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Relationship between Alcohol and Homicide, in Nairobi County, Kenya: Autopsy Study.

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Abstract

This study sought to investigate the relationship between alcohol and homicide, in Nairobi County, Kenya. The study was carried out at the city Mortuary, Nairobi. In this study, all cases of violent deaths for a period of twelve consecutive months were included. Alcohol level estimation was done on 400 of all the study subjects. The 400 were selected consecutively as every fifth subject. This was a purposeful sampling frame and size. The data obtained included age and gender distribution, type of accident, when the accident occurred and the alcohol levels of the deceased. This data was analysed using SPSS. The study concludes that homicide is a preventable public health problem and a major contributor to violent deaths. Moderate and heavy intoxication predispose to homicide. Deaths from accidents were largely those caused by burns and drowning; they were positively correlated with alcohol intake and are a preventable public health problem in Kenya. The study recommends that public policy should educate the public on this phenomenon that relates homicide to alcohol intoxication. Violence causing fatal trauma to the body, the commonest cause of unnatural death, is a preventable leading global public health problem. Further, it shows intercountry and intercity variation. Its prevention and control require data on the magnitude and nature of the problem.

Key Terms: Autopsy, homicide, alcohol death, Nairobi, Kenya.

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1.0 INTRODUCTION

Violence causing fatal trauma to the body, the commonest cause of unnatural death, is a preventable leading global public health problem. Further, it shows intercountry and intercity variation. Its prevention and control require data on the magnitude and nature of the problem. Violence leading to fatal trauma is a preventable leading global public health problem. However, its control and prevention depend on the magnitude and nature of the problem. For example, an estimated 3.7 per cent of all deaths worldwide are violence-related, with suicide being the most frequent form, followed by homicide and then war-related deaths (WHO, 1999; WHO, 2000). Therefore, violence leading to death is significant and preventable public health problem (Hilal et al., 2005).

In 1990, people who died from violence were estimated to be 1,851,000 (35.3 per 100,000) in the world. (Reza et al., 2001). Generally, violence is referred to as the threatened or actual use of power or physical force against another person, against oneself, or a group or community that results in or has a high likelihood of injury, death, or deprivation. Violent deaths are those fatalities, which result from injuries consequent to the use of force in cases where no natural cause can be identified (Rafindadi et al., 1998). Categories of violent deaths are suicide, homicide and accidents. Suicide is fatal self-inflicted injuries specified as intentional; homicide is fatal injuries inflicted by another person to injure or kill by any means, whereas accidental deaths result from road traffic accidents and other forms of violence (Reza et al., 2001). Violent deaths (suicides, homicides, and accidents) are the leading cause of death of people aged 1-39; overall, they are the third leading cause of death, behind cardiovascular disease and cancer, respectively (Hollinger, 1980). Therefore, this study will sought to establish the relationship between alcohol and homicide, in Nairobi County, Kenya.

2.0 LITERATURE REVIEW

In the United States, violent deaths from suicides, homicides, and accidents are the leading cause of death of people aged 1-39 years (Krug et al., 1998). In Norway, the causes of violent deaths include blunt injury, drowning, suffocation, firearm and poisoning (Nordrum et al., 1992). In South Africa, mortality rate due to violence is nearly 8 times the global rate (WHO, 2000), which is 72 per 100,000 and varies between cities such that it is highest in Cape Town, 66 per 100,000 and lowest in Pretoria/Tshwane 24 per 100,000 (National Injury Mortality Surveillance System, 2005). In East Africa, a single study in Uganda reveals that 25 per cent of all deaths in Kampala are due to violent injuries (Sudha et al., 2011).

The global rate of homicide is 7.6 per 100,000 (WHO, 2004). The highest is 15.5 per 100,000 in the Americas, and the lowest is 3.8 per 100,000 in Europe. In Southern Africa, it is 24.7 per 100,000, while in East Africa, it is 20.8 per 100,000 (WHO, 2004). The prevalence of Homicide in the city is highest in Adana, Turkey, at 21 per cent (Hilal et al., 2005), 19.8 Zeidenberg in Maputo, Mozambique (Hanifa et al., 2006) and lowest in Ibadan, Nigeria 3.1 per cent (Eze et al., 2011). Most of Africa lacks statistics on violent deaths; in South Africa, where most studies from Africa have been conducted, the leading cause of violent deaths is gunshot injuries (Butchart et al., 2000).

A significant proportion of violence-related deaths worldwide are associated with alcohol (Parry et al., 1998). For example, over 20 per cent of the violent deaths in Finland are alcohol-related, with differences in

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epidemiologic patterns and trends for different types of violent death between sexes and age groups (Philippe et al., 2001). Alcohol is involved to a substantial extent in all major categories of violent deaths for all age cohorts, especially for road traffic victims aged 35 years and under; 48.6 per cent of the traffic accidents, the victims had been drinking, 45.2 per cent of homicides and 35.4 per cent of suicides. Distribution by age in the age group 15-19, 42.7 per cent of violent deaths were alcohol-related, while in the age groups 20-24, 25-34, 35-44 and 45-54, the finding was 51.1 per cent, 48.6 per cent, 49.1 per cent and 47.2 per cent respectively (Abel & Zeidenberg, 1985).

Suicide, homicides, motor vehicle crashes and other violent deaths and injuries are linked inextricably to alcoholism (Lowenstein et al. 1990). It is well established that the use of alcohol increases the risk of fatal injuries. Blood alcohol concentration >50 mg /100ml was found in 47.6 per cent of violent deaths, amongst which 93 per cent of these BAC was ≥ 100 mg/100ml. (Nordrum et al., 2000). A study by Hilal et al. (2005) noted that alcohol was present in the blood of the homicide victims. Studies have established a strong connection between alcohol addiction, acute inebriation and suicides (Bilban & Skibin, 2005). The clinical features of alcoholic intoxication are largely the consequence of its effect on intellect, voluntary movement, speech content, sensation, reflexes, and cardiovascular and gastrointestinal function.

The term under the influence is used to describe any physical condition or abnormal mental which is the outcome of indulgence in any amount of alcohol, and that can range from a state that divests the subject of that clearness of intellect and control that he would otherwise possess to a state where death from alcohol poisoning may be at hand. An individual under the alcohol influence may appear sober, that is, evidencing no noticeable effect at routine clinical examination even to the observer who is skilled. For example, the clinically intoxicated person may appear as follows: *Lightly drunk*, *Moderately drunk*, *Heavily drunk*, *Very heavily drunk*, drunk to the extent of being stuporous to comatose. These degrees are not clearly distinguishable from one another but represent rather a subtle progression of change in a broad spectrum of functional patterns and behavioural.

Lightly intoxicated persons may clinically reveal signs of mental impairment, incoordination of movements and defects in speech. On the other hand, the face may be flushed, behaviour friendly and mood elevated. There is, however, a tendency for the individual reactions to be coloured by his personality and his surroundings. Euphoria or depression, generosity, altered judgment, increased confidence, expansiveness and dulling of attention may be present in differing degrees in different individuals and the same individual at different times at a given blood alcohol level. Blood alcohol levels of up to 0.10g per cent may be observed. In moderately intoxicated persons, clinical examination generally readily reveals faculty impairment evidence. The mood becomes less self-critical, and behavioural becomes less tempered by reason, accentuated, and often characterized by impulsive acts. Recklessness or, on infrequent occasions, subjective caution increases. Unsteadiness on standing, turning and walking may be present in varying degrees. Nystagmus is usually present. The eyes are bloodshot, and the face is often flushed. Blood alcohol levels range between 0.10 and 0.20g per cent.

No difficulty is experienced in detecting functional impairment in heavily intoxicated persons with this degree of intoxication. Many aspects of behaviour are generally beyond self-evaluation and self-control. The

mind is dull, and most faculties are impaired. The faculties necessary for close coordination in walking and other voluntary motor actions have become obviously impaired. Staggering, thick speech and slurred, the quality of which becomes shallow, confused and illogical, is present. Movements are clumsy. Distance and positions are misjudged. The subject may attempt to conceal impairment by undertaking tasks more slowly. The sense of pain and other sensations are dulled. Reflexes, as clinically tested, are depressed and reaction time prolonged. The pupils become dilated and sluggishly react to light. Coordination of eye movement is impaired. Balance is disturbed. There may be an increased heart rate. If there is a presence of nausea and vomiting, the subject may appear pale. Blood levels of up to 0.30 per cent and very occasionally even higher are found.

In very heavily intoxicated persons, gross confusion and disorientation with regard to time and place, apathy, drowsiness and marked motor and functional incoordination are usually present. The confused, disoriented state and depressed sensibility, particularly when accompanied by nausea and vomiting, may mask or resemble underlying organic pathology. Blood alcohol levels between 0.30g per cent to 0.35g per cent are found.

In stuporous to comatose persons, determination of the cause of the stupor or coma may often present great difficulty. Unconsciousness, slowed respiration, weak cardiac action and dilated pupils with marked depression of all reflex actions may be caused by diverse intoxicants and a great variety of diseases. Blood alcohol levels above 0.35g per cent are found. The manner of death is from deepening coma to respiratory paralysis. In the habituated, the behavioural disturbance will be less marked at all levels of blood alcohol.

3.0 METHODOLOGY

Materials were all the deaths resulting from violence between June 1 2009, and May 31 2010; complete forensic autopsies were conducted. The data obtained included age and gender distribution, type of accident, when the accident occurred and the alcohol levels of the deceased. This data was analysed using SPSS.

Study Design, Methodology and Setting

This was a descriptive prospective study of homicidal deaths in Nairobi from June 1, 2009 –to May 31, 2010. It was carried out at the city Mortuary, Nairobi. The city mortuary is the largest mortuary in Nairobi, situated at the junction of Mbagathi Way and Ngong road. The City Council of Nairobi runs it. The Ministry of health is also involved by way of hiring the pathologists who provide the services. The morticians are, however, hired by the Nairobi City council. This mortuary receives approximately 200 bodies of unnatural deaths every month. In addition, it is the main centre for medico-legal autopsies in Nairobi.

Study Subjects

The study subjects were selected at the City Mortuary as follows: The study subjects were recruited consecutively and this was for a period of one calendar year.

Selection Criteria

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All bodies resulting from violent injuries in Nairobi that occurred within the study period were included. However, bodies that were badly decomposed and therefore, the estimation of exogenous alcohol was not possible, those without vitreous humour, those that arrived at the mortuary 72 hours after death unless it was a transfer from another mortuary facility with an indication that it was well preserved were excluded from the study.

In this study, all cases of violent deaths for a period of twelve consecutive months were included. Alcohol level estimation was done on 400 of all the study subjects. The 400 were selected consecutively as every fifth subject. This was a purposeful sampling frame and size. Suitable bodies were identified, and a complete forensic autopsy was performed. Identification of the bodies was made by the relatives in the presence of a police officer, as is the practice. The Autopsies were conducted according to the law regarding investigations of unnatural deaths.

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 were preserved in a fluoride bottle sealed with a sellotape. It was transported 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, cultural media is part of the materials used. For bacteriology, the materials required are those for Gram stain and biochemical tests.

The machine used for alcohol estimation was the Gas-liquid chromatography machine at the 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) Detector used FID (Flame Ionisation Detector).
- 6) Column support used: Carbowax 20m.

Reagents: All reagents used 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 deionized 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 deionized water was done.

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

Procedure: 10 Microlitres of the sample were mixed with 250 ml of Internal standard (propanol) of known concentration .1-2 microlitre of the mixture was then injected into the gas chromatograph. Calculation;

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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: Photograph: Alcohol Analyser Machine at the Government Chemist

The focused on 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. Transport of the samples was done 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.

Specimens collected for microbiological analysis were inoculated into the culture media: 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. Blood, MacConkey and Sobourounds Agars have been incubated aerobically for 24-48 hours and examined at 24 hours and finally at 48 hours. Robertson's cooked meat media was initially

incubated at 37 degrees Celsius for 18-24 hours, thereafter subcultured onto blood agar and incubated under conditions that are anaerobic using Gas pack anaerobic systems. This was incubated for 48 hours before being examined. Where organisms were isolated, the identification was carried out according to the Manual of Clinical Microbiology (Fourth edition 1996).

Data was entered on a proforma datasheet. The month, date, day and time of death were noted. The cases were divided into male and female, and each gender divided into 8 age groups namely 0-9;10-19;20-29;30-39;40-49;50-59;60-69;>70 years. Data were analysed using SPSS.

4.0 RESULTS AND DISCUSSION

Violent deaths are a major cause of medico-legal deaths. In the present study, out of 2566 autopsy cases in one year, between June 1, 2009, and May 31 2010. One thousand one hundred and fifty-four (47.3%) deaths were due to homicide, 1064(43.6%) deaths were due to accidents, while 224(9.1%) deaths were due to suicide. Alcohol was found in 39.5 per cent of all homicides, 52 per cent of all accidents and 8.3 per cent of suicides. This study found that of the 38 persons of homicide victims that were intoxicated, 36 were males (94.7%), and 2 were females (5.3%); the age distribution was 20-29 were, 17 (44.7%), 30-39 were 16(42.1%), 40-49 were 4(10.5%) and 50-59 was 1(2.6%). A p-value of 0.03 (95% confidence interval) was found when the data were analysed using an F-test. A statistically significant difference ($p=0.03$) existed between homicide and alcohol intoxication. Autopsies were conducted on 2566 bodies over a period of one year.

Table 1: Distribution of deaths by categories in Nairobi.

Cause	Number	Percentage (%)
Violent deaths	2442	95.2
Natural Death	82	3.2
Unascertained	42	1.6
Total	2566	100

Table shows the distribution of the autopsy cases: Two thousand four hundred and forty-two cases were violent deaths.

Table 2: Distribution of violent deaths by category in Nairobi.

Cause of Death	Numbers	Percentage (%)
Homicide	1154	47.3
Accident	1064	43.6
Suicide	224	9.1
Total	2442	100

Table 2 illustrates that the causes of death were distributed among all the known causes of violent deaths, namely homicide 47.3 per cent, accidents 43.6 per cent and suicide 9.1 per cent. A total of 400 study subjects were randomly selected from 2566 that were autopsied and studied for alcohol levels in the vitreous humour.

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Out of the 400, 105 (26.3%) were found to have alcohol in the vitreous humour. Further, 96(91.4%) had died violently.

Table 3: Distribution of other accidents cases by categories in Nairobi.

Categories of intoxication	Number	Percentage (%)
Lightly	13	13.5
Moderate	16	16.7
Heavily	27	28.1
Very heavily	14	14.6
Stuporous	26	27.1
Total	96	100

Table 3 shows the categorization of the study subjects by the level of alcohol intoxication: Lightly intoxicating 13.5 per cent, moderately intoxicating 16.7 per cent, heavily intoxicating 28.1 per cent, very heavily intoxicating 14.6 per cent, and stuporous levels were 27.1 per cent.

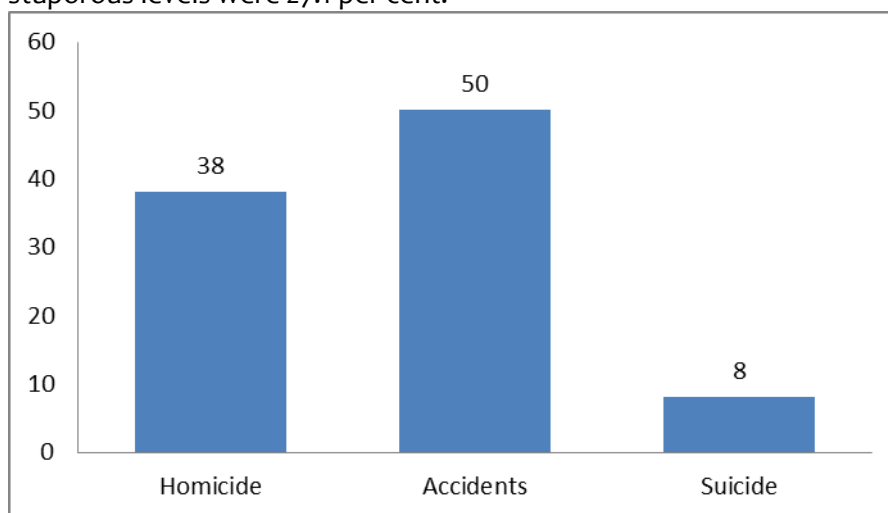


Figure 2: Alcohol Distribution Cases

Those that was found to be intoxicated were further classified by the cause of the violent death, homicide 38 (39.6%), accidents 50 (52.1%) and suicide 8(8.3%).

Homicide and Alcohol Intoxication

In this study, the causes of homicide were persons shot by police, mob justice, murder, stabbing, strangulation and persons shot by unknown persons.

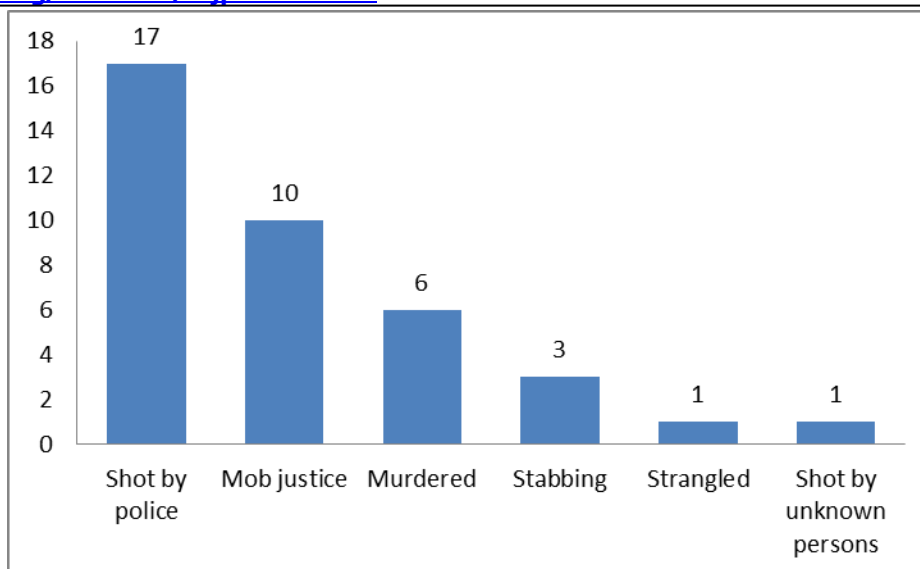


Figure 3: Alcohol Distribution by Mode of Death

Shows the distribution of known causes of homicide by alcohol intoxication, the highest being persons shot by police 17 (44.7%) and murder 10(26.3%), the least being strangulation and persons shot by unknown persons at 2.6 per cent.

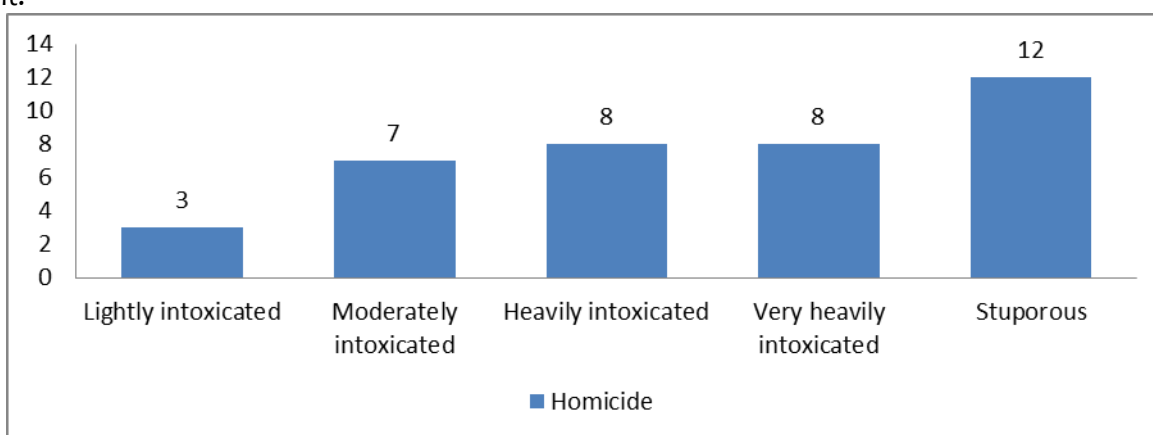


Figure 4: Homicide: Level of alcohol intoxication.

Figure 4 Shows distribution amongst the homicide cases the level of alcohol intoxication 3(7.9%) were slightly intoxicated, 7 (18.4%) were moderately intoxicated, 8 (21.1%) were heavily intoxicated, 8 (21.1%) were very heavily

intoxicated, and 12(31.6%) were stuporous. Out of the 38 persons of homicide that were intoxicated, 36 were males (94.7%), and 2 were females (5.3%); the age distribution was 20-29 were 17 (44.7%), 30-39 were 16(42.1%), 40-49 were 4(10.5%), and 50-59 were 1(2.6%).

Suicide, homicides, motor vehicle crashes and other violent deaths and injuries are linked inextricably to alcoholism (Lowenstein et al., 1990). It is well established that the use of alcohol increases the risk of fatal injuries. Blood alcohol concentration >50 mg /100ml was found in 47.6 per cent of violent deaths, amongst which 93 per cent of these BAC was $\geq 100\text{mg}/100\text{ml}$ (Nordrum et al., 2000). A current study reveals that 1154 persons died due to homicide. Amongst the homicide victims, distribution by cause was 44.7 per cent were shot by police, 26.3 per cent were victims of mob justice, and 28.9 per cent were murdered. In addition, .of those found to be intoxicated by alcohol, 38(39.6%) had died due to homicide. In South Africa, over 60 per cent of all adult victims of homicide are associated with alcohol (National Injury Mortality Surveillance System, 2005). A study conducted by an examination of the files of the medical examiner's office of Erie County, New York, for 1973-1983 inclusive conducted with respect to the cause of death, age of victim and presence of alcohol in the blood at the time of death showed that 45.2 per cent homicides were intoxicated with alcohol (Abel & Zeidenberg, 1985).

5.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions: A causal role exists between alcoholic intoxication and the liability to die a violent death. Homicide is a preventable public health problem and a major contributor to violent deaths. Moderate and heavy intoxication predispose to homicide. Deaths from accidents were largely those caused by burns and drowning; they were positively correlated with alcohol intake and are a preventable public health problem in Kenya. The age group between 20 and 39 is the most prone to these accidents, while males were more affected than females.

Recommendations: The current study reveals that alcohol intoxication contributed significantly to violent deaths resulting from homicide. The circumstances between alcohol intoxication and homicide require further investigations. In particular, public policy should educate the public on this phenomenon that relates homicide to alcohol intoxication. Violence causing fatal trauma to the body, the commonest cause of unnatural death, is a preventable leading global public health problem. Further, it shows intercountry and intercity variation. Its prevention and control require data on the magnitude and nature of the problem.

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