrialized countries. Any orderly transition from diseases of 'under-development' to those of 'development' is, however, increasingly being questioned (Soderlund and Zwi 1995). Emerging data suggest that many 'diseases of development' are now occurring in poor countries in addition to their existing burden of poverty-related diseases. In fact, the incidence rates of diseases commonly associated with industrialized countries are often higher in developing countries (World Bank 1993).

Road traffic accidents are a perfect example of a 'disease of development' which is far more prevalent in developing countries than in developed ones. Road traffic-related morbidity and mortality have traditionally been regarded as a problem primarily of industrialized countries (Soderlund and Zwi 1995). There is, however, growing evidence of a strong negative relationship between economic development and exposure-adjusted traffic-related death rates. In other words, after adjusting for motor vehicle numbers, it appears that the poorest countries show the highest road traffic-related morbidity and mortality rates (Soderlund and Zwi 1995).

Due to its perception as a 'disease of development', road traffic accidents – and related injuries -- tend to be under-recognized as major health problems in developing countries (Zwi 1993). However, the World Bank's *World Development Report* (1993) and the World Health Organization's *The Global Burden of Disease* (1996) both highlight the worldwide burden of traffic-related injuries and mortality, emphasizing their importance in less developed countries. The WHO predicts that road traffic accidents will rise from the ninth leading 'burden of disease' in 1990 to the third leading cause in 2020 worldwide (Murray and Lopez 1996). Among males in the economically active age group, motor vehicle injuries are considered to be the third most important cause of death in developing countries, the first two being tuberculosis and HIV/AIDS (Soderlund and Zwi 1995). Mortality from RTAs accounts for 10% of all deaths in the 5-44 year age group (Jacobs and Sayer 1983). A number of developing countries are currently experiencing a steady increase in the proportion and absolute number of fatalities from RTAs, while deaths from infectious diseases are on the decline (Soderlund and Zwi 1995). In Nigeria and Kenya, for example, a five-fold increase in the numbers of RTA fatalities was observed over the last 30 years. When compared with European and North American countries, African and Asian countries experience substantially higher fatality rates per 10,000 vehicles (Odero 1995). Based on this evidence, it is clear that road traffic accidents represent a growing social problem – particularly for juveniles, young adults and those in early middle age (Jacobs and Sayer 1983).

As examples of the severity of the problem, road traffic accidents – and associated death and disability – in Nigeria and Kenya will be discussed. The situations found in Nigeria and Kenya in relation to RTAs are typical of many developing countries; in fact, the fatality rate per 10,000 vehicles is at least as great in many African countries such as Ethiopia, Malawi, Lesotho, Swaziland and Niger (Jacobs and Sayer 1983). It is also important to keep in mind that the RTA fatality rates are at least 20 times greater in developing countries such as Nigeria and Kenya than for countries of Western Europe and North America.

Although the specific situation in Nigeria is difficult to assess – there is likely to have been gross underestimation of RTA injuries and fatalities due to a lack of sufficient data collection by government agencies – RTAs are an undeniably important health concern given the available data. Between 1970 and 1975, over 25,000 persons died on Nigeria's highways, while more than 100,000 people sustained injuries from traffic accidents (Oyebanji 1984). In 1975 alone, an average of 463 persons were killed on the highways per month while nearly 1,700 other were injured. As depicted in Figure 1, reported cases of RTAs and associated injuries and fatalities in Nigeria are rapidly increasing, with fatalities rising from 2,895 in 1970 to 9,252 in 1978 and injuries rising from 13,154 to 28,854 during the same period. The socioeconomic cost of RTAs in Nigeria are immense. The direct cost of traffic casualties can perhaps best be understood in terms of the labor lost to the nation's economy. It has been estimated that 8,000 out of the 20,132 persons injured in accidents on Nigeria's highways and streets in 1975 no longer participated in the economic mainstream and this amounted to a loss of about two million person-years to the nation (Oyebanji 1984). This

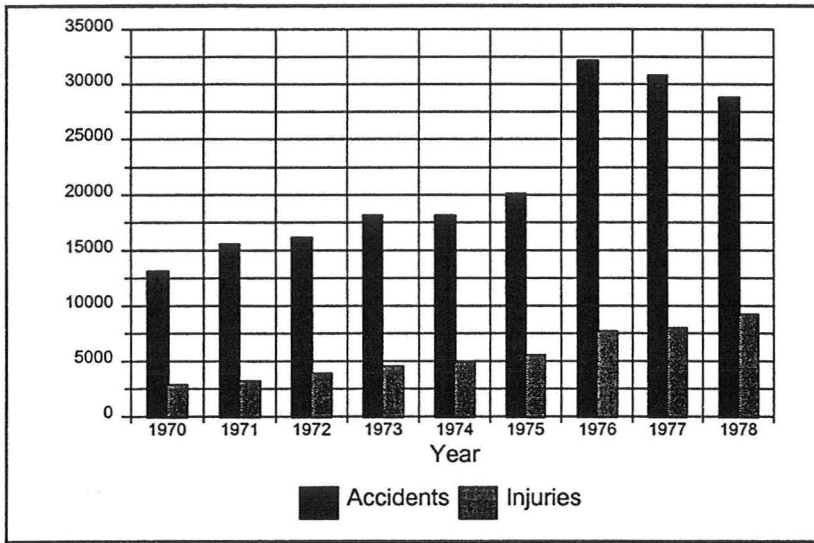


Figure 1. Trends in RTAs in Nigeria, 1970-1978.

(Source: Federal Republic of Nigeria, Social Statistics in Nigeria Federal Office of Statistics 1979)

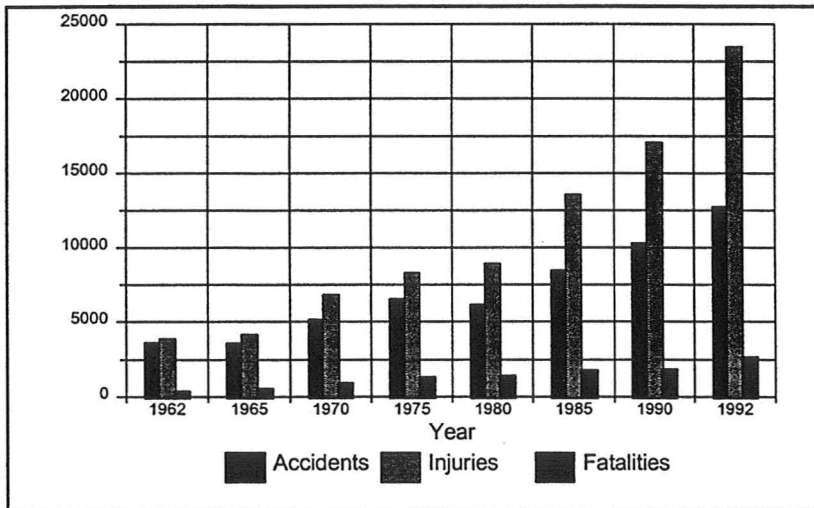


Figure 2. Trends in RTAs in 1962-1992. (Source: Odera 1995).

estimate, daunting as it may be, does not even consider the familial and social costs involved. RTAs have significantly retarded Nigeria's socioeconomic aspirations and development due to the premature loss of qualified and potential contributing professionals and able-bodied men and women in the labor force (Oyebanji 1984). The situation is even more tragic, given the large proportion of men in traffic death statistics (84.6% of fatalities were male) and given the fact that in Nigeria men are still the major breadwinners of their families. It is also important to consider the fact that RTA rates have rapidly increased in the developing world since 1975, and it is therefore likely that the number of injuries and fatalities in Nigeria are at least twice as great as those reported above. RTAs are also an important cause of morbidity, mortality and disability in Kenya. The available data demonstrate that between 1962 and 1992, RTAs increased by 2.5 times, the numbers of injuries increased five-fold, whilst those killed rose by 5.7 times (Figure 2). Over the last 10 years, fatality rates per 10,000 vehicles ranged from 50.7 to 64.2, while fatality in relation to population size was demands on hospital resources (Ating'a 1990). RTAs also exert a huge burden on Kenya's economy in terms of hospital costs, costs of vehicle insurance and maintenance as well as indirect costs to individuals, families and society due to loss of production, and effects of disability and death (Odero 1995). According to the National Road Safety Council, in 1984 the annual cost of RTAs was estimated to be 1.6% of the country's GNP per annum, and by 1989 the cost had risen to 3.6% of the GNP per annum (Gekonde 1990). This rising economic cost has inevitably caused considerable drain on the country's human and financial resources (Odero 1995).

Given the apparent severe 'burden of disease' being experienced by developing countries due to road traffic accidents, the question becomes, how do we approach researching this urgent health concern in an effort to design and implement sustainable, meaningful and culturally appropriate interventions?

Epidemiological Approach

Now what I want is Facts...Facts alone are wanted in Life.

Charles Dickens, *Hard Times*

Epidemiology is generally defined as the study of the distribution and determinants of disease and disability in human populations (Dunn and Janes 1986). Epidemiological analysis operates primarily at the population-level, which is identified in terms of geographic, administrative, and/or demographic boundaries. Population-based data, often collected from archival sources or government documents, are used in order to identify and measure the relative importance of factors within the causal web of a disease or disability (Dunn and Janes 1986). The three basic study designs that are used in epidemiological investigations are: randomized clinical trials, cohort studies, and case-control studies (Gordis 1996). As epidemiology expands its concerns to encompass the full range of human diseases and disorders, researchers have been increasingly required to grapple with complex assemblages of psychological, social, cultural, demographic, and genetic factors in their quest to identify etiologic relationships and improve health

services. In other words, epidemiology seeks primarily to identify the amount and distribution of disease within a population by examining the characteristics of person, place, and time (Dunn and Janes 1986). Because many diseases are caused, at least in part, by human behavior – at the level of the individual, group, or community – epidemiology must be a behavioral science. In fact, a concern with health-related behavior is a commonality shared by epidemiologists and anthropologists. The manner in which these two sciences examine health-related behavior – superficially appearing to have little in common given the quantitative focus of epidemiology versus the qualitative focus of anthropology – share a common interest in the risk approach.

Epidemiological Theory of Risk

Risk, literally defined as “the possibility of incurring misfortune or loss” is differentiated by epidemiologists into 3 types; absolute risk, relative risk and attributable risk. The incidence of a disease in a population is termed the absolute risk (Gordis 1996). Absolute risk can indicate the magnitude of the risk in a group of people with a certain exposure, but because it does not take into consideration the risk of disease in unexposed individuals, it does not indicate whether or not the exposure is associated with an increased risk of the disease.

Relative risk is the ratio of the risk of disease in exposed individuals to the risk of disease in non-exposed individuals (Gordis 1996). An example of relative risk might be the ratio of smokers contracting lung cancer to non-smokers contracting lung cancer. If the ratio is 1, smokers and non-smokers are at equal risk of lung cancer, while a ratio of greater than 1 is indicative of risk in smokers contracting lung cancer being greater than that of non-smokers. From an anthropological perspective, the concept of relative risk is far more appealing than absolute risk because it does not assume that a single factor (exposure) determines the level of risk.

The concept of attributable risk, defined as the amount or proportion of disease incidence (or disease risk) that can be attributed to a specific exposure, is an extension of relative risk (Gordis 1996). Attributable risk is useful in answering the question of how much disease can be prevented if we have an effective means of eliminating the exposure in question, and it therefore has major application potential in clinical practice and public health. Thus, the concepts of relative risk and attributable risk are essential for understanding causation and the potential for prevention from an epidemiological perspective (Gordis 1996).

Factors whose presence appears to be associated with increasing susceptibility are termed risk factors (Dunn and Janes 1986). The importance of determining the natural history of any disease lies in identifying appropriate points for disease prevention and control. This is generally done at the stage of susceptibility, which is in turn recognized on the basis of risk factors – characteristics of person and place identified through analytic research (Dunn and Janes 1986). The decision to smoke cigarettes is an example of a person-oriented risk factor for lung cancer, while frequenting a smoke-filled tavern is a place-oriented risk factor for lung cancer given the known association between smoke inhalation and this disease. It

is important to note that both person- and place-oriented risk factors are not always under the control of the individual, even when the associated risks are well understood (Lupton 1993).

Risk and Road Traffic Accidents

Given their respective literal definitions, it is clear that there is an important relationship between the concept of *risk* (the possibility of incurring misfortune or loss) and *accident* (an unforeseen event or one without an apparent cause; a misfortune or mishap, especially one causing injury or death). It should be emphasized that the concept of *cost* (suffering or sacrifice) is inextricably linked to epidemiological and anthropological notions of risk. In fact, the ultimate goal of health research from any perspective should be the elimination or reduction of the *costs* of the risk factors associated with the specific health issue under investigation (Haight 1986).

Epidemiologists have thus far been mainly concerned with quantifying – through the use of statistical information and technical studies – what has been termed “objective risk” (Haight 1986). Objective risk is based on the idea that risk is a quantity to be estimated by experts, such as epidemiologists, rather than deduced. Subjective risk, on the other hand, is that which is experienced or perceived by – in the context of road traffic accidents – road users. In order to calculate the amount of risk for a given exposure, first the risk factors must be identified.

Epidemiologists and clinicians have generally divided risk factors into three categories when addressing the issue of road traffic accidents. The three categories used are: human, vehicle, and physical/social environmental factors (Baker *et al.* 1984). Five ‘human’ risk factors have been identified as areas where clinically based intervention may have positive outcomes – use of alcohol, use of drugs, morbidity, use of occupant restraints (seat belts), and advanced age. Epidemiological research has tended to focus on human risk factors because they are most relevant to the search for preventive measures and because they have been identified (by epidemiologists) as the most frequent cause of crashes (Polen and Friedman 1988). Each of these ‘human’ risk factors will now be considered in reference to road traffic accidents in developing countries.

A strong, positive association between increasing blood alcohol concentration and the risk of road traffic accident involvement has been documented by researchers for many decades. Alcohol use is generally seen as contributing to traffic injuries by impairing driving capabilities and thus increasing the risk of crash involvement (Polen and Friedman 1988). Recent evidence, however, suggests that alcohol use may also increase injury risk in the crash itself by reducing tolerance of body tissues to trauma as well as potentially compromising medical diagnosis and treatment (Waller *et al.* 1996). As noted by Oyebanji (1984), “the human factors in fatal highway accidents in Nigeria include careless drivers who are often drunk, reckless and ignorant of traffic regulations.” It has been estimated that human factors accounted for 73% of accidents and 74% of people killed in Nigeria between 1970 and 1975. Interestingly, however, Nigeria reported that less than

1% of crashes attributed to human factors were due to intoxication (Oyebanji 1984). Human factors are also felt to be the main causes of RTAs in Kenya – responsible for 85.5% of all reported causes. Despite this recognition no information on the prevalence of alcohol intoxication in drivers or among traffic casualties has been collected in Kenya. Given the fact that studies in industrialized countries have shown that about half of fatally injured drivers have blood alcohol concentrations above the legal limit (0.10% by weight in North America) and that there is evidence for a number of developing countries — Zambia, Papua New Guinea, and Surinam – that imply a causal relationship between alcohol and road traffic accidents (Odero 1995), it would appear that these two developing countries have overlooked a potentially pivotal human risk factor.

Although alcohol is generally thought to be by far the most important risk factor among all drugs, some evidence has also linked the use of minor tranquilizers, such as benzodiazepines, to increased risk of crash involvement (Polen and Friedman 1988). Reviews of the crash risk associated with the use of narcotics, amphetamines, barbiturates, and marijuana frequently lament the lack of epidemiologic data comparable with that which is available for alcohol use and driving. Laboratory evidence has demonstrated negative effects of using particular drugs on driving-related skills, but the evidence is inadequate to determine the extent to which drug use is an important risk factor for automobile crashes (Waller 1985). Despite the apparent lack of available evidence needed to establish the relative importance of the use of medical and non-medical drugs as risk factors in RTAs, they continue to be listed among potential risk factors in the epidemiology literature. Not surprisingly, given the limitations of the epidemiological data available for Nigeria and Kenya and the poorly understood relationship between drugs and RTAs, neither country reported the use of drugs as potential causative agents.

Studies have linked certain chronic medical conditions to elevated risks of crash involvement, while other studies have presented evidence suggesting that these medical conditions represent a negligible risk in reference to automobile injuries or fatalities (Polen and Friedman 1988). There is some evidence that drivers with diabetes, epilepsy, cardiovascular disease, or mental illness experience higher crash and violation rates (Waller 1985), but there is an equal number of studies indicating that neither chronic medical conditions nor disabilities among automobile drivers put them at greater risk of RTAs (Baker and Spitz 1986). Once again, despite apparently contradictory evidence in regards to morbidity and its contribution to RTAs, it continues to be counted among potential risk factors by epidemiologists examining road traffic accidents. Much the same as alcohol intoxication and drug use, morbidity is not reported as a causative agent in RTAs in Nigeria and Kenya.

Much research has demonstrated the efficacy of occupant restraint systems (seat belts) in reducing injuries and preventing deaths in RTAs. Investigations include laboratory studies (using human volunteers, cadavers, and dummies), post-crash comparisons of injuries sustained by restrained and unrestrained occupants, and post-crash judgments by crash analysts regarding the probable effects of restraints

had they been used. Estimates of effectiveness vary, depending on the restraint system investigated, the type of crash, the size of the vehicle, and other factors, but tend to cluster between 40% and 60%, meaning risk of injury or death due to a road traffic accident is reduced 40-60% by using a seat belt (Polen and Friedman 1988). Child safety seats are also effective in preventing fatalities and injuries among young children. An analysis of child seat use in Tennessee found that unrestrained children were 11 times more likely to die in a RTA than restrained children (Decker *et al.* 1984). Despite the apparent relationship between seat belt use and risk of injury or death from a RTA, there is neither recognition or discussion of their role in RTAs in the epidemiological literature for Nigeria and Kenya.

Descriptive studies suggest that the risk of death from automobile crashes is elevated in older individuals. Fatality rates per passenger-mile of travel are relatively high among those older than 70 years of age (Baker *et al.* 1984). Data from a Northeastern Ohio Trauma Study indicate that motor vehicle deaths per 100,000 population sharply increase among men at about age 70 years and the proportion of injuries that were fatal rose dramatically in those older than 60 years of age. Age is not considered a risk factor for RTAs in the developing countries literature, including Nigeria and Kenya, perhaps due to the fact that far fewer people live to advanced ages and thus the proportion of drivers over the age of 60 years is relatively small.

As noted earlier, road traffic accidents in developing countries are largely due to human factors (approximately 80-90%), and although the available literature for developing countries does not address several of the human risk factors discussed, this does not necessarily indicate that these risk factors are not important in LDCs. In fact, recklessness or negligence of drivers, excessive speed, inattention, confusion, and lack of judgment are listed as the main human causes of RTAs in Nigeria. Drug or alcohol use, morbidity and/or advanced age could have contributed to such causes. Nonetheless, there is an apparent gap in the RTA literature for developing countries in terms of the identification and analysis of potential risk factors.

Anthropological Perspective

Perhaps the apparent lack of attention paid to traditional epidemiological risk

*It's a crazy, crazy mixed up town
but it's the rattlesnake I fear
in another place, in another time
I'd be driving trucks my dear*

LIVE, SECRET SAMADHI 1997

factors in relation to road traffic accidents in developing countries is not an oversight on the part of public health officials in these countries, but rather a reflection of the socio-cultural and politico-economic realities in which RTAs are

occurring. It is now recognized that any human disease or disorder is the result of many factors operating within what has been termed the “causal web”, or web of determinants (Dunn and Janes 1986). An anthropological perspective would suggest that the ‘causal web’ in developing countries, such as Nigeria and Kenya, is substantially different than the web of determinants in industrialized countries. Given the fact that epidemiological notions of risk emerged from research conducted largely in industrialized countries, it should not be unexpected that these models of risk do not apply equally well in developing ones. By examining the issue of RTAs in developing countries from an anthropological – and thus qualitative and holistic – perspective, the nexus between the health consequences of behavior and the social and cultural correlates of that behavior may lead to new insights (Dunn and Janes 1986).

Anthropological Theory of Risk

Anthropologists have compared lay, epidemiological, and clinical conceptions of risk in order to examine how individuals and groups perceive risk and how culture influences risk behaviors in a wide variety of settings (Trostle and Sommerfeld 1996). Anthropologists have attempted to move beyond the epidemiological individualized notion of risk – which often sights ignorance of high-risk behavior as the main cause of disease – by focusing instead on social, cultural, political, and economic conditions which place entire groups in positions more vulnerable to disease or disability (Singer 1994). An anthropological perspective on risk is not meant to replace the epidemiological approach to risk, but rather to enhance and supplement it. By examining socio-cultural and politico-economic processes as they relate to risk, anthropologists are not denying the importance of education as it relates to epidemiological behavior-change health initiatives, but rather are recognizing the fact that human behavior operates at many different levels and must not be reduced to a matter of education alone.

Anthropological research focuses on “subjective risk” – the socially experienced or lived dimension of risk – and evaluates it as a social process rather than a technical and ‘scientific’ one in order to reveal the other half of the risk equation. As Gifford (1986) points out, “risk may sometimes be objective, sometimes lived, and sometimes both.” The challenge facing epidemiologists and anthropologists is to untangle the ‘causal web’ in an effort to facilitate effective health interventions.

Risk, Vulnerability and Road Traffic Accidents

Vulnerability can be defined as “open to being physically or emotionally wounded or hurt; exposed to attack.” Clearly linked to the definitions of ‘risk’ and ‘accident’ previously discussed, vulnerability is increasingly being explored as an explanatory concept by anthropologists. As the definition implies, vulnerability includes an element of powerlessness which the epidemiological conception of risk does not. Vulnerability includes notions of marginalization which recognize the socio-cultural and politico-economic circumstances of many individuals and groups in developing countries. Women and children, for example, are frequently more ‘vulnerable’ due to the fact that the circumstances surrounding their lives

often include disempowering elements which exist within patriarchal, hegemonic societies. Risk, on the other hand, is considered a construct which can take on a different content and meaning, depending on whether the language used is epidemiological, clinical or lay (Gifford 1986). The ways in which these three languages of risk are used may either affirm or challenge existing relationships of power and control or express deeply held feelings of vulnerability and responsibility (Kaufert and O'Neil 1993). By adopting the language of vulnerability, however, anthropology not only recognizes and addresses the socio-cultural and politico-economic elements of the 'burden of disease', but also reveals the fact that 'risk' is a concept with multiple meanings and is ideologically loaded (Lupton 1993).

Anthropologically informed research on road traffic accidents has investigated a range of elements such as distribution of wealth, class of road users involved, urban/rural differences, and studies of behavior in developing countries. According to Wintemute (1985), for example, income distribution accounts to an alarming degree for the variation in reported motor vehicle-related mortality in developing countries. In developing countries, income maldistribution is much greater than in industrialized ones, and this may serve as an inhibitor of the spread of motorization (Wintemute 1985). The net effect may be, in fact, that RTA-related mortality behaves like a disease of social reform, rather than a disease of development as it is often expressed in the epidemiological literature. Economic and social reforms are undoubtedly connected to the dire situations found in Nigeria and Kenya in relation to RTAs. As Oyebanji (1984) states in reference to the situation in Nigeria, "road accidents remain the greatest threat to the successful movement and transport of human and material resources from one place to the other in an attempt to build up a strong and self-reliant country, with a great and dynamic economy." However, Oyebanji (1984) notes that as long as the careless and corrupt attitude of the law enforcement agencies continue to overlook serious and even deadly traffic violations in return for monetary bribes, a stable and prosperous economy in Nigeria is unlikely to emerge.

The class of road users involved in RTAs – such as pedestrians, cyclists, motor cyclists or scooterists, passengers, and drivers – has been examined by both epidemiologists and anthropologists. There are considerable differences in the relative risk the various classes of road users are exposed to from country to country (Jacobs and Sayer 1983). However, among road users in developing countries, pedestrians in urban settings have been shown to be most vulnerable to injury and fatality (Downing 1994). In Kenya, one third of all pedestrians killed were in Nairobi (Odero 1995). Figures reported in other developing countries are even higher. In Cote d'Ivoire, for example, Muhrad (1987) found that 75% of the total pedestrian fatalities occurred in Abidjan. A hospital-based survey by Dessie and Larson (1991) in Addis Ababa, revealed that 91% of all non-fatal traffic casualties were pedestrians. The high proportion of pedestrian fatalities in the urban centres of developing countries have been attributed to behavioral (socio-cultural) and structural (politico-economic) factors. These include the greater concentration of vehicles in major urban centres, inadequate public transport systems to cope with increasing demands of the growing urban population, a large

number of pedestrians, poor observance of traffic rules by both motorists and pedestrians, as well as a lack of segregated pedestrian facilities (sidewalks, for example) in the road network (Odero 1995).

Although some urban elements of RTAs have been discussed above, it must be noted that wide urban/rural differences exist between industrialized and developing countries. In towns and cities in Great Britain, 20% of all accidents occurred within the central area of each town. In Nairobi and Mombasa (Kenya), Surabaya (Indonesia) and Kingston (Jamaica), the equivalent values ranged from 24% to almost 60%, the disparities reflecting differences in land use and social activity (Jacobs and Sayer 1983). Furthermore, the proportion of pedestrian casualties in many developing world cities is considerably higher than in Western cities. As Jacobs and Sayer (1983) emphasize, greater efforts must be devoted to understanding the roots of pedestrian vulnerability because they are often the most neglected road users in many developing nation cities.

Accidents involving forms of public transport (such as rickshaws, shared taxis, and buses) are also an important element in urban RTAs. According to surveys carried out in Surabaya, Indonesia, there were an estimated 70,000 rickshaws or betjaks in use in 1974. The drivers and passengers of these vehicles are often placed in a vulnerable position, not only because these vehicles provide little protection but also because the drivers frequently ignore all traffic rules (Jacobs and Sayer 1983). In Jordan, shared taxis were involved in almost a quarter of all accidents yet represented only 10% of the total vehicles registered in that country (Kandela 1993). The proportion of accidents involving commercial vehicles and buses - which are often overloaded - in the developing world are much greater than in industrialized nations (Jacobs and Sayer 1983). Because these sorts of problems are rarely encountered in the developed world, remedial measures adapted from developed countries may do little to remedy this situation in LDCs.

Given the epidemiological focus of human risk factors, studies of behavior as they relate to risk and road traffic accidents in the developing world may be particularly useful. As discussed earlier, human factors clearly appear to be responsible for the majority of RTAs globally. In Nigeria and Kenya, 74% and 85% of RTAs have been attributed to human factors respectively (Oyebanji 1984; Odero 1995). Of the human errors, driver faults account for the highest proportion. It is therefore important to investigate the specific elements of driver, passenger and pedestrian life that render them more vulnerable to being involved in road accidents. RTAs are often associated with reckless driving, speeding, losing control, improper overtaking, and misjudging, and these could be the result of the epidemiological human risk factors discussed earlier, socio-cultural and/or politico-economic factors presently under consideration, or a combination of the two. Overloading of buses, for example, may be the result of socio-cultural notions of personal and public space, culturally determined levels of acceptable risk, institutional or economic pressures placed on bus drivers, as well as traditional epidemiological risk factors such as alcohol intoxication or the failure to use seat belts. However, to the author's knowledge there has not been a single anthropological, holistic study of the circumstances surrounding the lives of drivers, passengers or

pedestrians in an attempt to create a complete picture of the 'web of causation' in a developing country.

Towards a Holistic Understanding of Risk and Road Traffic Accidents

*All nature is but art, unknown to thee;
All chance, direction which thou canst not see.*

Alexander Pope

Almost every developing country suffers from a lack of financial resources, and therefore the capital available to spend on road safety improvements, road rehabilitation and maintenance, police enforcement and other government-level investments are severely limited. Although in the industrialized world investment in transport infrastructure is often associated with greater road safety, research has demonstrated that the vast majority of accidents relate to human behavior. Perhaps investment in roadway infrastructure – as it relates to road traffic accidents – should not, therefore, be the highest priority in developing countries. It is essential that scarce resources are not wasted and that any measures that are introduced are carefully appraised and an assessment made of their relative effectiveness (Jacobs and Sayer 1983). Basic accident data collection and analysis is lacking for much of the developing world, but what data does exist suggests that human factors are the main cause of RTAs in developing countries such as Nigeria and Kenya. However, little is known in terms of why drivers, passengers and pedestrians expose themselves to potentially high-risk situations or are left vulnerable to them. Although research findings from developed countries can provide some guidance, the inevitable uncertainties surrounding their transfer to developing countries emphasize the need for caution in their application (Jacobs and Sayer 1983). The problem faced by many developing countries is markedly different from that in industrialized ones. This, coupled with the apparent differences in road-user behavior, knowledge and attitude introduce an element of uncertainty in the potential effectiveness of many interventions.

It is clear that a great deal of research is required before a holistic conception of road traffic accidents and associated death and disability is achieved. An approach which incorporates elements of epidemiological and anthropological understandings of risk and vulnerability, based on a mutual understanding about the limits of knowledge while legitimizing different ways of knowing, may well be the path to a comprehensive coverage of the issues (Gifford 1986). By focusing on the level of logical inquiry, and only secondarily on the use of specific methodologies, a conceptual integration of epidemiology and anthropology will undoubtedly help advance our understanding of risk and vulnerability as they apply to road traffic accidents (Rubinstein and Perloff 1986). Answers to the conjoined questions about the meaning, significance and nature of RTAs for drivers, passengers and pedestrians clearly lie outside of the explanatory models of either epidemiological or anthropological research alone. Clinging to a particular set of methodologies serves only to obfuscate the issue. New forms of research

collaboration, of theory, and of practice are required. Through the conceptual integration of different theoretical approaches – rather than simply the coordination of separate, often inconsistent, methodological preferences – these changes may well be brought about (Rubinstein and Perloff 1986). This is not to suggest that a “units of analysis dilemma” requires the abandonment of epidemiological and anthropological methods of inquiry, but rather that researchers in both fields must not allow themselves to be blinded by artificial boundaries created by superficially opposed methodological approaches (Frankenburg 1993).

Future Consideration

Although a conceptual synthesis of epidemiological and anthropological ‘ways of knowing’ may indeed create an environment of collaboration in an effort to address issues of health intervention for RTAs in developing countries, the feasibility of such a recommendation must be considered. Perhaps the highest priority should be a focus on the more immediate concerns: the apparent lack of basic data (including such issues as underreporting of a number of potential risk factors such as alcohol use); and the complete absence of anthropological studies of any sort in relation to RTAs in developing countries. With road traffic mortality rates increasing by more than 200% in African countries and by 150% in Asian countries between 1968 and 1983, it is absolutely essential that studies examine the underlying forces behind such an enormous ‘burden of disease’, which is compounding the difficulties faced by the already heavily burdened developing countries of the world. Epidemiology and anthropology, and the concepts of risk and vulnerability, offer complementary approaches to researching these issues and should logically be combined in an effort to construct a holistic view of RTAs in developing countries. Without such an approach, the development of appropriate and sustainable interventions is likely to continue to fail.

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