

## POSTMORTEM OF TRAFFIC ACCIDENT DEATHS IN KENYA: INDICATORS OF ALCOHOL INTOXICATION

Author

Peter Wangai Kiama 

Email: [pkiamo1@hotmail.com](mailto:pkiamo1@hotmail.com)

Egerton University, Kenya.

### Cite this article in APA

Kiama, W. P. (2022). Postmortem of traffic accident deaths in Kenya: Indicators of alcohol intoxication. *Journal of physical and applied sciences*, 1(1), 19-27. <https://doi.org/10.51317/jpas.v2i1.70>



A publication of Editon Consortium Publishing (online)

### Article history

Received: 25.04.2022

Accepted: 27.05.2022

Published: 07.07.2022

Scan this QR to read the paper online



**Copyright:** ©2022 by the author(s). This article is an open access article distributed under the license of the Creative Commons Attribution (CC BY) and their terms and conditions.



### Abstract

This study sought to establish the magnitude of fatalities resulting from road traffic accidents and their relation to alcohol intoxication to inform public health policy on the need for their prevention. This descriptive prospective study was undertaken at the city Mortuary, Nairobi. This study included all cases of deaths from road traffic accidents for twelve consecutive months. Data were analysed using SPSS. Descriptive statistics using means, medians and modes were used to test for age and gender differences. Road traffic accidents contribute to violent deaths; road traffic accident deaths in Kenya are associated with alcohol intoxication. The male gender is more involved. The study recommends that road safety and alcohol abuse be interrogated more as a cause of unnatural death. Deaths caused by road traffic accidents are a major problem. Public health measures and policies must be implemented to address this malady. Further road traffic accidents show a positive correlation with alcohol intoxication. Males were more prone to road traffic accidents; society should address the plight of the male child.

**Key terms:** Road traffic accidents, alcohol intoxication, deaths, public health policy.

## 1.0 INTRODUCTION

Africa studies indicate that violence rates may be much higher than in the rest of the world and that there is also considerable variation in homicide rates between different urban centres (National Injury Mortality Surveillance System, 2005). Violence-related deaths are associated with alcohol intoxication (Abel & Zeidenberg, 1985). Preliminary studies in Nairobi on fatalities in road traffic accidents show that 15 per cent of all fatalities in road traffic accidents are alcohol-related (Kiama, 2008). The prevalence of fatal road traffic accidents is reported to be highest in Chitwan, Nepal, at 47 per cent (Prasad & Prasad, 2003). Maputo, Mozambique, 43.7 per cent (Hanifa et al., 2006) and the lowest in Northern Norway, 18.6 per cent (Nordrum et al., 1998).

## 2.0 LITERATURE REVIEW

Various studies demonstrate that road traffic accident deaths predominantly involve males. The prevalence is 93.3 per cent in Dar es Salaam, Tanzania (Out Water et al., 2008), 82.6 per cent in Northern Norway (Nordrum et al., 1998) and 60 per cent in Manipal, Southern India (Mohan et al., 2006). However, one study reveals a female predominance of 73 per cent in Trakya, Turkey (Azmak et al., 2006). The majority of studies reveal that as regards violent deaths, the age group 21-40 is the most dominant, Kinyanda et al. (2004), 20-24, 31 per cent, Kumar et al. (2005), 20-39, 63.6 per cent, Hilal et al. (2005), 21-40, 72.7 per cent, Azmak (2006), 21-30, 27, Mohanty et al. (2007), 21-30, 34 per cent, Gouda and Aramani (2010), 21-30, 32.5 per cent. Most drivers in fatal accidents have measurable alcohol in their bloodstream (McCoy et al., 1989). Alcoholism, rather than merely social drinking, is involved in the case of deceased drivers with very high alcohol concentrations (Mccarroll & Haddon, 1962). Many of the drivers and passengers that consumed alcohol had injuries that were more rapidly fatal (Sevit, 1973).

## 3.0 METHODOLOGY

### Estimation of Exogenous Alcohol in Vitreous Humour

#### Sample Collection and Materials

Vitreous humour was obtained with an 18-gauge needle and syringe. The eye was cleaned with antiseptic, the eyelids drew apart, and the needle was inserted through the lateral canthus to the vitreous chamber. For alcohol estimation, two millilitres of the sample was preserved in a fluoride bottle sealed with a cello tape. It was carried in a cooler box and stored at temperatures of -4 degrees Celsius until the time of analysis. Vitreous humour was cultured at the point of collection to avoid the need for transport media; thus, culture media is part of the materials used. The materials required for bacteriology are Gram stain and biochemical tests.

#### Method of Alcohol Estimation

The machine used was the Gas-liquid chromatography machine at the For government chemists, the analysis was done in batches of ten.

The method was quantitative. The specifications were:-

1. Gas Chromatograph Varian 3700
2. Injection Temperature at 100 degrees Celsius
3. Column Temperature at 80 degrees Celsius
4. Detector Temperature at 140 degrees Celsius

5. The detector used FID (Flame Ionisation Detector)
6. Column support used: Carbowax 20m

## Reagent:

All reagents were anhydrous and of analytical reagent grade.

1) Combined alcohol and acetone stock reference solution: Dilution of 3.0ml each of anhydrous ethanol and methanol, 2.0ml of Isopropanol and 1.0 ml of anhydrous acetone to 100.0ml with deionised water was. At 20 degrees Celsius, this provided reference concentrations of ethanol 23.7g/l, methanol 23.7g/l, isopropanol 15.7g/l and acetone 8.0g/l.

2) Combined alcohol and acetone working calibrators: Dilution separately 1.0, 2.0, 4.0, 8.0 and 16.0 of the combined stock solution to 100.0ml with deionised water was done.

3) Internal standard solution: Dilution of 0.5ml of *n*-propanol to 1L with deionised water saturated with sodium chloride was done.

Procedure: 10 Microliters of the sample were mixed with 250 ml of internal standard (propanol) of known concentration. 1-2 microliter of the mixture was then injected into the gas chromatograph. Calculation; since the molecular weight of ethanol, Methanol and propanol are different; there was clear separation from the resultant Chromatograph. The peak height ratio (or peak area) of the Unknown to that of the internal standard, *n*-propanol, was done and was compared with the ratio obtained for the corresponding calibrators. The concentration of alcohol was given as g/L.



**Figure 1: Alcohol Analyser Machine at the Government Chemist**

## Quality Assurance

The focus of this study was exogenous alcohol. The studies on microbiology were used as quality control to rule out endogenous alcohol formed by putrefaction. Sample collection was done after cleaning the eye with antiseptic. The samples were carried in a cooler box, and storage of the samples for alcohol estimation was at temperatures of -4 degrees Celsius. The alcohol estimation was carried out at the Government chemist, the laboratory used for all the public forensic work in Kenya. An internal standard was used when the samples were being analysed.

## Microbiological Investigations

### Specimen Collection

Specimens for microbiological analysis were inoculated into the culture media as follows: Blood agar, Macconkey and Robertson's cooked meat media, and Soubourounds Dextrose agar. This was done at the mortuary upon procurement of the specimen and then transported to the microbiology laboratory of the school of medicine, University of Nairobi.

### Conditions of Incubation

Blood, MacConkey and Sobourounds Agars were incubated aerobically for 24-48 hours and examined at 24 hours and finally at 48 hours. Robertson cooked meat media was initially incubated at 37 degrees Celsius for 18-24 hours, thereafter sub-cultured into blood agar and incubated under anaerobic conditions using Gas pack anaerobic systems. This was incubated for 48 hours before being examined. The identification was carried out when organisms were isolated according to the Manual of Clinical Microbiology (Fourth edition 1996).

### Data Entry, Analysis and Presentation

Data was entered on a proforma data sheet. The month, date, day of the week and time of death were noted. The cases were categorised into male and female, and each gender was divided into 8 age groups that are; 0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, >70 years. Data was analysed using SPSS 11.5.0 (SPSS Inc., Chicago, III.)

## 4.0 RESULTS AND DISCUSSION

### Accidents

One thousand and sixty-four cases were analysed for accidents; of these, 929 were as a result of a road traffic accident, and 135 were other accidents. The accidents were caused by road traffic accidents 87.3 per cent, while other accidents were 12.7 per cent, as shown in table 1.

**Table 1: Distribution of Accident Cases in Nairobi, Kenya**

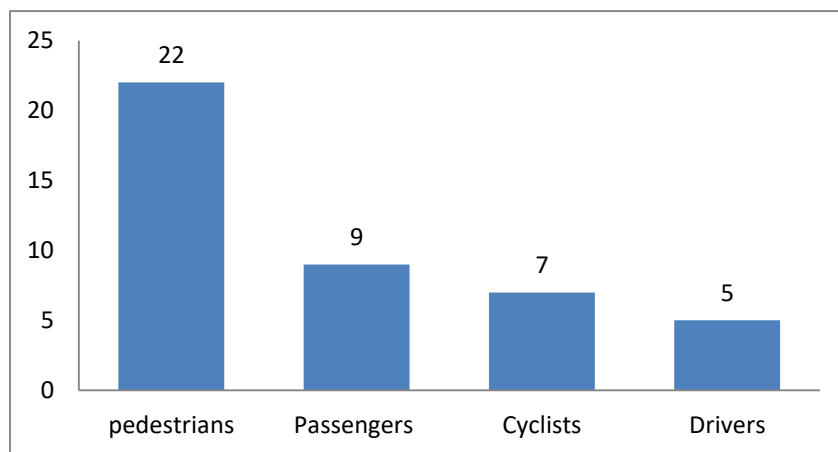
Accidents	Number	Percentage
Road Traffic Accident	929	87.3
Other accidents	135	12.7
Total	1064	100

Road traffic accidents by class comprised pedestrians 46.9 per cent, cyclists 25.2 per cent, passengers 23.0 per cent and drivers 4.8 per cent, as shown in table 2 below.

**Table 2: Distribution of Road Traffic Accidents cases by class in Nairobi, Kenya**

Categories of Road Traffic Accidents	Number	Percentage
Pedestrian	436	46.9
Cyclist	234	25.2
Passenger	214	23.0
Drivers	45	4.8
Total	929	100

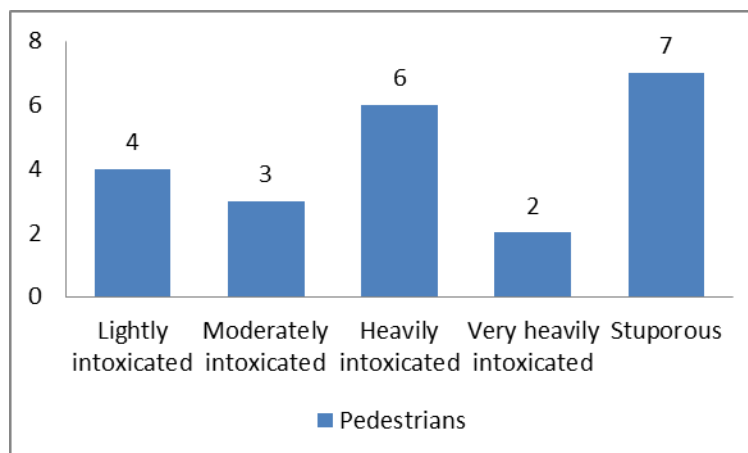
Amongst the road traffic accident victims, 22(51.2%) were pedestrians, 9(20.9%) were passengers, 7(16.3%) were cyclists, and 5(11.6%) were drivers figure 2.



**Figure 2: Alcohol Distribution in RTA by class**

## Pedestrians

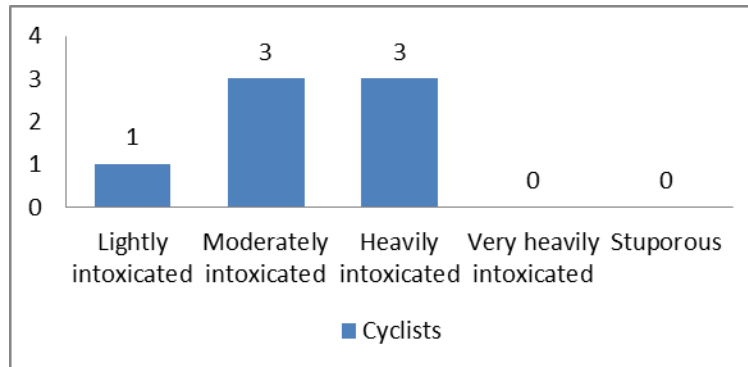
Amongst the pedestrians, 4 (18.2%) were lightly intoxicated, 3 (13.6%) were moderately intoxicated, 6 (27.3%) were heavily intoxicated, 2(9.1%) were very heavily intoxicated, and 7(31.8%) were stuporous as shown in figure 3.



**Figure 3: Level of Alcohol Intoxication by Pedestrians**

## Cyclists

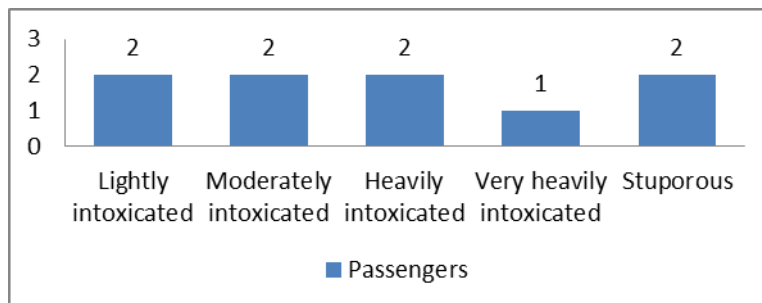
Amongst the cyclist who died, 1(14.2%) were lightly intoxicated, 3(42.9%) were moderately intoxicated, and 3 (42.9%) were heavily intoxicated, as shown in figure 4 below.



**Figure 4: Level of Alcohol Intoxication by Cyclists**

## Passengers

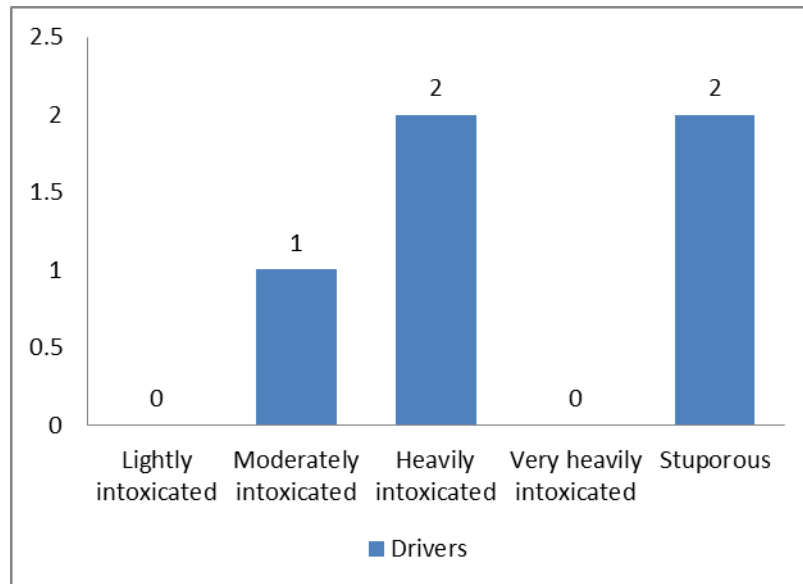
Amongst the passengers who died, 2(22.2%) were lightly intoxicated, moderately intoxicated and heavily intoxicated, respectively, 1(11.1%) very heavily, and 2(22.2%) stuporously intoxicated, as shown in figure 5 below.



**Figure 5: Level of Alcohol Intoxication by Passengers**

## Drivers

Amongst the drivers, 1(20%) were moderately intoxicated while 2(40%) were heavily intoxicated, and 2(40%) were stuporous intoxicated, as shown in figure 6 below.



**Figure 6: Level of Alcohol Intoxication by Drivers**

This study found that the deaths from the road traffic accidents related to alcohol intoxication were distributed between the age of 20 and 49 as follows 20-29, 15(34.8%), 30-39, 16 (37.2%) and 40-49, 12 (27.9%). A current study reveals alcohol intoxication in 52.1 per cent of those that died violently from accidents. Amongst the accident victims, 86 per cent were due to road traffic accidents, while 14 per cent were victims of other accidents. This is similar to figures in South Africa, where over 50 per cent of all fatal adult victims of traffic accidents are associated with alcohol (National Injury Mortality Surveillance System, 2005).

In the United States, studies reveal that 43.5 per cent of road deaths result from alcohol-related vehicle crashes. In Canada, studies showed that 45 per cent of those killed on the roads were found to be under alcohol influence, while the corresponding figure for Australia was 33 per cent (Reza et al., 2001).

Studies have revealed that most drivers involved in fatal accidents have measurable alcohol in their bloodstream (McCoy et al., 1989). Alcoholism, rather than merely social drinking, is involved in the case of deceased drivers with very high alcohol concentrations (Mccarroll et al., 1962). Many of the drivers and passengers that consumed alcohol had injuries that were more rapidly fatal (Sevit, 1973).

A study conducted by Hilal et al. (2005) demonstrated alcohol in the blood of homicide victims. Further studies have established a strong connection between acute inebriation, alcohol addiction and suicides (Bilban & Skibin, 2005).

The further current study reveals that amongst the road traffic accident victims, 51.2 per cent were pedestrians, 20.9 per cent were passengers, 16.3 per cent were cyclists, and 11.6 per cent were drivers. In South Africa, 7 per cent of drivers with illegal blood alcohol levels account for nearly 30 per cent of non-fatal and 47 per cent of fatal driver deaths. Still, an injury to drunken pedestrians

shows even greater alcohol-relatedness, as pedestrian accidents account for 72 per cent of adult traffic deaths.

Among accidents, road traffic accidents contributed 87.3 per cent, with pedestrians as the majority, 46.9 per cent. Alcohol was found in 24 per cent of all the victims of violent deaths of these accidents contributed to 43.6 per cent of violent deaths. The accidents were due to road traffic accidents 87.3 per cent, while other accidents were 12.7 per cent. Amongst the victims of violent deaths (400), alcohol was found in 96(24 %), of these accidents contributed 50(12.5%), and road traffic accidents contributed 43(10.75%).

Among the road traffic accident victims of alcohol, 42(97.7%) were males, while the age group 30-39 contributed 16 (37.2%) of the deaths from road traffic accidents related to alcohol intoxication. A 0.03 (95% confidence interval) p-value was noted when the data were analysed using an F-test. There was a statistically significant difference ( $p=0.03$ ) between violent death and alcohol intoxication.

## 5.0 CONCLUSION AND RECOMMENDATIONS

**Conclusion:** Road traffic accidents contribute to violent deaths; road traffic accident deaths in Kenya are associated with alcohol intoxication. The male gender is more involved.

**Recommendations:** Current study reveals that deaths due to road traffic accidents are a major problem in Nairobi, Kenya. As such, public health measures and policies need to be implemented to address this malady. Further road traffic accidents show a positive correlation with alcohol intoxication. Males were more prone to road traffic accidents; society should address the plight of the male child. The study recommends that road safety and alcohol abuse be interrogated more as a cause of unnatural death.

## 6.0 REFERENCES

1. Abel, E. L., & Zeidenberg P. (1985). Age, Alcohol and Violent Deaths: A Post-mortem Study. *J Stud Alcohol*. 46(3), 228-31.
2. Azmak, A. D. (2006). Suicides in Trakya Region, Turkey, from 1984 to 2004. *Medicine, Science and the Law*, 46(1), 19–30. <https://doi.org/10.1258/rsmmsl.46.1.19>.
3. Bilban, M., & skibin, N (2005). Presence of alcohol in suicide victims. *Forensic Sci Int*. 147, S9-12.
4. Gouda, H. S., & Aramani, S. C. (2010). Analysis of Medico-Legal Autopsies-A 6 years Retrospective Study: *Indian Internet Journal of Forensic Medicine & Toxicology* 8(1).
5. Hanifa, N., Meyrowitsch, D. W., Zacarias, E., & Konradsen, F. (2006). Mortality due to Injuries in Maputo City, Mozambique: *International Journal of Injury Control and Safety Promotion*, 13(1), 1-6.
6. Hila, A., Cekin, N., Gülmen, C. K., Ozdemir, M. H., & Karanfil, R. (2005). Homicide in Adana, Turkey: A 5-Year Review. *American Journal of Forensic Medicine & Pathology*, 26(2), 141-145.
7. Kiama, W. P. (2008). *Alcohol-related Deaths amongst Drivers, Passengers, Pedestrians and Cyclists in Nairobi*. The Thesis University of Nairobi.

8. Kinyanda, E., Hjelmeland, H., & Musisi, S. (2004). Deliberate self-harm as seen in Kampala, Uganda - a case-control study. *Soc Psychiatry Psychiatr Epidemiol.* 39(4), 318-25. DOI: 10.1007/s00127-004-0748-2. PMID: 15085335.
9. Kumar, V., Li, A. K., Zaniel, A. Z., Lee, D. A., & Salleh, S. A. (2005). A study of homicidal deaths in medico-legal autopsies at UMMC, Kuala Lumpur. *J Clin Forensic Med.* 12(5), 254-7. DOI: 10.1016/j.jcfm.2005.02.007. Epub 2005 Apr 7. PMID: 16198967.
10. Mccarroll, J. R., & Haddon, W Jr. (1962). A controlled study of fatal automobile accidents in New York City. *J Chronic Dis.* 15, 811-26. DOI: 10.1016/0021-9681(62)90051-6. PMID: 13932047.
11. McCoy, G. F., Johnstone, R. A., Nelson, I. W., & Duthie, R. B. (1989). A review of fatal road accidents in Oxfordshire over a 2-year period. *Injury.* 20(2), 65-8. DOI: 10.1016/0020-1383(89)90141-1. PMID: 2592081.
12. Mohan, K. T., Kanchan, T., & Yoganarasimha, K. (2006). Profile of Unnatural Deaths in Manipal, Southern India 1994-2004. *Journal of Forensic and Legal Medicine*, 13(3), 117-120. 12.
13. Mohanty, S., Sahu, G., Mohanty, M. K., & Patnaik, M. (2007). Suicide in India-A four-year retrospective study. *Journal of Legal and Forensic Medicine*, 14(4), 185-189.
14. National Injury Mortality Surveillance System. (2005). *Violent deaths in South Africa in 2003*, (13).
15. Nordrum, I. S. (1998). Medicolegal Autopsies of Violent Deaths in Northern Norway 1972-1992. *Forensic Science International* 92(1), 39-48.
16. Out water, A. H., Campbell, J. C., Mgaya, E., Abraham, A. G., Kinabo, L., Kazaura, M., & Kub, J. (2008). *Risk and Protective Factors for Homicide Death in Dar es Salaam, Tanzania 2005*. The Johns Hopkins University, 264, 3309805.
17. Prasad, B. K., & Prasad, C. (2003). Road Traffic Accident (R.T.A) as Major Killer: A Report on Medico-Legal Autopsies in Bharatpur Hospital. *Kathmandu University Medical Journal* 1(1), 34-35.
18. Reza, A., Mercy, J. A., & Krug, E. (2001). Epidemiology of Violent Deaths in the World: Division of violence prevention, National centre for injury control and prevention and centres for disease control and prevention. *Injury Prevention*, 7, 104-111.
19. Sevitt, S. (1973). Fatal road accidents in Birmingham: times to death and their causes. *Injury*, 4(4), 281-93. DOI: 10.1016/0020-1383(73)90001-6. PMID: 4710920.