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Traumatic Brain Injuries in Developing Countries. Road War in Africa

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Abstract: *Objective:* The epidemiology of road traffic accidents (RTA) in Africa. *Methods:* Data is presented concerning the problems of RTA in Africa and the human, social and economic consequences. The study is based on a questionnaire addressed to different African medical and neurosurgical societies, and reports of the WHO, the I.R.F. and the World Bank. *Results:* Africa is facing 2 major wars, civil and regional on one hand and road wars on the other, leading to nearly the same number of mortalities and morbidities. The economic costs of these road wars vary from 1 to 3% of gross domestic products. The documented mortality rate at the site of trauma is 20-30%, during transportation 7-20%, and 2-10% on hospital admission. However, due to inadequate accident reporting systems, these figures do not reflect the true numbers. 40% of traffic-related deaths occur in the industrialized countries, which own 89% of automobiles. In contrast, the majority of traffic-related deaths, 60%, occur in developing countries (including those in Africa) which collectively own only 11% of the worlds automobiles. The last 3 decades have seen a decrease of RTA deaths in developed countries, whereas in Africa the number increased by 350% for the same period. *Conclusions*: The high level of casualties are attributed to (1) Road users´ attitudes and behaviour. (2) Unorderly traffic and the poor- condition of the vehicles. (3) The design and state of the roads. (4) The major causes of post-accident mortality are poor pre-hospital and hospital services. **Key words:** road safety, transportation, traffic accidents, traumatic brain injury.

El daño cerebral traumático en los países en desarrollo

Resumen: *Objetivo:* La epidemiología de los accidentes de tráfico en África. *Método:* Los datos se refieren a los problemas de los accidentes de tráfico en África y sus efectos desde el punto de vista humano, social y económico. El estudio está basado en un cuestionario dirigido a diferentes sociedades médicas y neuroquirúrgicas de África así como en informes de la OMS, I.R.F. y el Wold Bank. *Resultados:* África se enfrenta a dos tipos de "guerras", la civil y regional por una parte y la de

las carreteras que lleva casi al mismo nivel de mortalidad y morbilidad. Además, las pérdidas económicas varían entre 1-3% del producto bruto doméstico. La mortalidad en el lugar del accidente es de 20-30% , durante el transporte 7-20%, y en la admisión hospitalaria del 2-10%. Estas cifras son mucho más bajas que en la realidad debido al inadecuado sistema de informes de accidentes. Los países industrializados poseen un 80% de automóviles y tienen un 40% de mortalidad, mientras que los países en desarrollo, incluyendo África, poseen un 20% de automóviles y un 60% de mortalidad. En las 3 últimas décadas esta mortalidad ha disminuído en los países desarrollados. En África, durante el mismo periodo, ha aumentado en un 350%. *Conclusiones*: Esto se atribuye a (1) La actitud y la conducta de los usuarios de las carreteras. (2) El desorden del tráfico y la condición de los vehículos. (3) El diseño y estado de las carreteras. (4) La causa más importante es la pobre pre-hospitalización y la condición de los servicios hospitalarios. **Palabras clave:** seguridad en las carreteras, transporte, accidentes de tráfico, daño cerebral traumático.

Africa is facing two major types of wars: civil and regional wars, and road wars, leading to a great number of mortalities and tremendous economic loss.

The road wars rage between moving vehicles on one side and an innocent and productive population on the other.

Safety is the primary goal during transportation. Industrialized countries began putting a major emphasis on safety in the early sixties, imposing strict rules in order to deal with the increasing amount of traffic-related problems. This led to an important reduction in the number of accident mortalities and post-traumatic complications in spite of the increase in the daily volume of traffic. On the contrary, the situation in developing countries has deteriorated, as the number of RTA has increased dramatically bringing a drastic reduction in human, social and economic well-being (Carlsson, and Hedman, 1990; World Health Organization, 1984; Yerrel, 1987). There is clear evidence of a negative relation between economic development and the death rate of RTA; the poorest countries show the highest road traffic-related mortality rates. (Soderlund, & Zuri, 1995).

Statistics from Developing countries

International statistics give a clear idea of the situation in developing countries.

- Road accidents cause 700,000 deaths every year in the world (Nakajima, 1994), three quarters of them in developing countries (Odero et al, 1997).
- 12-15% of hospital beds are occupied by accident patients.
- In developing countries, RTA are the first or second cause of death in the 15-45 age group.
- The financial costs of RTA in the industrialized countries amount to about 1% of the gross national product, increasing to 5% in some developing countries (World Health Organization, 1987). In Africa the losses incurred amount to about 1.25 billion US$ per year.
- As a result of huge investments and committed efforts towards accident control, the last four decades have seen a decrease in the number of RTA deaths in developed countries (Federal Highway Administration, 1990; Highway users Federation and the Automotive Safety Foundation, 1991; Kepp, 1992; OECD, 1984). In Africa, the numbers increased by 35% for the same period.
- The industrialized countries own 89% of the world's cars and suffer 24% of RTA deaths, while developing countries own 11% of cars with 76% of RTA deaths. The figure for fatalities per 10,000 vehicles in the developing countries ranges between 2-20%, while, conversely, the figures range from 0.2-0.5% (Hamdy, 1993) for developed countries.

Traumatic Injuries in Africa

In Africa, RTA are responsible for the majority of head and spinal injuries, causing 80% of all head injuries in Nigeria alone. Better quality roads resulted in excessive speed and careless driving, actually leading to a rise in the death toll. In Zambia, pedestrian injuries are particularly common, especially in the first two decades of life. In South Africa, RTA are the commonest cause of spinal injuries, responsible for 38% of cases. In West Africa, it is the second most common cause of spinal trauma. In Burkina Fasso, where neurosurgery was instigated in the early nineties, and its bordering countries, 2,200 cases of head trauma and 200 spinal traumas were recorded in a period of 2 years.

In Ghana, the annual incidence of injuries is over 900 per 100,000 persons. In urban areas passengers are injured in minibus and taxi crashes, or pedestrians are struck by these vehicles. In rural areas, the most common RTA were bicycle crashes followed by motor vehicles accidents

involving commercial rather than private vehicles. (Mock, Farjuog, & Rivara, 1999). In Ethiopia, pedestrians account for 50% of RTA deaths, compared to 13% in the United States (Insurance Institute for highway safety, N.D.).

Rural roads are hazardous, particularly at night as vehicles sometimes travel with no lights. Collisions are associated with severe forms of trauma and multiple casualties. Rural and remote locations present difficult challenges in providing acceptable standards of treatment. The population is separated by vast distances from hospitals, with bad roads, no communications, no doctors and no ambulance services. A patient must travel hundreds of kilometres to reach a hospital. This time-lapse is especially dangerous as it leads to the development of secondary brain damage when head trauma has occurred as a result of RTA. Collisions with animals crossing roads in rural areas are quite common, and these injured panicked animals lead to more collisions, injuries and deaths. Young children are also injured as they run across roads while playing or running after a ball, or are hit while riding on bicycles or carts. Traffic is often a mixture of automobiles and carts sharing the same road (Hammad, N.D.). The effects of alcohol or drugs are major factors in predisposing both drivers and pedestrians towards being involved in RTA.

Road War In Africa

In the early nineties I collected data from the countries who responded to my questionnaire. The results were as follows:

- Mortality at the site of trauma was 20-37%.
- During transportation mortality was 7-20%.
- Mortality on hospital admission was 2-10%.

Despite under-reporting, the percentage of RTA deaths per 100,000 population was 8.62%, with an estimated 47,841 deaths per year (Federal Highway Administration, 1990). In reality, the number of deaths is higher than these figures reflect (Carlsson, and Hedman, 1990). More than half of the deaths attributed to head injuries occur before the patients can be admitted to hospital. While most hospital deaths occur within a few days, hospital treatment now prolongs the lives of patients whose eventual deaths are not registered as due to injury (Register General For Scotland. Annual report, 1975; Review of the registrar general on death in England and Wales, 1976). According to the World Health Organization's definition of accident deaths, only those occurring within 30 days of an accident are considered as such. Statistics show that for every death at the scene of an accident

there is one death in the hospital within 30 days. The delayed statistics of the accidents do not seem to exist. Also, reports mention the number of deaths but ignore the victims who are crippled for the rest of their lives. The recording of accidents are often simply for judicial purposes (Yerrel, 1987). Police forces assume the responsibility for road safety and generally only seek to penalize offenders and are not necessarily concerned with developing comprehensive prevention programs. As a result of this, less than 50% of all injuries are reported (Kepp, 1992) and road accident collisions do not receive an adequate response and reaction on a national level (Carlsson, and Hedman,1990; World Health Organization, 1984; Yerrel, 1987). In Africa, whenever a car travels a given distance, the possibility of one RTA death is 40 times greater than in the United States and the number of deaths related to the number of injured is 9 times that of the U.S. (Sharaf-Isam, 1989).

In Egypt, 70% of accidents are due to ignorance and carelessness, and 30% are the result of mechanical problems and poor road conditions. These include insufficient pedestrian crossing facilities and deficient traffic signs at intersections.

The situation in Egypt is somewhat serious and getting worse year by year, especially exacerbated by the progressing density of traffic, with an annual increase of 80,000 vehicles.

Year	Total reported accidents	Total victims	Injured	Death	Damaged cars
1987	18,049	29,464	24,676	4,788	6,182
1991	19,557	25,578	20,882	4,929	10,072
1998	32,363	29,200	22,100	5,002	19,971

It is important to point out that the highways under the control of the Ministry of Transport or the traffic police have a better outlook, as the number of mortalities is about 7% of the total number of deaths. In the period between 1986 and 1996 the death rate dropped by 30% on Cairo-Alexandria rural roads and by 70% on Cairo-Alexandria desert roads because of the strict speed control and the mandatory use of seat belts. 75% of deaths occurred on the rural side roads because of their low

quality and the absence of police control (Hamdy, 1993). The percentage of RTA deaths occurring on city streets range between 15-20%, due to the slower heavy traffic, and the trauma is generally not severe. Nonetheless, if victims suffer head, chest or abdominal injuries, they fare poorly because of the difficulty in getting ambulances to the site of trauma.

In areas where paramedical services and pre-hospital care were implemented, head injury deaths on admission decreased by 15%; at the scene of the accident by 10% and by 52% during transportation.

In a round table discussion in March, 1999, the following conclusions were reached by a multidisciplinary group concerned with the different aspects of RTA (Round table disscusion, in press, 1999):

11. The main reasons that drivers fail to follow traffic safety regulations are: over-long work hours, lack of sleep, use of drugs, stress and disturbed personalities, carelessness and ignorance. Teenagers tend to speed and show off when they drive.
12. 70% of accidents are caused by human behaviour, 28% by inadequate roads and 2% by the poor condition of the vehicles.
13. 50% of rural deaths occur in young students.
14. The highest incidence of injuries is found in pedestrians; sidewalks and roadsides are occupied forcing pedestrians to walk along the streets. Also, there is an insufficient number of pedestrian crossing points.
15. Most injuries and deaths occur during the summer months, and during vacation periods.
16. Deficiencies in pre-hospital care and delayed first aid are a major contributing factor to the high mortality rate.

I would add that the preponderant lack of road safety in developing countries is increasing at a fast rate and at the same time is not receiving proper attention from the public nor the media concerning the resultant high socio-economic costs.

Some recommendations

The wide diversity of authoritative bodies responsible for road safety makes it very difficult to control the problem. Taking this and other issues into account, recommendations from the round table group include the following :

1. Responsibility for road traffic should be shouldered by the High Commissioner’s Office for Road Safety. This body would have its

own budget and have the right to make recommendations and follow up on the results.

2. An emergency telephone number for ambulance communication should be issued for all of Egypt.
13. Trained ambulance personnel should man fully-equipped medical vehicles.
3. Traffic police, usually the first to attend to the wounded, should be trained in first aid.
15. Motor vehicles should undergo mandatory periodical testing and drivers should be tested annually. A 2-day basic first aid course should be pre-requisite to receiving a driver's license.
16. Speed control points should be located on roads every 30 kilometres.
17. Lorries should be allowed on roads only during the day and not be permitted to do night trips.
18. A microwave communications network for emergency services should be built along highways, with points situated every 10 kilometres.
19. Immediate penalties should be imposed upon offenders and all traffic laws should be enforced.
20. School programs educating younger generations regarding traffic safety concerns can play an important role in diminishing RTA.
11. A campaign in the communications media could take advantage of available resources, such as the press, radio, TV, and even the cinema in an effort to wake up all the different public sectors to the realities of this problem. The media all over the world will focus on an airplane crash in which 100 victims are killed, but do not adequately respond to the tragedy of hundreds of people who are killed in road accidents. If the media were to treat these deaths with the same level of importance, public and government opinion might attend to this tragedy as it deserves and not leave the victims' families to suffer alone.
12. Finally, and I believe most important, as underscored by the results of the survey questionnaire, is the matter of speed control. A driver needs 2/3 of a second to react once imminent danger has been perceived. This period can be prolonged by many factors, 80% of which are related to the driver him/herself. These factors include tiredness, poor concentration, drug and alcohol use, even sleepiness. The other 20% are related to the condition of vehicles and roads. Thus, if a driver is travelling at a speed of 120 kph, s/he will travel

120 kph x 1,000 m/60 min. x 60 sec. x 2/3 sec. = 22.5 meters before s/he reacts. If we add another 30 meters before the car stops, taking into account the condition of the breaks and tires, the weight of the car and the road surface condition, the driver must be aware of an impending collision a good 50 meters away in order to avoid an accident. Speed control is paramount in reducing the number of major accidents.

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