

EPIDEMIOLOGICAL PATTERN OF TRAUMATIC DEATHS IN A TERTIARY HEALTH INSTITUTION IN SOUTH-SOUTH NIGERIA: AN 11 YEAR RETROSPECTIVE AUTOPSY STUDY

Ugiagbe EE, Udoh MO

Department of Pathology, University of Benin and University of Benin Teaching Hospital,
Benin City, Edo State, Nigeria.

Abstract

Background: Trauma is an important cause of death in our environment, and data on its epidemiological pattern is critical for strategic planning and policy formulation. **Aim:** To determine the epidemiological pattern of traumatic deaths in a tertiary health institution in South-South Nigerian. **Materials and methods:** A retrospective study of traumatic deaths cases autopsied in our institution, from January 2011 to December 2021. Source of information were the autopsy registers of the Department. **Results:** Medicolegal autopsies were performed on 3,620 cases, 1020 cases (28.2%) of which were traumatic deaths. The M:F ratio was 4.5:1. The age range was 1-100 years with a mean age of 39.5 ± 15.9 years; a modal age group of 30-39 years (27.1%); with the 20-49-year age groups accounting for 703 cases constituting a 68.9% majority. Most common were cases due to road traffic accidents - 879(86.2%) cases. Followed by Gunshot injury and assault - 105(10.3%) and 33(3.2%) respectively. Head injury was the most common cause of death - 684(67%); followed by Haemorrhagic shock - 306(30%). Neurogenic shock, overwhelming sepsis and cardiogenic shock were rare causes of death. **Conclusion:** Head injury from road traffic accidents accounted for the highest cause of trauma deaths. Necessity is thus laid on our government and policy makers to improve the safety on our roads to reduce deaths from road traffic accidents.

Key words: Autopsy, Tertiary Health Centre, Traumatic death,

INTRODUCTION

Trauma is the sixth leading cause of death worldwide, resulting in five million or 10% of all deaths annually. [1,2] It is the fifth leading cause of significant disability. [1] About half of trauma deaths are in people aged between 15 and 45 years and trauma is the leading cause of death in this age group. [2] Injury affects more males; 68% of injuries occur in males [3] and death from trauma is twice as common in males as it is in females, this is believed to be because males are much more willing to engage in risk-taking activities. [3] The leading causes of traumatic deaths are blunt and penetrating injuries, including falls, motor vehicle collisions, stab wounds, and gunshot wound. Depending on the severity of injury, quickness of management, and transportation to an appropriate medical facility (called a trauma center), it may be possible to prevent loss of life or limb.

Based on manner of death, medicolegal death cases are classified as due to: natural causes, accidents, homicides, suicides or undetermined cause. [4,5] Traumatic deaths cut across accidents, homicide and

suicide based on the manner of death. In many studies, road traffic accident accounts for a major cause of accidental deaths while gunshot injury accounts for a majority of homicide cases. Other less common causes of traumatic deaths include; assaults, falls from heights amongst others. [6,7]

Corresponding Author:

Dr. Mojisola O Udoh, Department of Pathology, University of Benin Teaching Hospital, Benin City, Edo State, Nigeria. Email: moludoh@yahoo.co.uk. +2348033505462

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Injuries from trauma could be intentional or unintentional and requires prompt and appropriate management that may consume a larger proportion of the national budget than the management of other non-communicable and communicable diseases combined. [8] Traumatic deaths occur in immediate,

early, or late stages. Immediate deaths usually are due to apnea, severe brain or high spinal cord injury, or rupture of the heart or of large blood vessels. Early deaths occur within minutes to hours and often are due to hemorrhages in the outer meningeal layer of the brain, torn arteries, blood around the lungs, ruptured spleen, liver laceration, or pelvic fracture. Immediate access to care may be crucial to prevent death in persons experiencing major trauma. Late deaths occur days or weeks after the injury and often are related to infections. Prognosis is better in countries with a dedicated trauma system where injured persons are provided quick and effective access to proper treatment facilities.^[9] Traumatic deaths are to a large extent preventable. Determining its magnitude is important to ascertain its public health burden.

Many Nigerian studies have shown that traumatic deaths are responsible for a high percentage of medicolegal autopsies, recent surveys suggest that civil unrest, communal clashes, cult activities, violence and natural disasters are becoming a worldwide leading causes of traumatic deaths, particularly in developing countries. Knowledge of the epidemiological pattern of traumatic death are essential for the planning, implementation and evaluation of preventive measures in developed countries. There are not many reports on the epidemiological pattern of traumatic deaths in South-South Nigeria, where such data could be invaluable for policy formulation aimed at prevention, management and improvement of outcome.

The aim of this 11-year retrospective study is to determine the epidemiological pattern of traumatic deaths in a tertiary centre, South-South Nigeria. This information could be useful in policy formulation aimed at trauma prevention and reduction of associated morbidity and mortality.

MATERIALS AND METHODS

The autopsy reports of traumatic cases in the records of the department between January 2011 and December 2021 form the basis of this study. From a pool of all post-mortem examinations performed during the period under review, the study population consisting of those who died from trauma-related causes was drawn. Bio-data and other relevant information such as age, sex and the precise causes of traumatic deaths were extracted from the mortuary/autopsy registers of each case in the study population. Cases with complete demographic data and post-mortem cause of traumatic death were included in this study while those with incomplete demographic data were excluded from this study.

Data analysis

Data analysis was done using the Statistical Package for Social Sciences, version 2020 (SPSS 20, IBM Corp. Armonk, NY, United States of America). For categorical variables (sex and causes of traumatic deaths) the frequency and corresponding rates in percentages were analyzed while for the continuous

variable (age), the age range, mean age, standard deviation and peak age were analyzed.

RESULTS

During the 11-year period (January 2011-December 2021), 3620 medicolegal autopsies were performed. One thousand and twenty (1020) cases of traumatic deaths that met the inclusion criteria were used for the study, and this constituted 28.2% of the total. There were 834(81.8%) males and 186 (18.2%) females with a M:F ratio of 4.5:1. The age range of the cases was 1-100 years with a mean age of 39.5±15.9 years.

Table 1 shows the age and sex distribution of all cases. The modal age group was 30-39 years which accounted for 276(27.1%) cases. This was

Table 1: Age and Sex Distribution of Traumatic Death Cases

Age groups	Male	Female	Total	Percent
>20	32	18	50	4.9
20-29	194	46	240	23.5
30-39	245	31	276	27.1
40-49	162	25	187	18.3
50-59	97	31	128	12.5
60-69	60	16	76	7.5
70-79	31	13	44	4.3
80-89	11	6	17	1.7
90-99	2	0	2	0.2
Total	834(81.8%)	186(18.2%)	1020	100

closely followed by the 20-29- and 40-49-year age groups which accounted for 240 (23.5%) cases and 187(18.3%) cases respectively. Thus the 20-49-year age groups which accounted for 703 (68.9%) cases constituted the majority of the study population.

Table 2: Sex Distribution of the Aetiology of Traumatic Death

Aetiology	Male	Female	Total	Percent
Road Traffic Accidents	707	172	879	86.2
Gunshot	99	6	105	10.3
Assaults	25	8	33	3.2
Falls	3	0	3	0.3
Total	834	186	1020	100

Table 2 shows the sex distribution of different causes of traumatic deaths. The most common cause was death related to road traffic accidents which was seen in 879 (86.2%) cases. Deaths from gunshot injury which could either be homicide or suicide related were found in 105(10.3%) cases. Assault related deaths were seen in 33(3.2%) cases; these included blunt force trauma cases, machete cuts, as well as stab wounds and other penetrating injuries. Only 3 (0.3%) cases of falls were seen in the study population. As expected, there was a male preponderance in every category as they formed a significantly large proportion of the study population. As shown in Table 3, there was a statistically significant relationship between the aetiology of traumatic death and the mechanism/cause of death ($p < 0.0001$). autopsy on the victims revealed that head

Table 3: Correlation Between Aetiology of Trauma and Causes of Death.

Aetiology	Head Injury	Haemorrhagic Shock	Sepsis	Neurogenic Shock	Cardiogenic Shock	Total
Road Traffic Accidents	628	225	1	25	0	879
Gunshot	36	68	0	1	0	105
Assaults	17	13	1	1	1	33
Falls	3	0	0	0	0	3
Total	684	306	2	27	1	1020

injury (cerebral contusion, laceration and intracranial haemorrhage) was the most common cause of death as recorded in 684(67%) cases. This was followed by solid viscera lacerations, major vessel transection and multiple fractures resulting in profuse bleeding and established irreversible haemorrhagic shock in 306 (30%) cases. Neurogenic shock resulting from spinal cord injury was seen in 27(2.6%) cases. Overwhelming sepsis resulting in multiple organs failure was seen in 2(0.2%) and a single (0.1%) case of cardiogenic shock from ventricular rupture due to penetrating chest injury was recorded.

DISCUSSION

According to the Nigerian coroner's law, all cases of sudden deaths must be reported to the coroner who orders an autopsy as part of the investigations into the circumstances of death. The causes and circumstances of sudden deaths can broadly be classified into sudden natural and sudden unnatural deaths.^[10,11] Sudden unnatural deaths comprise; accidental, suicidal, homicidal and undetermined death.^[12,13] According to the World Health Organization (WHO), sudden deaths are deaths which occur within 1–24 hours after the onset of symptom.^[14] Sudden unnatural deaths could be traumatic or non-traumatic. Traumatic deaths constitute a major part of sudden unnatural deaths and could include accidents, homicides or suicides.

Traumatic death; which has been described variously by other investigators as violent or accidental death, are medicolegal deaths caused by unexpected force or injury rather than natural causes. The major culprits of traumatic deaths are; blunt or penetrating injuries, including road traffic accidents, gunshot wounds, falls, stab wounds and assaults.^[1-3,7]

A total of 1020 trauma deaths representing 28.2% of medicolegal deaths were encountered during the period under review. Although all the age groups were affected by trauma death, males of all age group were significantly more involved than females, with 834(81.8%) males and 186(18.2%) females and a M: F ratio of 4.5:1. The traumatic deaths victims were more in the 20–49-year age groups which accounted for 703 (68.9%) cases. This observation is similar to findings in other parts of Nigeria, Africa and the rest of the World.^[15-17]

The reason for male predominance among trauma victims is not unconnected to their roles in the home and society. Individuals within the 20–49-year age group, are mostly active, driven by the weight of responsibilities and tend to travel more. Driving under the influence of alcohol, and carrying of firearms are also common within this age group. They are more involved in out-door activities and are more likely to

engage in risky activities, business ventures, sports, the use of vehicular means of transportation, with attendant risk of traumatic death.

In this study, road traffic accident-related deaths accounted for majority of the traumatic deaths. The high incidence of road traffic crashes as the most common cause of trauma death in this environment may not be unconnected with the deplorable state of our roads, poor roadworthiness of many vehicles and the high prevalence of reckless driving by young drivers who may occasionally be under the influence of alcohol. Other workers have reported that the high illiteracy level and inadequate knowledge of the use of safety measures play significant role in the high rate of road traffic crashes in this subregion.^[18,19] The high number of deaths following road crashes worldwide led to the UN General Assembly resolution proclaiming a Second Decade of Action for Road Safety 2021–2030 (A/74/299). The Second Decade of Action for Road Safety 2021–2030 is aimed at saving lives by halting the rising trends in road traffic deaths and injuries by 2030 by at least 50%. The full-scale implementation of this resolution in sub-Saharan Africa (with low compliance), where Nigeria belongs will result in considerable reduction in the high rate of road traffic associated deaths. Death from road traffic accidents virtually affected all age group in this study. This is consistent with the documentation of the World Health Organization and previous medicolegal studies that looked at road traffic fatalities.^[20,21]

Traumatic deaths due to gunshot was seen in 105 (10.3%) of cases. This is the second highest cause of traumatic deaths in this study. Majority of these firearm deaths were by the use of shot guns which is readily available for hunting and of recent is being cut to small size for ease of carriage. The rate of firearm violence in our study is higher than the rate in Japan, but similar to finding in Ibadan and lower than 35.2% reported in Port Harcourt.^[17,22,23] The firearm homicidal deaths in South Africa are higher than the rate in our study.^[24] A major discovery in this study is that majority of these firearm cases were victims of kidnappers, killer herdsmen and bandit's cult activities. Other rare causes were death from assaults and falls from heights. Deaths from assaults were associated with stab wounds, use of machete and other sharps that could not be determined. Previous works by Osifo et al and Azeke et al have indicated falls from a height as rare cause of traumatic deaths.^[8,25]

Late arrival of victims of trauma (more than 12h after the trauma) is a major factor affecting patient's survival.^[8,18] This may be occasioned by initial presentation and subsequent referral at other centre before arrival at a specialized or tertiary care centre. The situation is different in developed economies where pre-hospital and emergency care are at advanced stages. The non-availability of organized pre-hospital trauma services results in untrained passers-by providing resuscitation and conveying of

patients to the hospital, sometimes worsening the injury.

The primary causes of death in major trauma are referable to central nervous system injuries and substantial blood loss culminating in haemorrhagic shock. Several studies [8,26] have shown that head injury is the leading cause of death in trauma patients irrespective of age group. Findings in this series support the above claims because the majority of cases died from head injury, which was seen in 684(67%) cases. There is a need to increase the capacity of hospitals in our environment; as well as have a standardized protocol; for initial assessment, referral and emergency management of head injured patients.

Haemorrhagic shock was the second leading cause of death in this study as it occurred in 306(30%) cases. This was mainly due to multiple organ injuries including, ruptured viscus (liver and spleen), chest injury and limb fractures. Many of the patients had bled profusely at trauma location before arrival and lapsed into irreversible shock making them unresponsive to resuscitative measures. Head injury and haemorrhagic shock were therefore the leading causes of death in poly-trauma cases especially in the setting of road traffic accident cases. Other less common causes of deaths were neurogenic shock, sepsis and cardiogenic shock which were seen in 27(2.6%) cases, 2(0.2%) cases and 1(0.1%) case respectively

CONCLUSION

Road traffic accident is a major cause of trauma death in our environment, closely followed by gunshot wounds and assault. Males are more commonly affected by traumatic deaths. The 20–49-year age group in the peak of active living forms the dominant population in this study. The most common causes of death following trauma were head injury and haemorrhagic shock. Prognosis of trauma patients is worsened by lack of emergency pre-hospital services and often late arrival at the hospital. There is a need for increased road safety campaign, appropriate injury management policies, legislations on alcohol use and firearms possession. The full implementation, especially in sub-Saharan Africa, of the Second Decade of Action for Road Safety 2021–2030 (A/74/299) proclaimed by governments around the world is advocated. Government should allocate substantial portion of the national budget to massive road rehabilitation and construction, and heighten Security services on our highways to ensure safe use of the road as a means of transportation across the country.

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