

Study of Adult Injury Fatality in Nigeria

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Abstract

Background: Although Injury is a major cause of death in low and middle income countries, its demographic characteristics in such regions is poorly characterized.

Aims and Objective: The study aims at determining the demographic pattern of adult injury-related deaths in a metropolitan City in Nigeria.

Materials and Methods: This is a 14-year (2003-2016) descriptive retrospective autopsy study of adult injury fatalities in Warri, Nigeria. The gender, age, and causes of death analyzed using SPSS version 22 and the results presented in tables and figures.

Results: Of the 975 medico-legal deaths in this city from 2003 to 2016, 860(88.2%) deaths were attributed to adult injury; among 778 (90.5%) males and 82 (9.5%) females. The highest and lowest incidence were among the 21-30 years (39.8%) and 51-60 years (6.6%) age brackets respectively. Homicide, accident and suicide contributed 639 (74.3%), 205 (23.8%) and 16 (1.9%) of the fatalities respectively. Firearm injury (47.4%), road injury (11.7%), sharp weapon injury (18.1%), blunt injury (8.1%), drowning (3.5%), burns injury (2.9%), electrocution (2.3%), hanging (1.5%) and petrochemical gas inhalation (1.3%) and falls (0.9%) were the major causes of death.

Conclusion: Adult injury fatality is poorly addressed public health problem in Nigeria. The study showed high vulnerability of victims in the 3rd decade of life and a disproportionately higher male fatality. Homicide is the most common manner of death while is very rare. Proper understanding of causes and manners of these preventable deaths is necessary to public health interventions and policies.

Keyword: Unintentional injuries, Adult, Autopsy, Homicide, Road Traffic Injuries

Introduction

Injury refers to “physical damage that results when a human body is suddenly or briefly subjected to intolerable levels of energy”.¹ The energy may be mechanical/kinetic, electrical, thermal or chemical

as seen in road traffic injury, gun-shot injury and suffocation; electrocution; burns; and gas inhalation and poisoning respectively.¹ Each year, injury contributes about 16% of the global burden of diseases,² and 9% of all deaths.³

The impact of injury is immense and can be measured in terms of mortality, morbidity, disability, and economic loss. While the public health implication of injuries are well documented in developing countries, the situation is different in sub-Sahara Africa which are continually burdened with economic crisis and other competing health challenges.⁴

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The age-group 15-60 years (adult) is a critical period in human lifespan as it represents the reproductive and most productive age range.⁵ According to world health organization, the global mean adult(15-60 years) mortality is about 142 deaths per 100,000 population, with the higher rates encountered among low income countries.⁶

The study hopes to evaluate the epidemiological profile of adult fatal injuries among medicolegal deaths in Warri, Nigeria with the hope of providing relevant information for policy makers in this region.

Materials and Method

Warri, Nigeria is located 5.52 latitude and 5.75 longitude and situated 6 meters above sea level. It has high density of natural water bodies, with a population of 536, 023 inhabitants. Its location is shown in figure I.

This is a 14-year descriptive retrospective study of adult injury related deaths among medico-legal deaths in this City. The information used for this study was extracted from the testimonies of the investigating police officers, the eye-witness account, the scene of crime observations and the written autopsy reports. The date, sex, age and manner of death for these cases were used for this study.

Data were analyzed using Statistical Package for the Social Sciences version 21(Released 2012, Armonk, New York: IBM Corporation), and presented in tables and figures.

All death confirmed as primarily due to homicide,

suicide or accidents within the geographical region after autopsy studies were included in the study, while deaths primarily of natural causes or of inconclusive diagnosis were excluded. Fifteen cases with inconclusive diagnosis were excluded from the study.

Result

We encountered 860 adult injury fatalities, representing 83.7% of medicolegal deaths. The gender and manner of death is shown in table 1, with the victims composed of 778 males and 82 females, which gave a male to female ratio of 9.5:1. Homicide, accident and suicide contributed 639(74.3%), 205(23.8%) and 16(1.9%) of the death burden respectively. Of the 778 males fatalities, the leading causes were intentional firearm injury(48.6%), Sharp weapon injury(18.8%),road injury(10.5%), blunt weapon injury(8.1%), drowning(3.7%), electrocution(2.6%), burns(1.7%), gaseous chemical inhalation(1.4%), suicidal hanging(1.3%) and accidental fall(1.0%). Of the 82 adult female fatalities, leading contributors were intentional firearm injury (30%), road injury (23.2%), burn (14.6%), sharp weapon (12.2% and blunt weapon injury (8.5%).

The yearly distribution of adult injury fatality is shown in Figure II. The peak and trough corresponded to 2014 and 2006 respectively.

The relationship between the causes of fatality and the ages of the victims is shown in table 2. The highest mortality was in the 3rd decade and a continuous decline noted until the 6th decade.

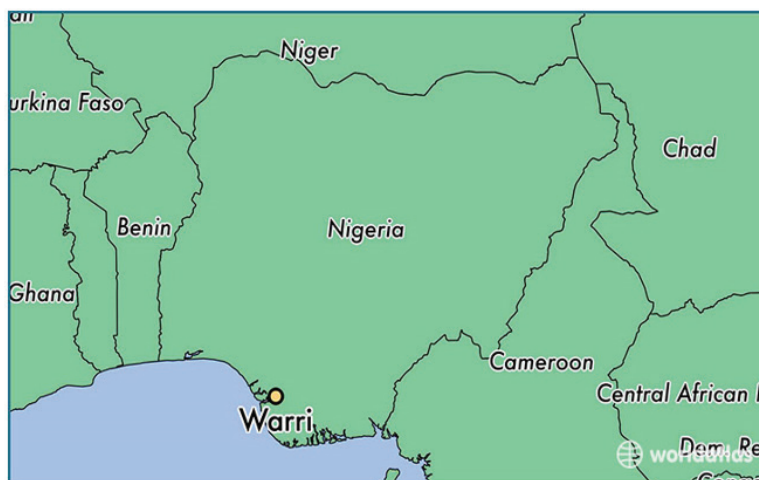


FIGURE I: LOCATION OF WARRI, NIGERIA

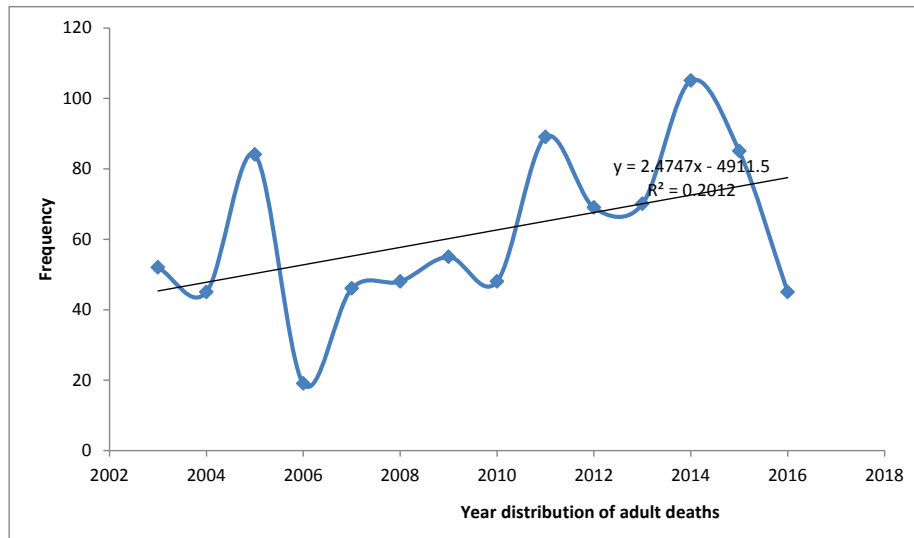


FIGURE II: YEARLY DISTRIBUTION OF ADULT INJURY FATALITY IN WARRI, NIGERIA

TABLE I: SEX DISTRIBUTION OF CAUSES OF INJURY FATALITY IN NIGERIA

Manner of death	No of cases	Cause of Death	Sex		Total
			Male	Female	
Homicide	639(74.3%)	Blunt weapon injury	63(8.1)	7(8.5)	70(8.1)
		Firearm injury	378(48.6)	25(30.5)	403(46.9)
		Sharp weapon injury	146(18.8)	10(12.2)	156(18.1)
		Suffocation	9(1.2)	1(1.2)	10(1.2)
Accidental	205(23.8%)	Accidental poisoning	1(0.1)	1(1.2)	2(0.2)
		Burn injury	13(1.7)	12(14.6)	25(2.9)
		Carbon monoxide Poisoning	2(0.3)	1(1.2)	3(0.4)
		Drowning	29(3.7)	1(1.2)	30(3.5)
		Electrocution	20(2.6)		20(2.3)
		Fall from height	8(1.0)		8(0.9)
		Firearm injury	5(0.6)		5(0.7)
		Road injury	82(10.5)	19(23.2)	101(11.7)
		Gas/chemical inhalation	11(1.4)		11(1.3)
Suicide	16(1.9%)	Hanging	10(1.3)	3(3.7)	13(1.5)
		Chemical/drug ingestion	1(0.1)	2(2.4)	3(0.4)
Total	860(100%)		778(100.0)	82(100.0)	860(100.0)

$\chi^2 = 83.506$ df = 13 $p < 0.001$

Table II: AGE-WISE DISTRIBUTION OF CAUSES OF ADULT INJURY FATALITY

Manner of death	Mechanism of death	Age in years					No of cases (%)
		≤20	21-30	31-40	41-50	51-60	
Homicide	Blunt weapon	7(7.7)	21(6.1)	22(9.3)	11(8.2)	9(15.8)	70(8.1)
	Firearm	28(30.8)	168(49.1)	118(50.0)	64(47.8)	25(43.9)	403(47.4)
	Sharp Weapon	34(37.4)	71(20.8)	31(13.1)	17(12.7)	3(5.3)	156(18.1)
	Suffocation	1(1.1)	1(0.3)	1(0.4)	3(2.2)	4(7.0)	10(1.2)
Accidental	Accidental poisoning	1(1.1)			1(0.8)		2(0.2)
	Burn	4(4.4)	6(1.8)	8(3.4)	7(5.2)		25(2.9)
	CO poisoning	2(2.2)		1(0.4)			3(0.4)
	Drowning	2(2.2)	11(3.2)	12(5.1)	3(2.2)	2(3.5)	30(3.5)
	Electrocution	2(2.2)	7(2.1)	7(3.0)	4(3.0)		20(2.3)
	Fall	2(2.2)	1(0.3)	1(0.4)	3(2.2)	1(1.8)	8(0.9)
	Firearm		2(0.6)	3(1.3)			5(0.6)
	Road injury	4(4.4)	45(13.2)	24(10.2)	18(13.4)	10(17.5)	101(11.7)
	Gas inhalation		5(1.5)	3(1.3)	1(0.7)	2(3.5)	11(1.3)
Suicide	Chemical/drug Injection	2(2.2)	0(0.0)	1(0.4)			3(0.3)
	Hanging	2(2.2)	4(1.2)	4(1.7)	2(1.5)	1(1.8)	13(1.5)
	Total	91(100.0)	342(100.0)	236(100.0)	134(100.0)	57(100.0)	860(100.0)

Discussion

This is the first study of injury fatality among adults in this region. Unlike in developed countries, the vital registration in Nigeria is a perennial failure.⁶ Information from medico-legal autopsy data has advantage of capturing unnatural deaths in the community, irrespective of where the death occurred. This is corroborated by the

high rate of unnatural deaths in autopsy-based mortality studies in Nigeria.⁷ It is also a general observation that injury fatality represents the tip of a pyramid whose base is composed of non-recorded, non-treated and treated non-fatal injuries.⁸ There is therefore need for improved surveillance system for more holistic retrieval of data on injury mortality of the population to guide health intervention and policies.

In developing countries, injuries have remained a poorly-addressed public health concern. Poverty, non-existence of preventive measures and the poorly equipped health-care system remain major draw-backs in low and middle income countries (LMIC). This corroborated by the report that more than 90% of injury fatality occur in LMIC.⁹

In this study, we noted a preponderance of male injury fatality, which is consistent with other reports.¹⁰ The gender disparity on adult fatal injuries is attributed to multiple factors, including male masculinity, gender role in the society, occupational choices, sociocultural and behavioral factors.^{10,11} Generally, relative to women, men have higher propensity to risk taking.¹¹ Males are more involved in outdoor occupations associated with high risk of injuries such as electrification, welding, boat-driving, haulage services, and automobile services. Alcohol and substance abuse, a proven risk factor for injury is also more prevalent among males.¹² Women's role in childbearing increases their cost of risk-taking since offspring survival depends on them, making them to be more prudent in their actions.¹³ Although, injury fatality among adult females is relatively lower, injuries are also an important cause of morbidity and mortality among this group.¹⁴ There is need for public health intervention that do not only advocate for behavioral change but also societal changes, especially as it relates to gender perceived roles in the society.

Our report shows that mortality rate increased with age and peaked in the 3rd decade and declined gradually thereafter. This finding is corroborated by reports from WHO, supporting a relatively high injury fatality among the 15-29 years age group, mostly attributed to homicide, road injuries and war.¹⁵ High risk-taking behavior, peer influence and delinquent behavior are the major triggers of such high fatality among young adults.¹⁵ Older adults are more prudent hence they are less adventurous which reflects in low injury rates in the older age group.

In relation to manner of death, homicide was the most common with suicide being the least. The high rate of homicide in this region may be attributed to multiple factors including the age-long militancy, cultism, long-standing inter-ethnic crisis, unemployment, ignorance, inequality, poverty and the ineffective health system.¹⁶ The low level of suicide death is expected in our

environment where suicide is seen as a taboo and a desecration of the land.¹⁷ Earlier studies across the globe also showed that suicide rate is lowest in Africa.¹⁸ It could be postulated that accidental deaths are under-reported due to laxity of law-enforcement agencies, who would not be bothered over accidental deaths as they are over homicide cases.

In this study, fatal intentional firearm injuries ranked topmost among causes of fatality with 70% of cases encountered in the 21-40 years age-group. There was also a marked gender disparity with 93.8% of the victims being males. This is not surprising as activities associated with use of firearm such as interpersonal violence, armed robbery, communal clashes, religious violence, militancy, cultism and political vendettas are common in this age group.¹⁹ Also corroborating this fact is the report of influx of illicit firearms into this region²⁰ despite the law that restricts ownership of firearms in the country.²¹ There is therefore need for the law enforcement agencies to ensure enforcement of this law.

Road injury is a serious problem in developing countries, resulting in increasing death, disability and economic loss.²² In this study, it accounted for 11.7% of fatality, 82% were among males, and 70% occurred among adults of 21-40 years. This is attributable to the explosive economic and population growth in a backdrop of non-existing railway system and unaffordable air transport. Road safety is determined by a combination of human behavior and structural factors. Better road design that accommodates footpath for pedestrians, street lighting, proper road maintenance, use of road worthy vehicles, enforcement of road safety rules, banning of motor cycle in major roads and provision of surveillance ambulance services are ways of effectively reducing road injury rate.^{22,23}

Fatal drowning in this study is low in view of the WHO report that drowning claimed 372,000 lives in 2012 and that most of these cases occurred in LMIC.²⁴ *The cases in our study therefore represent a tip of the iceberg with a base composed of unreported fatal drowning. High gender disparity may be attributed to greater involvement of adult males in water-related leisure and occupations. There is need for individuals, community and policy makers to adopt preventive measures to tackle this menace.*

The electrocution fatalities in this report were all unintentional deaths and exclusively among males, with 70% affecting the 21-40 years age group. There is need for proper electric safety training both at home and workplace to reduce the risk of electrocution injuries.

Flame burn injury was encountered in 2.9% of fatality in this study with a fairly equal gender distribution. Most studies in Nigeria are based on in-hospital patients or autopsy studies and may not give a clear picture of the incidence. Studies have shown that 4.8% of trauma deaths in Nigeria result from burn injuries.²⁵ The rising incidence of burns injury are due to pilfering and vandalization of petrochemical pipelines, kerosene adulteration, poor understanding of burns prevention strategy, poverty and ignorance.²⁶ There is need to focus on burn prevention strategies, and to strengthen the health sector on management of burn injuries.

Cases of gas explosion related deaths were also reported in this study. These are attributed to poor maintenance culture of the multi-national companies, and the lingering pipeline vandalization that frequently occur in this region.²⁷

With the available weight of evidence, there is an urgent need for all stake holders to ensure reversal of this death toll. If the law enforcement agencies are better equipped to persecute criminals, it will discourage prospective homicide offenders. Educating the society on injury prevention strategies will go a long way in reducing accident related injuries. There is no better time than now for the government to invest in road rehabilitation, considering the present state of the roads. Above all, developing a low cost but effective trauma care service within the state will no doubt reduce the mortality rate of injured victims.

In sum, adult injury fatality is poorly addressed public health problem in Nigeria. The study showed high vulnerability of victims in the 3rd decade of life and a disproportionately higher male fatality. Homicides appeared relatively high while suicides was rare. Proper understanding of causes and manners of these preventable deaths is necessary to guide design of public health interventions and policies.

Limitation of the study: The study is an autopsy study and is based on cases referred to us by the law enforcement agencies. Some cases may not be reported to the Police and some cases, the people concerned may avert the course of justice through illegal means. Therefore, the autopsy rate may only cover a fraction of injury related deaths. There is therefore need for greater surveillance and enforcement of autopsy on all coroner cases.

Conflicts of Interest: Nil

Source of Funding: Self.

Ethical clearance: Ethical approval for this study was obtained from the ethics and clearance committee of Central Hospital, Warri, in Delta State (Reference number CHW/ECC VOL1/124)

References

1. Holder Y, Peden M, Krug E, Lund J, Gururaj J, Kobusingye, O. Injury Surveillance
2. Guidelines. Geneva: World Health Organization 2001.
3. World Health Organization (WHO). The injury chart book. A graphical overview of the global burden of injuries, Geneva: WHO; 2002
4. World health statistics 2014. Geneva: World Health Organization; 2014 (http://apps.who.int/iris/bitstream/10665/112738/1/9789240692671_eng.pdf?au=1, Accessed 19 January, 2019
5. Forjuoh SN, Zwi BA, Mock CN. Injury control in Africa: getting governments to do more. *Tropical Medicine and International Health*. 1998; 3(5):349–56.
6. WHO: Adult mortality rate, 2000-2016. Available at: https://www.who.int/gho/mortality_burden_disease/mortality_adult/situation_trends_text/en/
7. Maduekwe NI, Banjo OO, Sangodapo MO. "The Nigerian Civil Registration and Vital Statistics System: Contexts, Institutions, Operation," *Social Indicators Research: An International and Interdisciplinary Journal for Quality-of-Life Measurement*, Springer, 2017;134(2):651-74.
8. Nwachokor F. N, Ijomone E. A, Uchendu O. J. A forensic study of unnatural death in Warri, Delta State, Nigeria. *IJFMI* 2017;3(1): 8-19.

9. World Health Organization (WHO). Injuries and Violence: The facts. 2014.
10. Gosselin RA, Spiegel DA, Coughlin R, Zirkle LG. Injuries: the neglected burden in developing countries. *Bulletin of the World Health Organization* 2009; 87:246.
11. Sorenson SB. Gender Disparities in Injury Mortality: Consistent, Persistent, and Larger Than You'd Think. *Am J Public Health*. 2011; 101(11): 353–8.
12. Courtenay WH. Behavioral factors associated with disease, injury, and death among men: evidence and implications for prevention. *J Men Stud*. 2000; 9:81–142.
13. Kraemer S. The fragile male. *British Medical Journal*.2000;321: 1609-12.
14. Campbell A. Staying alive: Evolution, culture, and Women's intersexual aggression. *Behavioral and Brain Science*.1999; 22:203-52.
15. Ijomone EA, Uchendu OJ, Nwachokor NF. Pattern of unnatural death among females in niger delta: A retrospective medicolegal study. *Ann Trop Pathol*.2019;10:6-10
16. WHO (World Health Organization). 2002a. World Report on Violence and Health. Geneva: WHO
17. Obiorah CC, Atanda AT. Influence of Socio-Cultural Factors on Homicide: The Nigeria Case Study. *J Forensic Res*.2013; 4:186.
18. Lester D, Akande A. Attitudes about suicide among the Yoruba of Nigeria. *J Soc Psychol* 1994;134: 851-3.
19. Burrows S, Vaez M, Butchart A, Laflamme L. The Share of Suicide in Injury Deaths in the South African Context: Sociodemographic Distribution. *Public Health*. 2003; 117(1):3–10.
20. Omoke NI. Firearm injuries received in emergency room of a Nigerian teaching hospital: Analysis of pattern, morbidity, and mortality. *Niger J Clin Pract* 2017; 20:587-94.
21. Musa S. Border Security, Arms Proliferation and Terrorism in Nigeria. *Sahara Reporters*; 20 April, 2013.
22. Olakanmi J: Firearm act.In Olakanmi J. Police Force. LawLords Publications. 2012; 218-297.
23. Eze BUN. Road Traffic Accidents in Nigeria: A Public Health Problem. *AFRIMEDIC*. 2012; 3(2):34-5.
24. Rafindadi AH. A review of types of injuries sustained following road traffic accidents and their prevention. *Nig J Surg Res* 2000;2:100-4.
25. World Health Organization. Global report on drowning: preventing a leading killer. World Health Organization; 2014.
26. Adesunkanmi AR, Akinkuolie AA, Badru OS. A five-year analysis of death in the accident and emergency room of a semi-urban hospital. *West Afr J Med*. 2002;21:99–104.
27. Oladele AO, Olabanji JK. Burns in Nigeria, a review. *Ann Burns Fire Disasters*. 2010;23(3): 120–7.
28. Onuoha F. Why the poor pay with their lives: Oil pipeline vandalisation, fires and human Security in Nigeria. *Disaster*. 2009; 33(3):369-89.