

## Causes of Violent Deaths in Senegal during Medico Legal Autopsies

Ndoye El Hadji Oumar<sup>1</sup>, Soumah Mouhamed Manibiliot<sup>1</sup>, Dia Sidy Ahmed<sup>2</sup>,  
Ngongangfranck Olivier<sup>3</sup>, Dial Chérif Mohammed Moustapha<sup>2</sup>, Thiam Ibou<sup>2</sup>

<sup>1</sup>Department of Legal Medicine, Cheikh Anta Diop Dakar University (UCAD), Dakar, Senegal

<sup>2</sup>University Cheikh Anta Diop Dakar (UCAD), Dakar, Senegal

<sup>3</sup>Faculty of Medicine and Biomedical Sciences/University of Yaounde I, Cameroon

**\*Corresponding Author:** Ndoye El Hadji Oumar, Department of Legal Medicine, Cheikh Anta Diop Dakar University (UCAD), Dakar, Senegal

### Abstract:

**Introduction:** Cases of violent deaths are investigated to help determine the cause of death and the mechanisms involved. Data on medical causes of death thus make it possible to understand the extent of certain public health problems at the national level: the frequency, their evolution, their spatial and sociodemographic differences. The objective of this study is to determine the epidemiological and medico-legal aspects of violent deaths involving a medico-legal obstacle in Senegal.

**Methodology:** Our study was carried out in public hospital structures in Senegal. This is a retrospective study based on data collected in court requisitions, autopsy reports and in registers from January 2017 to December 2021.

**Results:** Over the study period, violent deaths constituted the medico-legal form most represented with 53.4% of autopsies performed, ahead of natural deaths with 42.4%. Violent deaths were in the majority of cases following accidents 84% followed by homicides 12.5% and in last position suicide which was uncommon with 3.5%.

**Conclusion:** All forms of violent death (suicide, accidental, homicide) are all likely to be subject to a medico-legal autopsy. The analysis of the causes of death in our profession shows an increase in mortality due to violent accidental deaths constituting the most representative medico-legal form of autopsies performed. In front of natural deaths of cardiovascular origin. Prevention policies must be implemented to limit traffic accidents, physical attacks and drownings.

**Keywords:** trauma, murder, forensic autopsies, violent death, asphyxia, suicide.

### 1. INTRODUCTION

Cases of violent deaths are investigated to determine the cause of death and the mechanisms involved. According to the recommendation on the harmonization of rules on medico-legal autopsies of the Council of Europe [1], medico-legal autopsies should be carried out in all cases of obvious or suspected unnatural death and whatever i.e. this post-mortem period, Data on medical causes of death thus make it possible to understand the extent of certain public health problems at the national level: the frequency of morbid or violent deaths, the evolution over time, the differences spatial and sociodemographic. Violent deaths in industrialized countries show high suicide rates and this has been identified as a serious public health problem by the

World Health Organization [2] as opposed to developing countries where suicide rates are low [3,4]. This epidemiological information is also important for international comparisons. The objective of this study is to determine the epidemiological and medico-legal aspects of violent deaths involving a medico-legal obstacle in Senegal.

### 2. METHODOLOGY

Our study was carried out in the following hospital structures: the Aristide Le Dantec Public Health Establishment (EPS) (ALD) in Dakar, the Idrissa Pouye General Hospital in Grand Yoff and in the Public Hospital establishments in Ziguinchor, Kédougou.... This is a retrospective study based on data that will be collected in court requisitions, autopsy

reports and in the registers of the structures concerned by this study ranging from January 2017 to December 2021. It included all cases of violent deaths having benefited from a medico-legal autopsy following a judicial requisition. We excluded from this study other cases of natural deaths, undetermined deaths. The collection of elements will be carried out for each autopsy, on the basis of a file including epidemiological data and medico-legal aspects: epidemiological data (age, sex, place of death, period of death). accident) and medico-legal data (the circumstances of death or manner of death, the cause of death or type of death) The data analysis was carried out using Microsoft Excel 2007 software. The quantitative variables were described by their average, maximum and minimum while the qualitative variables by their number and percentage.

### 3. RESULTS

#### 3.1. Statistical and Epidemiological Data

Over the study period, violent deaths constituted the most represented medico-legal form with 53.4% of autopsies performed, ahead of natural deaths with 42.4% and finally undetermined deaths, which were lower with 4.2% of cases.

- **Age**

The average age of the deceased subjects was 30 years with extremes ranging from 0 to 94 years

- **Sex**

The deaths were predominantly

male with 2001 cases (80%) with a sex ratio of 4. - Nationality Major some of the deaths were of Senegalese nationality with 99% of cases.

- **Location**

The place of death or discovery of the corpse was in Dakar Rural (the suburbs of Dakar and its surroundings) in the majority of cases, i.e. 71.4%, followed by Dakar Urban or Dakar center at 28.6%.

- **Period of the Accident**

The months most affected by deaths were the months of September, August and July with successive values of 10%, 9.7% and 9.5%.

#### 3.2. Medico-Legal Data

##### 3.2.1. Modes of Death

Violent deaths were in the majority of cases following accidents 84% followed by homicides 12.5% and in last place suicide which was uncommon with 3.5%.

##### 3.2.2. Violent Deaths

Concerning violent accidental deaths, trauma represented 71%, followed by mechanical asphyxia 21.5%, burns 6.6% and poisoning 0.6%. As for violent deaths by homicide, intentional injuries by stabbing were at the forefront with 71.2% followed by infanticide 15%. Finally, violent deaths by suicide were the rarest but the most common cause was hanging with 89% of cases.

**Table2.** Distribution according to types of violent deaths

VIOLENT DEATHS		Absolute Frequency	Relative Frequency
ACCIDENT	ROAD ACCIDENT	1165	46,7%
	FALL	177	7,1%
	DOMESTIC ACCIDENT	62	2,5%
	TRAUMA	61	2,4%
	WORK ACCIDENT	16	0,6%
	SEA ACCIDENT	8	0,3%
	OTHERS: railway accident, sports accident, explosion		
DROWNING		355	14,2%
	THORACIC COMPRESSION	49	2,0%
ASPHYXIA	GAS INHALATION	28	1,1%
	SUFFOCATION	15	0,6%
	STRANGULATION	5	0,2%

		<b>THERMIQUES BURNS</b>	<b>78</b>	<b>3,1%</b>
	<b>BURNS</b>	<b>ELECTRIC BURNS</b>	<b>61</b>	<b>2,4%</b>
	<b>POISONING</b>	INTOXICATION	13	0,5%
		<b>HANGING</b>	<b>79</b>	<b>3,2%</b>
		INGESTION OF CAUSTIC PRODUCT	3	0,1%
<b>HOMICIDE</b>		FALLING	2	0,1%
		WHITE WEAPON	2	0,1%
		Others: Suffocation, Firearm, burn	3	0,1%
		<b>INTENTIONAL STRIKES AND INJURIES BY WHITE WEAPONS</b>	<b>223</b>	<b>8,9%</b>
		<b>INFANTICIDE</b>	<b>47</b>	<b>1,9%</b>
		INTENTIONAL STRIKES AND INJURIES BY FIREARM	17	0,7%
<b>HOMICIDE</b>		STRANGULATION	11	0,4%
		MEDICAL ACCIDENT	6	0,2%
		INTENTIONAL STRIKES AND INJURIES BY Blunt OBJECT	5	0,2%
		Others: : RAPE., FRATRICIDE	4	0,2%
		<b>TOTAL WORKFORCE</b>	<b>2495</b>	<b>100%</b>

#### 4. DISCUSSION

The limitations of our study are linked to the retrospective nature of the study with the absence of certain information on cases of death in the exploitation of hospital registers of mortuary services representative of the country. The information mainly concerns the victims, but that of the perpetrators is not known.

##### 4.1. Epidemiological Data

- **Age - Sex - Nationality**

The practice of autopsies in Senegal shows a high proportion of young people with an average age of 30 years, male (80%) and the vast majority of cases are made up of Senegalese (99%). This male predominance was also noted by studies carried out by Enow-Orock in Cameroon 69.8% [5], Soumah [6] in Dakar 86%. This contextual situation is largely due to the fact that men have more responsibilities within the family due to their socio-economic situations. Thus, men are more exposed to road traffic accidents, assaults and all other types of violence. Young men are also inclined to adopt risky behaviors, such as speeding, driving their motorcycle, and taking narcotics and drugs. These findings are of great concern as younger-aged men are major contributors to the country's economy

and are generally breadwinners. Consequently, the death of these economically productive individuals can prove to be a capital loss

- **Location**

The place of death or discovery of the corpse is located in rural Dakar (the suburbs of Dakar and its surroundings) in the majority of cases, i.e. 71.4%, followed by Dakar Urbain or Dakar center at 28.6%. Our study shows that the majority of fatal road traffic accidents and physical attacks occur in rural areas. Similar results were found by other authors [7,8], who recorded 88 and 74% of fatal road traffic accidents in rural areas respectively. In addition, some authors [9,10] noted that severe lesions were more frequent in rural areas. EBOUAT studies in Ivory Coast [11]. and NGONGANG in Cameroon[12]. find a predominance of delinquency in the streets of developing countries, especially in rural areas. We are faced in rural areas with the presence of defective or even impassable roads, lack of visibility, poor signage, houses line the road, sidewalks are invaded by merchants, road traffic is heterogeneous where carts rub shoulders, rickshaws, motorcycles, tricycles, in addition to other aggravating factors: the indiscipline of certain drivers, the absence of police officers in traffic, a very dilapidated vehicle fleet, failure to wear seat belts. safety,

lack of use of child seats, overloading on public transport. In addition, we are witnessing a growing increase in insecurity, fueled by a demographic explosion and endemic youth unemployment in the suburbs, the free circulation of bladed weapons, the abusive use of drugs and alcohol by young people, police and gendarmerie services are almost non-existent in the rural area. Thus, these different situations favor and accentuate the occurrence of fatal accidents, in this case the crime rate in rural areas.

### • **Period of the Accident**

In our study, the months most affected by death were September, August and July, with consecutive values of 10%, 9.7% and 9.5%. These months correspond to long school holiday activities, the heat period (summer), the rainy season and floods combined with unfavorable roads lead to numerous accidents. Added to this in our context are religious events with a monthly variation leading to a massive movement of people. These religious events attract many pilgrims from several countries.

## **4.2. Medico-Legal Data**

Regarding violent deaths, the majority of cases are the result of accidents 84%, followed by homicides 12.5% and in last place suicide which was uncommon with 3.5%.

### • **Accidental Deaths**

Trauma represented 71% of violent accidental deaths, followed by mechanical asphyxia 21.5%. In this subgroup of fatal injuries, road accidents with 46.7% and drowning with 14% of cases were the most common causes of death. We see that the road causes an impressive number of deaths. According to WHO statistics, unintentional injuries are responsible for 3.9 million deaths per year, approximately 90% of which occur in low- and middle-income countries (LMICs). They are mainly attributed to road accidents, falls, drownings, poisonings and burns [13]. The mortality rate linked to road accidents remains worrying in Senegal, despite the efforts made by the authorities. In Senegal, nearly 27,000 people are victims of accidents on public roads each year, including 11,000 recorded in Dakar. This trend reflects that of the African Region. While it represents only 3% of the total number of registered vehicles, the region accounts for 20% of road accident deaths

worldwide, with almost 272,000 deaths. In addition, it has a high road mortality rate with 26.6 per 100,000 inhabitants. Between 2015 and 2019, road accidents caused an average of 644 deaths each year [14].

However, forensic autopsies have been instrumental in the epidemiological evaluation of traffic accident cases. Studies conducted in Bangalore [15] (India), Mthatha and Transkei (South Africa) [16], used forensic autopsies to assess fatalities from road traffic accidents. Forensic autopsies help determine the exact cause and manner of death, the time since death, and the manner of death. The main causes of these accidents are linked to human behavior (speeding, telephone driving, effects of drugs and alcohol). Added to these are, among other things, the overloading of cars, the dilapidation of the vehicle fleet and the state of the roads. Beyond the human cost, these accidents constitute a significant burden for the country's economy. Analysis of these factors would help identify inadequacies in the implementation of preventive measures to reduce deaths due to road traffic accidents. As for drowning, it is a real public health problem that generally affects the most productive age groups. Around 150,000 people die from drowning each year worldwide [17]. This study shows that drowning is the cause of a significant number of deaths among young men in the Dakar suburbs between July and September. These figures confirm and agree with already existing data regarding the higher number of drowning deaths among men [18,19]. Sea water is the most common source of drowning in this study, especially on beaches located on the coast of Dakar. In terms of forensic etiology, accidental drowning accounted for all cases. Other authors have found this accidental nature of these cases of drowning, Nwafor in Benin [20] and Seleye-Fubara in the Niger Delta region [21]. The main reason for this situation is the existence of the long coast of the Atlantic Ocean, the easy accessibility to the sea, the absence of a surveillance team at the beaches where swimming is prohibited, the dependence on the sea as a professional resource, adventure and professional leisure activities. Often ignored, drowning deaths are preventable. The authorities must improve safety on the beaches by setting up rescue teams after having identified places with high attendance, especially during school holidays and summer, the massive presence of



lifeguards and lifeguards at the seaside at the level prohibited beaches, and put in place prevention strategies for vulnerable groups.

### • **Homicide**

Homicide comes second in our study with a mortality rate of 12.5%. Our study shows a predominance of intentional stab wounds with 8% followed by infanticide with a rate of 2%. YEBOUET's study [22] found identical factors. In fact, intentional stabbing and stabbing were the prerogative of fights and physical attacks. According to the UN, this difference could be explained by the existence of certain factors favoring crime and which are more observed in Africa: this involves high income inequality, rapid urbanization, a high proportion unemployed youth and insufficient resources in the criminal justice system [22]. . The second cause of these homicides is infanticide, often caused by young women. These are women who become pregnant outside of marriage, and who kill their babies out of fear and/or shame. Other factors such as rape, incest, forced marriages, poverty, adultery of certain emigrant wives, ignorance or neglect of contraceptive methods. Worldwide, nearly 464,000 people were victims of deadly violence in 2017, more than five times the number of people killed in armed conflicts during the same period, according to United Nations researchers. The United Nations Office on Drugs and Crime (UNODC) study indicates that Central America is the most dangerous region to live in, with the number of homicides – or unlawful killings – increasing in certain “hot spots”, reaching 62.1 per 100,000 people. This study specifies that the homicide rate in Africa was lower than that of the Americas, which had the highest percentage in 2017[23]. However, the homicide rate in Senegal is among the lowest in Africa (3 per 100,000 inhabitants) [24]. Faced with this growing crime, it is urgent for the authorities to fight against the increase in insecurity and the impunity of criminals. At the same time, tackling rampant youth unemployment and improving the socio-economic conditions of the population.

### • **Suicides**

In our study, violent deaths by suicide are rarer but the most common cause is hanging. Hanging appears to be the most used method of operation with 89% of cases. Our results

are comparable to those of Souguir [25] in Tunisia and Yapo Ette and EBouat [26] in Ivory Coast and Soumah in Senegal [27]. According to the World Health Organization (WHO), suicide is a public health problem found in most psychiatric illnesses, and is the 15th cause of death in the world with approximately one million suicides annually. With 11 people per 100,000 committing suicide each year in Africa, this figure is higher than the global average of nine suicides per 100,000 people [28]. In Africa, the suicide rate is relatively low compared to other parts of the world. However, recently the low rate is said to be increasing, which is a growing concern. Even though suicide rates are low compared to other parts of the world, this is attributed to cases of unreported or under-reported suicide in the continent. According to the ranking of African states by suicide rate in 2018, the countries with the highest rates are Lesotho, Equatorial Guinea, Ivory Coast with 21.2, 16.4 and 14.5 respectively. Senegal is in 32nd place in this ranking [29]. Suicide remains and continues to be a real public health problem. In Senegal, suicide is uncommon and this can be explained by underestimation or ignorance, by the religious and socio-cultural context. Indeed, suicide is prohibited in Islam, but 94% of the vast majority of the Senegalese population is Muslim. In Senegal, suicide is not considered a public health problem despite having one of the highest rates in the world. Indeed, the country is ranked 32nd in Africa, behind Lesotho and Equatorial Guinea and Ivory Coast. On the other hand, suicide rates in medical autopsies in industrialized countries are high and this has been identified as a serious public health problem by the World Health Organization [30]. as opposed to the developing world where suicide rates are low [31, 32]. Various causes are incriminated in suicides such as depression, stress, illness, school failure, mental health disorder, heartbreak, loneliness. Faced with the growing increase in the suicide rate throughout the world and particularly in Africa, prevention policies must be planned to eradicate risk factors.

## 5. CONCLUSION

All forms of violent death (suicide, accidental, homicide), death in custody or in a psychiatric hospital, or natural death occurring in

suspicious circumstances are all likely to be subject to a medico-legal autopsy. . Thus, the forensic doctor becomes an expert and he is also a justice assistant. Forensic work is carried out within the strict framework of a judicial investigation in the event of a violent death. The analysis of the causes of death in our profession shows an increase in mortality due to violent accidental deaths constituting the most representative medico-legal form of autopsies performed, ahead of natural deaths of cardiovascular origin. This work should encourage a reorientation of health resources towards these areas. Prevention policies must be implemented to limit traffic accidents, physical attacks, drownings, metabolic and infectious or even parasitic diseases.

### REFERENCES

- [1] Committee of Ministers to member states of the Council of Europe. Recommendation No. R (99) 3, relating to the harmonization of rules regarding medico-legal autopsies, adopted on February 2, 1999.
- [2] Bertolote J.M. and Fleischmann A. Suicide behavior prevention: WHO perspectives on research. *Bitter. J.Med. Broom. C.Semin. Med. Broom.* 2005; 133:8-12.
- [3] Diegbe I.T., Ideowor P.E. and Igbokwe U.O. Autopsy audit in a Teaching Hospital in Nigeria: The Benin experience. *West Africa J.Med.* 1998; 17:213-216.
- [4] Olasode B.J. and Odesanmi W.O. The hospital autopsy: Halting the decline. *Nigerian Post Grad. Med. J.* 1998; 5:37-39
- [5] Enow-Orock G, AssobNgu CJ, Pisoh T, Masumbe PS, Sando Z, Nkegoum B, Atangana P, Moampea-Mbio MC, Essame-Oyono JL. Contribution of autopsy to medical practice in Cameroon: a 10 year review. *Clin Mother Child Health* 2009; vol 6 (1): 1019-1024.
- [6] Soumah M M, Koumare M., Mor Ndiaye I, Sow M L. Causes of death in Dakar and health policy. *Pan African Medical Journal.* 2019;32:187.doi:10.11604/pamj.2019.32.187.10333
- [7] Sadeghi-, Sadeghi-Bazargani H, Samadirad B, Shahedifar N, Golestani M. Epidemiology of Road Traffic Injury Fatalities among Car Users; A Study Based on Forensic Medicine Data in East Azerbaijan of Iran. *Bull Emerg Trauma.* Apr 2018;6(2):146-154.
- [8] Taravatmanesh L, Mortazavi SM, Baneshi MR, Poor MS, Saedifar A, Zolala F. Epidemiology of road traffic accidents in Rafsanjan city, Iran. *Electron Physician.* May 2018;10(5):6859-6863.
- [9] Khorsidi, Khorshidi A, Ainy E, Soori H, Sabbagh MM. Iranian road traffic injury project: assessment of road traffic injuries in Iran in 2012. *J.PMA. The Journal of the Pakistan Medical Association.* May 2016;66(5):517-520.
- [10] Peura et al, Peura C, Kilch JA, Clark DE. Evaluating adverse rural crash outcomes using the NHTSA State Data System. *Accident; analysis and prevention.* Sep 2015;82:257-262.
- [11] Kmev. Ebouat a, K. Botti a, M. Djodjo a, H. YapouEtté. Review of 10 years of medico-legal autopsies in Ivory Coast (2002 to 2011). *Mali Medical* 2014 No. 3
- [12] Ngongang GFO, Nseme E, Bigot C, Mogue T Ottou MAZ, KenneTL, Akaba D, Kabeyene A, Sando Z, DjientcheuV. Epidemiological profile of medico-legal autopsies in two hospitals in the city of Yaoundé. *African Journal of Integrated Health | Volume 10, Issue 2, December 2020 | Pages 49-52* www.ajih.co
- [13] World Health Organization. The Global Burden of Disease: 2004 Update. Geneva: World Health Organization; 2008. Available on the site [http://www.who.int/healthinfo/global\\_burden\\_disease/GBD\\_report\\_2004\\_update\\_full.pdf?ua=1](http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004_update_full.pdf?ua=1)
- [14] <https://www.afro.who.int/fr/news/pour-que-les-routes-ne-tuent-plus- in Senegal>
- [15] Reddy NB, Hanumantha, Madithati P, Reddy NN, Reddy CS: An epidemiological study on pattern of thoracoabdominal injuries sustained in fatal road traffic accidents of Bangalore: autopsy-based study. *J Emerg Trauma Shock.* 2014, 7:116-20. 10.4103/0974-2700.130882
- [16] Mthatha and Transkei (South Africa) Meel BL: Fatal road traffic accidents in the Mthatha area of South Africa, 1993-2004. *S Afr Med J.* 2008, <tps://www.who.int/publications/i/item/9789241565684>.
- [17] K.S. Narayana Reddy, *The essential of Forensic Medicine & Toxicology*, 33rd edition, Jaypee brothers, 2015.
- [18] Phad and Dhawane, Epidemiological profile of drowning deaths: a cross sectional study, *Egyptian Journal of Forensic sciences*, 2018, 8:26.
- [19] Vijay kumar, et al.; pattern of drowning cases in rural area: A retrospective autopsy study, *Journal of Medical sciences and health*, Sep 2015, 1(3): 18-20.
- [20] Nwafor C C, Akhiwu W O. The Pattern and Frequency of Drowning Autopsies in Benin City, Nigeria. *Annals of Biomedical Science.* 2014; 13(2): 20-25
- [21] Seleye-Fubara D. Nicholas EE, Esse I. Drowning in the Niger Delta region of

- Nigeria. Niger Postgrad Med J. 2012;19(2): 111-114.
- [22] Henry Boah Yebouet. A thousand homicides in West Africa: what the murders say about morals. Presses de l'Université de Montréal, June 2017
- [23] United Nations Office on Drugs and Crime. Crime and development in Africa. Report June 2005. Available at <http://www.unodc.org>.
- [24] Peace and security July 8, 2019: file:///for/news/topic/peace-and-security
- [25] Souguir M K, Masmoudi T, Ben Dhiab M, Zemni M. Suicide among young people and adolescents in the central Tunisian region. J Med Leg Right Med. 2002; 45(2-3): 196-198. PubMed | Google Scholar
- [26] Yapo Ette H, Botti K, Djodjo. Suicide in Ivory Coast: medico-legal and epidemiological study over a period of 3 years (1999-2001). J Med Leg Right Med. 2005; 48 (1): 11-18. PubMed | Google Scholar
- [27] Soumah M M, Eboué B A, Ndiaye M, Sow M L. Epidemiological aspects of suicide in Dakar. P MJ. [https://doi.org/ 10.11604/pamj.2013.15.10.2221](https://doi.org/10.11604/pamj.2013.15.10.2221)
- [28] <https://www.who.int> Suicide -World Health Organization (WHO)
- [29] Ranking of African states by suicide rate. Atlasocio.com updated 10/22/2019.
- [30] Bertolote J.M. and Fleischmann A. Suicide behavior prevention: WHO perspectives on research. Bitter. J.Med. Broom. C.Semin. Med. Broom. 2005; 133:8-12.
- [31] Diegbe I.T., Ideowor P.E. and Igbokwe U.O. Autopsy audit in a Teaching Hospital in Nigeria: The Benin experience. West Africa J.Med. 1998; 17:213-216.
- [32] Olasode B.J. and Odesanmi W.O. The hospital autopsy: Halting the decline. Nigerian Post Grad. Med. J. 1998; 5:37-39

**Citation:** Ndoye El Hadji Oumar et al., "Causes of Violent Deaths in Senegal during Medico Legal Autopsies" *ARC Journal of Forensic Science*, vol 8, no.1, 2024, pp. 1-7. DOI: <https://doi.org/10.20431/2456-0049.0801001>

**Copyright:** © 2024 Authors. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.