

# Profile of Medicolegal Deaths in Females: An Autopsy-Based Study

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## Abstract

**Background:** The rate of female medicolegal deaths (MLD) due to homicides and road traffic accidents (RTAs) is the highest in Africa, compared to the rest of the world, though there is scanty literature locally on this subject. **Materials and Methods:** The major sources of information reviewed in this study were the autopsy registers and autopsy reports of the police clinic, Benin City, Edo State, over 10 years. **Results:** A total of 331 female medicolegal autopsies were performed, accounting for 21.8% of all cases. The mean age of cases was  $40.11 \pm 20.25$ . Age group of 30–39 years accounted for 22.1% ( $n = 73$ ) of cases, closely followed by the age group of 20–29 years, which accounted for 20.5% ( $n = 68$ ) of cases. Accidental deaths accounted for 36.9% ( $n = 122$ ) of cases. RTA was the most common cause of accidental deaths ( $n = 105$ ; 86%). The most common pattern of RTA was a vehicle knocking down a pedestrian as seen in 45 cases (42.9%). The most common age group involved in RTA was 20–29 years ( $n = 23$ ; 22%). For homicides, shotguns were mainly used ( $n = 31$ ; 31.6%), distantly followed by those caused by the use of sharp objects ( $n = 17$ ; 17.3%) and most cases belonged to the age groups of 40–49 years and 30–39 years (21.5% and 19.5%, respectively). In 5 (71.4%) cases, hanging was the method of choice for suicide. A majority of suicide victims ( $n = 4$ ; 57.1%) were aged between 30 and 39 years, with an average age of 36.3. Diseases of the cardiovascular system accounted for 41.8% ( $n = 41$ ) of cases, whereas pregnancy-associated deaths (excluding criminal abortions) accounted for 29.6% ( $n = 29$ ) of cases in the natural causes group. Preeclampsia/eclampsia ( $n = 9$ ; 31%) followed by postpartum hemorrhage ( $n = 8$ ; 27.6%) were the leading causes of maternal deaths. **Conclusion:** There is a need to provide basic infrastructure, formulate policies, and implement them, to reduce female MLD, which a significant number of them are preventable.

**Keywords:** Autopsies, females, manner of death, medicolegal deaths

## INTRODUCTION

Death of anybody causes pain and sorrow, at least to the immediate family of the deceased. Death of a female, especially when young is usually disastrous because of its effect on the survivors and family, especially when the children are still young. Based on history, scene visitation/examination, circumstantial evidence, and postmortem findings (including tissue histology and toxicology), every death could be classified as natural or unnatural. Natural deaths are deaths due to diseases and its progression or aging process, whereas unnatural deaths are premature deaths caused by injuries or other means that could be intentional or unintentional.<sup>1,2</sup> Pregnancy-associated deaths except criminal abortions are also natural deaths. Unnatural deaths could be accidents, homicides, or suicides. Accurate comprehensive autopsy-based publications on medicolegal deaths (MLDs) centered only on females are not readily

available in Nigeria except one.<sup>3</sup> Most of the female medicolegal autopsy (MLA) studies are from Asia.<sup>4–11</sup> Africa is said to have the highest road traffic fatality rate, though studies have shown that in Sub Saharan countries, such deaths are grossly underreported.<sup>12,13</sup> Similarly, according to the United Nations Office on Drugs and Crime (UNODC), Africa has the highest female homicide rate.<sup>14</sup>

The aim of this study is to provide the pattern of MLA in females from a Nigerian setting, which will assist concerned authorities in providing measures and policies that will help to reduce such deaths.

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## MATERIALS AND METHODS

This is a retrospective review of all the MLA on females that were conducted by the police pathologist at the police clinic, Benin City, Edo State, Nigeria, for 10 years (from January 1, 2008, to December 31, 2017). The autopsies were performed in various mortuaries in Edo State and neighboring states by the pathologist and his team (including other pathologists, pathologist assistants, and photographer) using standard autopsy procedures, with histological and toxicological analysis carried out where applicable. Whenever there is a complaint of suspicious or violent death in any locality in Edo State to a police station, the police officer, who acts as a coroner officer in our environment, conducts a preliminary investigation and reports to higher police authorities and the coroner, which mandates the pathologist to perform the autopsy. Following each autopsy, a detailed report is written and submitted to the coroner. The major sources of information reviewed were the autopsy registers and autopsy reports of the police clinic. The year-wise incidence, age, cause, and manner of death (namely natural, homicidal, suicidal, accidental, or undetermined) were analyzed statistically using SPSS version 17 (Chicago, Illinois, USA). Ethical approval was obtained from the University of Uyo Teaching Hospital ethical committee.

## RESULTS

A total of 331 female MLAs were done during the period under review, accounting for 21.8% of all cases. The youngest body autopsied was 5 days old and the oldest 125 years with a mean age of  $40.11 \pm 20.25$ . Table 1 shows the distribution of cases based on the manner of death in relation to the age groups. Age group of 30–39 years accounted for most, while accidental deaths were the most common manner of death. Table 2 shows the type of accidental deaths, whereas Table 3 shows the distribution of the age groups in relation to the type of RTA. Table 4 shows the weapons used to cause homicide injuries in relation to the age group of cases. Table 5 shows the pattern of suicide. Only a 25-year-old female dropped a suicide note. Table 6 shows the distribution of natural medicolegal

female cases. The pattern of the pregnancy-associated deaths is shown in Table 7. Table 8 shows a comparison of the index study to various female MLA studies.

## DISCUSSION

Accurate and comprehensive research into the pattern of MLD in an area plays a vital role in assisting policymakers and concerned authorities in formulating policies, its introduction and evaluation that helps to reduce such unwanted waste of life.<sup>4</sup> Most female deaths in the index study were seen in the fourth decade, with almost 60% occurring between 20 and 49 years. This is different from findings in India where the third decade accounted for most female deaths.<sup>5,6,9-11</sup> This is the active age group and our females these days are actively involved in economic empowerment pursuit. This is similar to finding in Warri, Nigeria.<sup>3</sup> In India, the younger age group was mainly due to dowry related issues, especially in very young brides. Furthermore, in India, the young females were prone to maladjustment and ill-treatment by in-laws, which also lead to their deaths.<sup>5,6,9-11</sup>

Accidental deaths (with RTA accounting for 86.1%), was the most predominant MLD in this series. RTA in Sub-Saharan countries is the 13<sup>th</sup> leading cause of death in females, compared with the 18<sup>th</sup> globally. Deaths due to RTA in females in Western sub-Saharan Africa (where Nigeria is located) is more than twice the global average and almost five times the rate in Western Europe.<sup>12</sup> According to the World Health Organization (WHO), RTA lead to 1.24 million deaths in 2010, with half of these deaths seen mostly among pedestrians, cyclist, and motorcyclist.<sup>13</sup> Africa is said to have the highest road traffic fatality rate, with the age group of 15–44 years old accounting for about 60% of all RTA deaths.<sup>12,13</sup> Globally speed, drink-driving and nonuse of helmets, seat-belts, and child restraints are the major risk factors for RTA.<sup>12</sup> In addition to these internationally identified factors, poor road network, riddled with potholes, is a major contributory factor in our environment.

Hemorrhagic shock was the most common cause of RTA deaths identified. In all studies except that by Mandar and

**Table 1: Manner of death in relation to the age groups**

Age group	Manner of death					Total (%)
	Accident	Homicide	Suicide	Natural	Undetermined	
0-9	11	5	-	2	-	18 (5.4)
10-19	10	8	-	2	1	21 (6.3)
20-29	9	17	2	19	1	68 (20.5)
30-39	18	19	4	32	-	73 (22.1)
40-49	19	21	-	16	-	56 (16.9)
50-59	15	11	-	8	-	34 (10.3)
60-69	7	11	-	11	1	30 (9.1)
70-79	8	4	1	4	1	18 (5.4)
80-89	3	1	-	4	1	9 (2.7)
≥90	2	1	-	-	1	4 (1.2)
Total	122 (36.9)	98 (29.6)	7 (2.1)	98 (29.6)	6 (1.8)	331 (100)

Ananda in South Bangalore, India, (that reported suicides as the most common), accidents accounted for most in the range of 40%–72.3%.<sup>3-11</sup> Accidental deaths are predominant due to the involvement of females like their male counterparts in many outdoor activities such as pursuit for education, employment, and other activities that could lead to a better standard of living.<sup>8,9</sup> In 42.9% of RTA cases in the index study, pedestrians were knocked down by vehicles and an additional 2.9% knocked down by motorbikes. This was seen in all age groups. These pedestrians were mainly hawkers on the road, petty traders in small makeshift stalls that are very close to the road and people

that were trekking. Pedestrians are the most neglected in transport and planning policy, among all road users.<sup>13</sup> The index rate of 45.8% is similar to the finding of a 44% pedestrian involvement in a more comprehensive Sub-Saharan study, which identified pedestrian deaths in Western Sub-Saharan Africa to be eight times the rate in Western Europe.<sup>12</sup> This rate is higher than the global average rate of 35%. To reduce such accidental deaths, hawking on the traffic should be prohibited, proper markets built and the roads should be repaired with proper sidewalk areas and proper markings indicating zebra crossing and other caution signs. In crowded areas with busy traffic, footbridges should be provided. Furthermore, driving licenses should be issued to only those that have been properly certified to drive.

Homicidal deaths ranked second, accounted for 29.6% of cases, and involved all age groups. This is different from all Indian studies where homicides ranked a distant third (ranging from 2.5% to 11%) after accidents and suicides.<sup>5,6,8-11</sup> In Sri Lanka, though it ranked third, it accounted for 24% of cases. In Warri, Nigeria, homicides ranked second, with a rate of 46.9% and not all age groups were victims as observed in the index study. The homicide victims in this study were mostly between the

**Table 2: Types of accidental deaths**

Type of accident	Frequency (%)
RTA	105 (86.1)
Drowning	8 (6.6)
Burns	3 (2.5)
Others	6 (4.8)

Others include a single case of the following: foreign-body aspiration, electrocution, industrial accident, fall from a tree, excess alcohol ingestion, and collapsed wall. RTA – Road traffic accident

**Table 3: Relationship of road traffic accident types to the age groups**

Age groups (years)	RTA type						Total (%)
	Car versus car	Motor bike versus car	Car versus pedestrian/hawkers	Motor bike versus pedestrian	Lone car accident	Others	
0-9	2	-	5	-	-	-	7 (6.7)
10-19	1	-	6	-	-	-	7 (6.7)
20-29	8	3	9	-	3	-	23 (22)
30-39	5	4	3	-	4	-	16 (15.2)
40-49	8	2	6	-	1	1	18 (17.1)
50-59	4	1	5	1	2	1	14 (13.3)
60-69	3	-	3	-	1	1	8 (7.6)
70-79	-	-	6	1	1	-	8 (7.6)
80-89	-	-	2	-	-	-	2 (1.9)
≥90	-	-	-	1	1	-	2 (1.9)
Total (%)	31 (29.5)	10 (9.5)	45 (42.9)	3 (2.9)	13 (12.3)	3 (2.9)	105 (100)

Others include: 2 cases of car versus bicycle and a case of car versus tricycle. RTA – Road traffic accident

**Table 4: Major instruments/weapons used in committing homicides**

Instrument	Age group										Total (%)
	0-9	10-19	20-29	30-39	40-47	50-59	60-69	70-79	80-89	≥90	
Shot gun	1	2	6	6	8	4	2	1	1	-	31 (31.6)
Sharp object	1	1	1	3	3	2	3	3	-	-	17 (17.3)
Blunt object	-	-	2	2	4	2	3	-	-	-	13 (13.3)
Stabbing	-	1	2	4	1	-	-	-	-	-	8 (8.2)
Rifle gun	-	1	-	1	2	2	2	-	-	-	8 (8.2)
Acid bath	-	1	3	1	1	-	-	-	-	-	6 (6.1)
Strangulation	-	1	-	1	1	-	1	-	-	1	5 (5.1)
Burning	2	-	1	-	-	-	-	-	-	-	3 (3.1)
Others	1	-	2	1	2	1	-	-	-	-	7 (7.1)
Total (%)	5 (5.2)	7 (7.2)	17 (17.4)	19 (19.5)	22 (21.5)	11 (11.2)	11 (11.2)	4 (4.1)	1 (1.2)	1 (1.2)	98 (100)

Others include: 2 cases of criminal abortion and 2 cases of poisoning. It also includes a case each of a combination of sharp and blunt objects injury, suffocation, and pushing off from a moving vehicle

**Table 5: Age group in relation to the suicide method used**

Suicide method	Age groups (years)			Total (%)
	20-29	30-39	70-79	
Hanging	1	3	1	5 (71.4)
Substance ingestion	1	-	-	1 (14.3)
Both methods combined	-	1	-	1 (14.3)
Total	2	4	1	7 (100)

**Table 6: Pattern of natural deaths**

System involved	Frequency (%)
Cardiovascular	41 (41.8)
Myocardial infarction	21 (21.4)
Hypertensive heart disease	10 (10.2)
Cerebrovascular accident	4 (4.1)
Congestive cardiac failure	4 (4.1)
Others	2 (2)
Pregnancy related	29 (29.6)
Respiratory	11 (11.2)
Pneumonia	5 (5.2)
Tuberculosis	2 (2)
Others	4 (4.1)
Neoplasia	5 (5.1)
Myeloproliferative	2 (2)
Ovary	2 (2)
Breast	1 (1)
Gastrointestinal tract	4 (4.1)
Others	8 (8.2)
Total	98 (100)

Eight cases of others include, malaria (3), gangrenous foot with septicaemia (2) and a case each of the following: retroviral disease, meningitis, chronic renal failure with severe anaemia. COPD – Chronic obstructive pulmonary disease

**Table 7: Pregnancy-associated deaths**

Diagnosis	Age group				Total (%)
	10-19	20-29	30-39	40-49	
Preeclampsia/eclampsia	1	3	4	1	9 (31)
PPH	-	2	5	1	8 (27.6)
Sepsis	-	2	2	-	4 (13.8)
Ruptured ectopic	-	-	3	-	3 (10.3)
Obstructed labor	-	1	1	-	2 (6.9)
Amniotic fluid embolism	-	-	2	-	2 (6.9)
Anemia in pregnancy	1	-	-	-	1 (3.5)
Total (%)	2 (6.9)	8 (27.6)	17 (58.6)	2 (6.9)	29 (100)

age group of 20–49 years, just like the predominant age groups involved in accidental deaths. We observed that >69 years old, death by murder in our females drastically reduced, just as was observed in Warri, Nigeria, and in South Africa.<sup>3,15</sup> This contrasts the UNODC finding which stated that female victims are more evenly distributed across all age groups.<sup>14</sup>

All sorts of agents/mechanisms were used to commit homicide in our setting (including pouring of acid and pushing off from

a moving vehicle). Firearm injury was the most common cause of homicidal death in this series, just as was also observed in Warri; Nigeria, and South Africa.<sup>3,15</sup> In Sri Lanka and in all studies from India except one, there was no homicide due to firearm injury.<sup>4,6,8-11</sup> The common sites of firearm and stabbing deaths were chest, followed by the abdomen, while blunt object injuries were mainly to the head. Genital injuries were not seen. These are similar to observations in South Africa.<sup>15</sup> In general, countries where gun access is restricted are known to have lower levels of gun violence.<sup>16</sup> In Nigeria, despite a policy against gun access, there are still guns in the hands of unlicensed individuals; hence, there is a need to introduce and use alternative strategies than just policy.

Of late, in Nigeria, there is proliferation and the use of light weapons, which has been attributed to purchase of guns by politicians for their thugs to be used in intimidating opponents during elections.<sup>17</sup> Usually, after elections, these guns are not retrieved from these thugs. Other identified reasons for light arm proliferation are increasing youth restiveness in Oil-rich Niger Delta zones of the country and the activities of armed herdsmen and increasing banditry in Northern zones of the country.<sup>18</sup> In Nigeria, it is only unformed agencies that are allowed to use rifle guns, but seeing some cases in the index study shot with such rifle guns calls for concern. There should be serious mop-up exercise to retrieve these guns from these unlicensed users. There should be strict control at all entry points into the country to prevent illegal gun movement into Nigeria.

Although suicides are preventable, every 40 s a person dies by suicide somewhere in the world and many more attempt suicide.<sup>19</sup> Suicides occur in all regions of the world and throughout the lifespan. For every suicidal death, there are many suicidal attempts that did not result in death. A total of 7238 suicides were recorded in Nigeria in 2012, with 1584 of them been females.<sup>19</sup>

Only 7 (2.1%) cases of suicide were seen, which is markedly small compared to 32% in Sri Lanka and a range of 24.8%–88.2% observed in various Indian studies.<sup>4,6,8-11</sup> Although the rate is low in the index study, this may not be a true reflection of the suicidal deaths presently in the society as is common to hear on the electronic media of loss of lives through suspected suicides at regular intervals. Females are believed to use less violent and less harmful methods during suicides like poisonous substance ingestion and drowning, while men usually employ hanging and the use of firearm.<sup>20</sup> Common methods used by Nigerian females are hanging, poisonous substance ingestion, or a combination of both.<sup>3,21</sup> Suicide notes are rarely written; hence, the reasons for suicide are not known except for the different postulations of family members, relatives, or neighbors. In Sri Lanka and India, identified reasons for suicide in females include; family reasons, love affairs, and dowry-related issues.<sup>4,10,11</sup> In addition to hanging and poisonous substance ingestion, a popular method in some parts of India is setting oneself ablaze (burning).<sup>10,11</sup> The high

**Table 8: Comparison of various female medicolegal autopsy studies**

Parameter	Index study	Ijomone <i>et al.</i> <sup>3</sup>	Kitulwatte <i>et al.</i> <sup>4</sup>	Pathak and Sharma <sup>5</sup>	Meera <i>et al.</i> <sup>7</sup>	Pawar <i>et al.</i> <sup>10</sup>	Sandhya <sup>11</sup>
Location	Benin (Nigeria)	Warri (Nigeria)	Sri Lanka	Gujarat (India)	Manipur (India)	Punjab (India)	Jammu (India)
Duration (years)	10	14	3	1	10	2	5
Number of cases	331	96	139	480	320	100	948
Accidents (%)	36.9	49	40	56.5	72.5	57	61.3
Homicides (%)	29.6	46.9	24	5.2	23.8	11	2.5
Suicides (%)	2.1	4.2	32	29.4	3.8	30	36.2
Natural (%)	29.6	-	-	8.9	-	-	0.9
Undetermined (%)	1.8	-	-	-	-	-	6
Most affected age group (%)	30-39 (22.1)	20-29 (27.1)	21-40 (37)	20-29 (35)	21-40 (36.3)	18-30 (68)	21-30 (32.6)

rate of suicidal burning in India has been queried, with a belief that a good number of them were homicidal dowry burning that were made (rearranged) to look like suicides or accidents to avoid the weight of the law (“so-called mysterious stoves or stove burst theory” in India<sup>22</sup>). To attempt to prevent suicide, the WHO has advised countries to employ a multisectoral approach that comprehensively addresses suicide, bringing together the different sectors and stakeholders most relevant to each context.<sup>21,22</sup> Mental health evaluation should be made popular in Nigeria and all suicidal attempts should be taken serious.

Heart- and pregnancy-related pathologies accounted for >71% of MLD due to natural causes in this study. In the past, it was thought that myocardial infarction (MI) was rare in Nigeria and other Sub-Saharan African countries.<sup>23-25</sup> Recently, MLA-based studies have shown that MI is responsible for a significant number of sudden deaths in Nigerians.<sup>21,26</sup> Fifty percent of the cardiovascular system-related deaths in females was due to MI, whereas 25% was due to hypertensive heart disease. Health education on routine health checks will help to slow the tide.

Universally pregnancy and childbirth are celebrated, though, for many women, it may lead to their untimely death.<sup>27</sup> According to the WHO, maternal mortality is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.<sup>28</sup> Nigeria, including five other developing countries (Democratic Republic of Congo, Ethiopia, Pakistan, India, and Afghanistan) accounts for more than 50% of the global maternal deaths.<sup>29</sup> The maternal mortality rate in Nigeria is estimated to be about 704 deaths/100,000 live births, with a range of about 165 deaths/100,000 live births in the southwest region to 1549 deaths/100,000 live births in the northeastern sub-regions of the country.<sup>30</sup> Postmortem examination has been shown to be an invaluable tool in accurately determining the cause of maternal death and also aids in its prevention.<sup>31,32</sup>

Preeclampsia/eclampsia (31%), postpartum hemorrhage (due to uterine rupture, uterine atony, and cervical laceration) (27.6%),

and sepsis (13.8%) in this order caused most deaths in this series. These three were the most common causes of maternal death in all Nigerian studies.<sup>32-36</sup> Similar maternal autopsy studies from other developing countries such as Mozambique and India also reported hemorrhage, sepsis, and preeclampsia as common causes, though the rate of preeclampsia was a distant third.<sup>27,37,38</sup> These kinds of deaths will reduce when functional primary health centers with good referral systems are established. In addition, periodic health education about these causes of maternal death and preventive methods should be given to adults (males and females) in various places such as market, churches, and mosques.

The major limitations of this study are the lack of historical/precipitating factor (underlying reasons) for suicides and homicides, lack of knowledge of the marital status of these females, and the relationship of the perpetrator to the victim in homicide. Also not documented was the parity and facilities where the women went to deliver.

## CONCLUSION

A second MLA in females in Nigeria has been documented and this will serve as a raw material for a future more comprehensive meta-analysis of female MLA in Nigeria.

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## Conflicts of interest

There are no conflicts of interest.

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