



EPIDEMIOLOGICAL PROFILE OF ROAD TRAFFIC ACCIDENTS IN NORTH KORDOFAN, SUDAN, (JUN 2017 TO JAN 2018).

Kubra A. E. Hammad*¹

¹Assistant Professor of Community Health, Department of Epidemiology, Faculty of Public and Environmental Health, University of Kordofan

Musa A. O. Mohammed²

²Assistant Professor of Community Health, Department of Epidemiology, Faculty of Public and Environmental Health, University of Kordofan

Abdollah A. M. Barakat³

³Ministry of Health, North Kordofan State,

Abdirahman M. Abdullahi⁴

⁴Faculty of Public and Environmental Health, University of Kordofan

ABSTRACT

Road traffic accidents pose a threat to the public health of individuals and communities; it is one of the modern problems that people depend on modern means of transportation and their exploitation of highways. Recently, the Sudanese states have witnessed many road traffic accidents that have killed many people and caused disability to others due to the poor quality of highways and their poor design that is not consistent with international standards. A retrospective cross-sectional descriptive An institution based study of all road traffic victims recorded in police department, North Kordofan State, Sudan from 2013 to 2017. It was carried out in Jun 2017 to January 2018, to study of epidemiological profile of road traffic accidents according age, gender, and mortality. Data were entered and analyzed using the Statistical Package of Social Sciences (SPSS) version (16.0) and Microsoft Excel (2010) software. Total victims during period (2013 to 2017) were 5113, among the total victims 3336 (60.7%) were male where 721 (13.1%) were female and 1441 (26%) of children. The findings showed that, all recorded road traffic accidents were responsible for (5.4%) of death, severity injuries (0.4%) and mild Injuries (94.2%). Males were more affected (58.7%) followed female (14.4%) and children (26.5%). 20 - 30 years old age group were more affected (23%). (27.7%) of death in the 20 - 30 years old age group. More half (59%) of deaths among male and (15.5%) female and (25.5%). There is need to develop and improve roads and their infrastructure; building safer roads for vehicles, pedestrians, cyclists consistent with international standards.

KEYWORDS: *Epidemiological, Roads, Traffic, Accidents, injuries, Severity, Mild, North Kordofan.*



BACKGROUND

Road traffic accidents are accidents that occur without prior management or anticipation, due to the availability of a number of conditions that are likely to occur, causing in undesirable consequences, ⁽¹⁾. Road traffic injuries disproportionately affect young people. More than 50 % of the deaths that occur in the world that are attributed to these injuries occur among young adults between (15 – 44) years. Morbidity is also highest among this age group, which is affected by approximately 60% of deaths that occur annually in the world as a result of road traffic injuries. Globally, the male mortality rate attributable to road traffic injuries is three times that of females, ⁽²⁾.

In many countries, motor vehicle accidents rank first among all death accidents. Annually, almost 1.24 million people die from road accidents in the world. In addition, for every death, there are as many as 20-50 non-fatal injuries and 10-20 severe injuries requiring long periods of expensive care, nursing and treatment. Younger age groups more affected with road traffic and mortalities rate is higher than other group. Children and young people under the age of 25 years account for over 30% of those killed and injured in road traffic accidents, ⁽³⁾.

Road traffic injuries in the Americas Region killed some 154,089 people each year, representing 12% of the road traffic deaths worldwide. The road traffic mortality rate for this Region as a whole is 15.9 per 100,000 populations, lower than the global rate of 17.4. Countries need to accelerate the step at which they carry out effective road safety measures to meet the recently adopted Sustainable Development Goal (SDG) on road safety “halving the number of global road traffic deaths and injuries by 2020”, ⁽⁴⁾. Glows are a worldwide public health problem, responsible for an estimated 265,000 deaths every year. About 11 million people global need medical attention due to severe burns. The majority of these occur in low and middle-income countries (LMICs) and about half occur in the South-East Asia Region, ⁽³⁾.

Regulation is key in the effort to improve road user behavior and reduction road traffic victims. Most of the Region’s countries need to tighten their laws dealing with road-safety risk and preventive factors to bring them in line with international best practices, ⁽⁴⁾. Regulation embodies codified set of rules. These are imposed by the State to avoid accidents. These included driving tests, medical fitness to drive, application of speed limits, obligatory wearing of seat-belts and crash-helmets, checking of alcohol concentration, road-side breath testing for alcohol, regular inspection of cars, periodic re-examination of

drivers over the age of 55, etc. ⁽³⁾. Procedures to improve roads and their substructure include the following: Separating different types of traffic, building safer roads for pedestrians and cyclists, creating sidewalks and clear places for pedestrians to cross, decreasing traffic speed by placing industrial bumps and introducing frozen bands and bends in roads, ⁽⁵⁾.

In many Member States, hospital records do not distinguish injuries received in road accidents from those received in other kinds of accident. Where road accidents are identified there is often no sign of the group of road user. Information on road accident mortality can also be obtained from death certificates, ⁽⁶⁾.

The future of accident prevention in research. As research will be concerned with gathering accurate information about the extent, type and other characteristics of accidents, correlating accident experience with personal attributes and the environments in which accidents occur, investigating new and better methods of altering human behavior; seeking ways to make environments safer; and evaluating more precisely the efficiency of control measures, ⁽³⁾.

It is very important that public health authorities should be aware of the extent of permanent incapacity from road accidents in the population. A number of special studies have been carried out which suggest that the pool of permanent incapacity in the community from these injury-producing road accidents is increasing. National statistics will often give information about disability, including degrees of disability, but rarely ever is the cause given, except in the case of industrial accidents, ⁽⁶⁾. Twelve countries (39%) report having national policies to separate vulnerable road users from high-speed traffic, ⁽⁴⁾.

Speed is the main reason in the occurrence of road traffic injuries on the roads in most countries. Young people in particular tend to drive at an excessive or inappropriate speed. Reducing traffic speed decrease in death collisions as well as reducing the speed that it also moves and protects pedestrians. Speed limits must be set and strictly enforced, ⁽⁵⁾. In many high-income countries (HICs), burn mortality rates have reduced, and the rate of child deaths from burns is now over seven times higher in low and middle-income countries than in high-income countries, ⁽³⁾.

MATERIAL AND METHODS

This is a retrospective cross-sectional descriptive institutional based study of all road traffic victims recorded in police department, North Kordofan State, Sudan from 2013 to 2017, aimed to study of



epidemiological profile of road traffic accidents, age, gender, and mortality.

The General Directorate of Traffic, North Kordofan State administratively follows the Federal General Traffic Department that manages the implementation of state traffic institutions in all parts of Sudan and thus the state administration is considered a unit for implementing the policy of the Federal Traffic Department within North Kordofan State. There are two units in El-Obeid city, one of which is in charge of the State Rapid Traffic Department and the other operates within cities and licensing affairs. It includes about 15 officers and 240 traffic staff who do their duties to carry out the traffic policy.

Sample Techniques

All road traffic accidents victims during (2013 to 2017) were included. Sample size taken was (5113) victims, all victims charts were reviewed to collect data relating age, gender, date, type of injuries and mortality. Data were obtained from records of the General Traffic Department through the period (June 2017 to January 2018).

Data collection

The researchers prepared form and checked for consistency. The form used to collect data on basic

information about road traffic accidents victims from records of the General Traffic Department. The final form included demographic characteristics relating to victims; age, gender, and date. Also the form included type of injuries and mortality.

Data processing and analysis

Taking samples and filling the form and cleaning all data and data were analyzed using the Statistical Package of Social Sciences (SPSS) version (16.0) software. Microsoft Excel (2010).

Result

Total victims from road traffic accidents during period (2013 to 2017) were 5113, among the total victims 3336 (60.7%) were male where 721 (13.1%) were female and 1441 (26%) of children. all recorded road traffic accidents were responsible for (5.4%) of death, severe injuries (0.4%) female and (94.2%). About (4.2%) of total victims were in the less than 10 years old age group, (17%) in the 10 – 20 years, (23%) in the 20 - 30 years, (18.4%) in the 30 – 40 years, (12.8%) in the 40 – 50 years, (8.3%) in the 50 - 60 years and (2%) in 60 – 70 years old. The obtained result below:

Table (1): Distribution of injuries from road traffic accidents (RTAs) a according to age during (2013-2017).

Years	Injuries	Age						Total	
		10 <	10 - 20	20 - 30	30 - 40	40 - 50	50 – 60		60 - 70
2013	Severe	-	-	4	2	3	-	-	9 (1.0%)
	Mild	48	289	297	171	78	37	9	929 (99%)
	Total	48 (5.1%)	289 (30.7%)	301 (32%)	173 (18.4%)	81 (8.6%)	37 (3.9%)	9 (0.9%)	938
2014	Severe	-	2	1	-	1	-	-	4 (0.5%)
	Mild	47	141	193	210	102	56	11	760 (95%)
	Total	47 (6.5%)	143 (18.7%)	194 (25.3%)	210 (27.4%)	103 (13.4%)	56 (7.3%)	11 (1.4%)	764
2015	Severe	-	-	-	-	1	-	2	3 (0.4%)
	Mild	-	173	211	210	150	181	20	945 (94.6%)
	Total	-	173 (18.2%)	211 (22.2%)	210 (22.1%)	151 (15.9%)	181 (19.1%)	22 (2.5%)	948
2016	Severe	1	-	1	1	-	-	-	3 (0.3%)
	Mild	-	186	253	230	140	154	48	1011 (99.7%)
	Total	1 (0.01%)	186 (18.3%)	254 (25%)	231 (22.7%)	140 (13.8%)	154 (15.1%)	48 (4.7%)	1014
2017	Severe	2	-	-	-	-	-	-	2 (0.2%)
	Mild	143	193	253	238	265	52	25	1169



Total	Total	145 (12.3%)	193 (16.4%)	253 (21.6%)	238 (20.3%)	265 (22.6%)	52 (4.4%)	25 (1.9%)	1171 (99.8%)
	Severe	3	2	6	3	5	-	2	21
	Mild	238	982	1207	1059	735	480	113	4814
		241 (4.2%)	984 (17%)	1213 (23%)	1062 (18.4%)	740 (12.8%)	480 (8.3%)	115 (2%)	4835

The above table shows that injuries from road traffic accidents according age during 2013, 2014, 2015, 2016 and 2017 was (99%), (95%), (94.6%), (99.7%) and (99.8%) respectively, regarded mild injuries whereas (1%), (5%), (0.4%), (03%) and (0.2%) respectively, regarded severe injuries. All

recorded road traffic accidents were responsible for casualty (23%) of victims in the 20 - 30 years old age group and followed 30 – 40 years old age was (18.4%), 10 – 20 was (17%) and 40 - 50 years was (12.8%).

Table: (2): The distribution of injuries from RTAs according to gender during (2013 - 2017)

Years	Injuries	Gender			Total	
		Male	Female	Children		
2013	Severe	9	-	-	9	1%
	Mild	675	46	216	936	99%
	Total	683 (71.4%)	46 (4.9%)	216 (22.9%)	945	
2014	Severe	4	-	-	4	0.7%
	Mild	535	67	152	754	99.3%
	Total	539 (71%)	67 (8.8%)	152 (20%)	759	
2015	Severe	2	-	1	3	0.4%
	Mild	470	-	474	944	99.6%
	Total	472 (49.8%)	-	475 (50.2%)	947	
2016	Severe	2	1	-	3	0.3%
	Mild	551	307	153	1011	99.7%
	Total	553 (54.5%)	308 (30.5%)	153 (15%)	1014	
2017	Severe	-	-	2	2	0.2%
	Mild	608	275	286	1169	99.8%
	Total	608 (51.9%)	275 (23.6%)	288 (24.5%)	1171	
Total	Severe	17	1	3	21 (0.4%)	
	Mild	2839	694	1281	4814 (99.6%)	
	Total	2856 (58.7%)	695 (14.4%)	1284 (26.5%)	4835	



The above table shows distribution of road traffic accidents according gender, from all recorded road traffic accidents (99.6%) regarded mild injuries and (0.4%) severe. during 2013, 2014, 2015, 2016 and 2017 was (99%), (99.3%), (99.6%), (99.7%) and (99.8%) respectively, regarded mild injuries where (1%), (0.7%), (0.4%), (0.3%) and (0.2%)

respectively, regarded severe injuries. All recorded road traffic accidents were responsible for casualty (58.7%) of male, (14.4%) of female and (26.5%) of children.

Table (3): Distribution of mortality from road traffic accidents according age during (2013 -2017), North Kordofan State

Year	Age								Total
	10 <	10 - 20	20 - 30	30 - 40	40-50	50 - 60	60 - 70	70 - 80	
2013	6 (12%)	6 (12%)	13 (26%)	7 (14%)	6 (12%)	8 (16%)	2 (4%)	2 (4%)	50 (18.0%)
2014	6 (16.6%)	9 (25%)	5 (13.8%)	6 (16.6%)	4 (11.5%)	3 (8.3%)	1 (2.7%)	2 (5.5%)	36 (13.0%)
2015	5 (11.1%)	2 (4.4%)	18 (40%)	7 (15.5%)	8 (18%)	2 (4.4%)	3 (6.6%)	-	45 (16.0%)
2016	14 (19.1%)	1 (1.7%)	20 (27.3%)	17 (23.2%)	13 (17.8%)	8 (10.9%)	-	-	73 (26.0%)
2017	8 (10.8%)	11 (14.8%)	21 (28.3%)	15 (20.2%)	7 (9.4%)	7 (9.4%)	4 (5.4%)	1 (1.7%)	74 (27.0%)
Total	39 (14.3%)	29 (10.4%)	77 (27.7%)	52 (18.7%)	38 (13.7%)	28 (10.1%)	10 (3.6%)	5 (1.8%)	278 (100%)

The above table shows that mortality from road traffic accidents according age during 2013, 2014, 2015, 2016, 2017 was (18%), (13%), (16%), (26%) and (27%) respectively. All recorded road traffic accidents were responsible for (27.7%) of

death in the 20 - 30 years old age group and followed 30 – 40 years old age was (18.7%), less than 10 years was (14.3%), 40 - 50 years was (13.7%) and 50 - 60 was (10.1%).

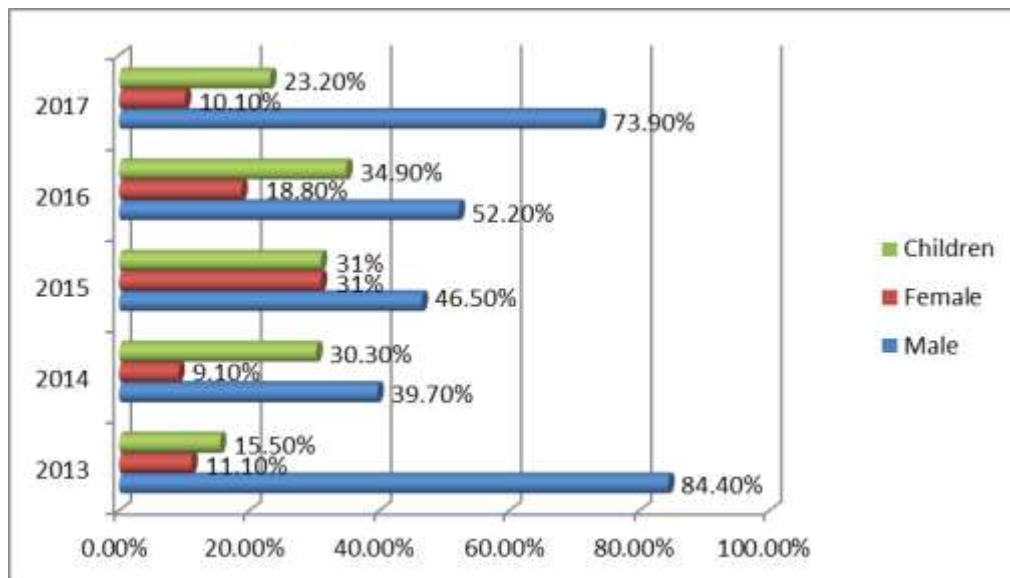


Figure (1): Distribution of mortality from road traffic accidents according gender during (2013 -2017), North Kordofan State.



The above table shows that mortality from road traffic accidents according gender during 2013, 2014, 2015, and 2016, 2017 was (16.8%), (12.2%),

(21%) and (25%) respectively. all recorded road traffic accidents were responsible for (59%) of death among male and (15.5%) female and (25.5%).

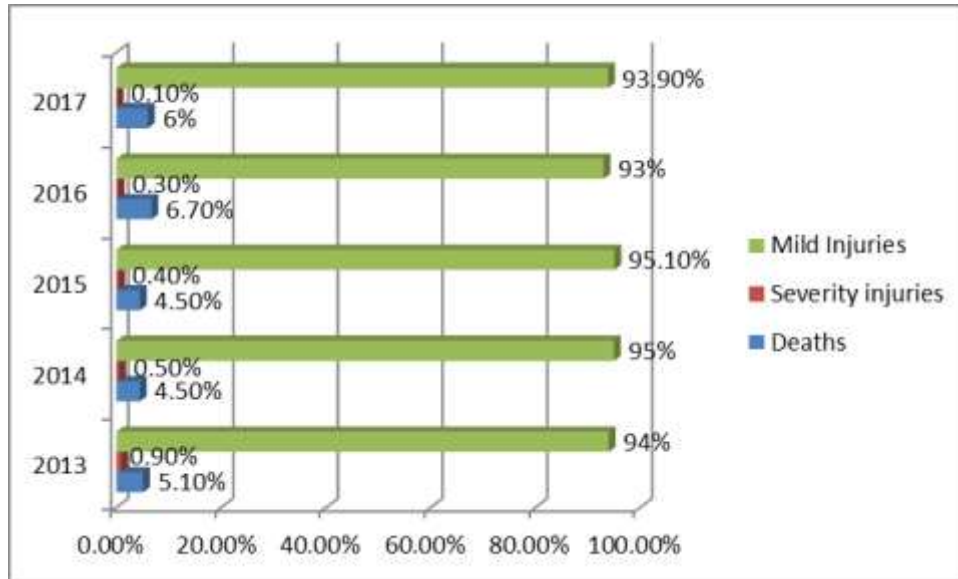


Table (2): Distribution of injuries and mortality from road traffic accidents according gender during (2013 -2017), North Kordofan State

The above table shows that mortality from road traffic accidents during 2013, 2014, 2015, 2016 and 2017 was (5.1%), (4.5%), (4.5%), (6.7%) and (6%), respectively. Severe injuries rate during 2013, 2014, 2015, 2016 and 2017 was (0.9%), (0.5%), (0.4%), (0.3%) and (0.1%) and mild injuries was (94%), (95%), (95.1%) and (93.1%). all recorded road traffic accidents were responsible for (5.4%) of death, severe injuries (0.4%) and Mild Injuries (94.2%).

DISCUSSION

Total victims from road traffic accidents during period (2013 to 2017) were 5113, among the total victims 3336 (60.7%) were male where 721 (13.1%) were female and 1441 (26%) of children. all recorded road traffic accidents were responsible for (5.4%) of death, severe injuries (0.4%) female and (94.2%). About (4.2%) of total victims were in the less than 10 years old age group, (17%) in the 10 – 20 years, (23%) in the 20 - 30 years, (18.4%) in the 30 – 40 years, (12.8%) in the 40 – 50 years, (8.3%) in the 50 - 60 years and (2%) in 60 – 70 years old.

This study revealed that all recorded road traffic accidents were responsible for casualty (23%) of victims in the 20 - 30 years old age group and followed 30 – 40 years old age was (18.4%), 10 – 20

was (17%) and 40 - 50 years was (12.8%). This group of more categories that drive cars and exploit highways, so they are frequently exposed to traffic injuries. These findings are consistent with other study in Khartoum, Sudan reported that the highest number of RTA victims (24%) was encountered in the age group of 20 - 29 years, (7). in addition to similar study conducted in Erbil City revealed that, most frequent age groups of RTA victims were 21-30 years old, while least frequent age groups was 71-80 years old (2%), with range of 78 years old and average of 35 years old, (8). Other a study conducted by Boniface et al. majority (70.2%) of road traffic injuries was between 18 - 45 years age group, (9). a study conducted by Mishra et al. most cases (38.33%) were in the age group of 15–30 years, (10).

The present study shows that males were more affected (60.7%) followed female (13.1%) and (26%) of children. Mostly men practice many activities in outdoor and exploit of cars, and the percentage of driving cars among males is higher than females. This is in accordance with studies conducted in Sudan reported that majority of the victims involved in RTA were males (85%), (7). The majority of victims were males of working age (25 – 44), (11). In Erbil City showed that the majority of victims were males (8). In Thika, Kenya reported



that, most road crash victims were male (73%),⁽¹²⁾. In Tanzania revealed that (76.6%) road traffic injury patients were males,⁽⁹⁾.

The present study revealed that, road traffic accidents were responsible for (27.7%) of death in the 20 - 30 years old age group and followed 30 – 40 years old age was (18.7%). In addition to other reasons, the above groups is exposed to death due to reckless driving, as the age of adolescence and recklessness that plays an inevitable role in the increase deaths from traffic accidents among young people and drifting is one of the causes of these deaths.

The current study illustrated that all recorded road traffic accidents were responsible for (5.4%) of death, severity injuries (0.4%) and mild injuries (94.2%). On the other hand, similar studies conducted in Sudan revealed that, about (31.2%) of accidents led to injuries while (26.4%) led to death and injuries,⁽¹¹⁾. In Kenya showed that 19% of the road crash victims sustained severe injury,⁽¹²⁾. In Ecuador showed that from the total fatalities (81.1 %) were men and (18%) are women,⁽¹³⁾.

CONCLUSIONS

Casualties and deaths were predominant among male and children. Peaked in the 20 - 30 years old age group and 30 – 40 years old age. Mild injuries were predominant in the all years from 2013 to 2017. Road traffic accidents were responsible for more than half of death among male. There is need to develop and improve roads and their substructure for example: building safer roads for vehicles, pedestrians, cyclists, creating sidewalks and clear places for pedestrians to cross, decreasing traffic speed by placing industrial bumps consistent with international standards.

Acknowledgments

The authors are thankful to the administrations of (the General Directorate of Traffic, North Kordofan State), and police officers of the El-Obeid Traffic Department for giving permission to conduct this study and for their support throughout.

Ethical Considerations

The study was conducted after getting permission from local authorities. This study was reviewed and approved by the Researches Committee of Department of Public and Environmental Health, University of Kordofan, The final report will be submitted to the General Directorate of Traffic,

North Kordofan State. Also the study will be available through Publication in journals.

REFERENCES

1. Al-Romany. Z. Mohammed (2013): *Traffic accidents; Disease of the era (article)* <https://www.alukah.net/culture/0/49747/>
2. World Health Organization (2003): *Global Road Safety Crisis, Resolution of United Nations General Assembly, 58th session, 19 November 2003.* <https://www.emro.who.int>
3. K. Park-Park's, Banarsidas Bhanot (2015); *Textbook of Preventive and Social Medicine, 23 Edition, Jabalpur, India.*
4. Pan American Health Organization (2016); *Road Safety in the Americas, PAHO HQ Library Cataloguing, Washington, D.C*
5. World Health Organization (2007): *Violence, injuries and disability; "First UN Global Road Safety Week" (article), Regional office the Eastern Mediterranean.* <https://www.emro.who.int>
6. World Health Organization (1976); *The Epidemiology of Road Traffic Accidents, Report on a Conference, Vienna, 4-7 November 1975, WHO Regional Publications European Series No. 2 Regional Office for Europe Copenhagen, Geneva, Switzerland)*
7. Degais Wadha, Awooda A. Hiba, Elnimeiri M. K. Mustafa, Kaddam Lamis (2018): *Epidemiological Pattern of Injuries Resulting from Road Traffic Accidents in Khartoum, Sudan, Scientific Research Publishing. Vol.10 No.06 (2018). ISSN Print: 1949-4998.* <http://www.scirp.org/journal/health>
8. Ismail S. Ali, Hasan M. Tahseen (2012); *Epidemiology of Road Traffic Accidents in Emergency Hospital in Erbil City (December 2008 to 1st January, 2009).* <https://www.researchgate.net/publication/278156526>
9. Boniface Respicious, Museru Lawrence, Kiloloma Othman and Munthali Victoria (2016); *Factors associated with road traffic injuries in Tanzania. Pan African Medical Journal. 2016; 23:46 doi:10.11604/pamj.2016.23.46.7487.* This article is available online at: <http://www.panafrican-med-journal.com/content/article/23/46/full/>
10. Mishra Badrinarayan , Mishra N. D Sinha, Sukhla SK and Sinha AK (2010); *Epidemiological Study of Road Traffic Accident Cases from Western Nepal, Indian J Community Med. 2010 Jan; 35(1): 115–121. doi: 10.4103/0970-0218.62568*
11. Elawad M. A., Elmardi A. E. and Salim L. H. M. (2014); *Epidemiological Profile Of Road Traffic Accidents On Khartoum – Medani Highway, Sudan. European Academic Research - Vol. Ii, Issue 7 / October 2014. Impact Factor: 3.1 (Uif).*
12. Eric O. Mogaka, Zipporah Ng'ang'a, Joseph Oundo, Jared Omolo, Elizabeth Luman (2011):



Factors associated with severity of road traffic injuries, Thika, Kenya. Pan African Medical Journal – ISSN: 1937- 8688. www.panafrican-med-journal.com

13. Buenafé AF, Algora, Bermúdez PR, Suasnavas, Salazar P, Merino, and García AR, Gómez (2017); *Epidemiological study of fatal road traffic accidents in Ecuador, Australasian Medical Journal* AMJ 2017;10(3):238–245. <https://doi.org/10.21767/AMJ.2017.2951>.