

The Magnitude of Medicolegal Postmortem That Turned Out to Be Natural Deaths at the University of Benin Teaching Hospital: A 3-Year Study

Abstract

Background: The periodic determination of the degree to which coroner's postmortems done for medicolegal purpose turns out to be natural death is desirable because of its usefulness to health administrators in making policies that may ultimately help in focusing on the prevention/management of the causes of natural death at that particular point in time. **Objective:** The objective of the study was to determine the causes of natural death by a retrospective analysis of coroner's postmortem cases carried out on patients ages 19 years and above who died from natural causes. **Materials and Methods:** A 3-year period, retrospective postmortem study was carried out at the Department of Anatomic Pathology, University of Benin Teaching Hospital on 530 medicolegal postmortem cases ages 19 and above who died from natural causes. **Results:** Natural deaths were observed in 530 cases of medicolegal postmortems. Their age ranged from 19 years to 104 years with a mean age and standard deviation of 52.82 ± 16.71 years. Cardiovascular system diseases were the most common causes of natural deaths with hypertensive heart disease being the most common underlining cause. Infections and diseases of the respiratory, gastrointestinal system/hepatic, central nervous and endocrine systems were also noteworthy. **Conclusions:** Most causes of natural deaths were in the middle ages with the noncommunicable diseases (NCDs) accounting for a significant proportion. To reduce premature death from NCDs by 2030, the World Health Organization (WHO) is promoting its prevention and management. It is our desire that our health administrators would adopt this WHO model incorporating postmortem-based data for planning of medical services.

Keywords: Coroner's, hypertensive heart disease, life expectancy, manner of death, natural death, postmortem, sustainable development goals, World Health Organization

Introduction

Any death that is subjected to a legal investigation is a medicolegal death.^[1] This investigation is necessary for accurate death certification to rule out secret homicides and for demographic study.^[2] To investigate suspicious deaths and determine the circumstances of such deaths (i.e., the manner of death) is at the request to the coroners.^[3] The manner of death, therefore, includes but not limited to natural deaths.^[3-6]

Natural death refers to the ultimate outcome of an ailment or a natural process or an internal malfunction of the body that lacks the enhanced effect of either an external force or an injury.^[3,7] Simply put, natural deaths are regarded as those deaths that are solely due to diseases or disease processes.^[8] Cardiovascular diseases had been reported as the main cause of natural death in

previous autopsy studies from Europe, America, and Africa.^[9-17] Hypertensive heart disease was found to be the most common cause of natural death in those subjects with cardiovascular diseases at postmortem in Nigeria,^[9-11,15,18-20] whereas ischaemic heart disease is the leading cause of natural death in Cape Town, South Africa, and in the developed countries of Europe and America.^[12,14,16]

It is important that as the years roll by, data collection and analyses are indispensable in elucidating the current trend of the causes of diseases in an environment, more so that the baseline data are available for comparison.^[21] This will give a spectrum of the prevalent causes of natural deaths from coroner's postmortems in our own environment and by extension helps health administrators in making policies that may ultimately help in increasing the life expectancy of Nigerians by focusing on the

Akhatore Terence Azeke, Dele Eradebamwen Imasogie¹

Department of Anatomic Pathology, Irrua Specialist Teaching Hospital, Irrua,

¹Department of Morbid Anatomy, University of Benin Teaching Hospital, Benin City, Edo State, Nigeria

Received: 05-Jun-2022

Accepted: 06-Jul-2022

Published: 06-Oct-2022

Address for correspondence:

Dr. Dele Eradebamwen Imasogie, Department of Anatomic Pathology, University of Benin Teaching Hospital, PMB 1111, Ugbowo Lagos Road, Benin City, Edo State, Nigeria. E-mail: eradebamwen4real@yahoo.com

Access this article online

Website:

www.jwacs-jcoac.com

DOI: 10.4103/jwas.jwas_132_22

Quick Response Code:



How to cite this article: Azeke AT, Imasogie DE. The magnitude of medicolegal postmortem that turned out to be natural deaths at the University of Benin Teaching Hospital: A 3-year study. *J West Afr Coll Surg* 2022;12:37-43.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

prevention and management of the health needs in relation to the causes of natural deaths in our environment. To this end, periodic data collection and analysis is vital in the determination of the current trend of the causes of natural deaths in our environment. The aim of this study was to determine the causes of natural deaths by a retrospective analysis of 530 coroner's postmortems carried out on patients ages 19 years and above who died from natural causes over a 3-year period at the University of Benin Teaching Hospital (UBTH).

Materials and Methods

This was a retrospective postmortem study that was carried out at the Department of Anatomic Pathology, UBTH, over a 3-year period from January 1, 2013, to December 31, 2015. Of the coroner's postmortem cases carried out in the period under appraisal, the target population was those who died from natural causes.

The clinical case notes of each subject, as well as the mortuary/autopsy register, were consulted for details of patients' age, sex, and the precise cause of natural death. Cases with incomplete demographic data were excluded from this study. Also excluded were all medicolegal cases that occurred in the paediatric age group and adolescent

(0–18 years), those that had no identifiable cause of death, and those deaths that were not natural causes of death.

The data obtained from this study were analysed using the Statistical Package for Social Sciences, version 20; qualitative (sex and causes of natural deaths) and quantitative (age) data were analysed for discussion. For the former, the respective frequency of causes of natural deaths and their corresponding rates in percentages were analysed. For the latter, the age range, mean age, standard deviation, and peak ages were analysed for the study population and the respective broad categories of causes of natural deaths.

Results

During the period under review, 1198 postmortems were performed in the postmortem suite of the Department of Anatomic Pathology, UBTH. Of these, 530 died from natural causes that accounted for 44.24% of the medicolegal postmortems during the period under review. The ages of the subjects in this study ranged from 19 years to 104 years with a mean age and standard deviation of 52.82 ± 16.71 years. The median and modal ages were 54.00 and 60.00 years, respectively. Natural death peaked in the sixth decade, and it accounted for 23.58% of subjects (125 subjects). The peak ages in the males and the females were also in the sixth decade. Table 1 shows the sex and age distribution of the study population. Overall, there was a male preponderance in the occurrence of natural deaths. There were 296 males (55.85%) and 234 females (44.15%) giving a male to female ratio of 1.3:1.

Diseases of the cardiovascular system were the most prevalent causes of natural deaths in this study. It accounted for the death of 197 (37.2%) subjects of the study population. Other broad categories of causes of natural deaths are as shown in Table 2.

Of the 197 subjects who died from cardiovascular-related diseases, 92.39% (182/197 subjects) and 2.60% (5/197 subjects) were due to hypertensive heart disease and pericardial effusion, respectively. Other less common causes of natural deaths from cardiovascular-related diseases

Table 1: Age group and sex distribution of the study population

Age group (years)	Sex		Total
	Male	Female	
10–19	0	2	2
20–29	22	31	53
30–39	24	44	68
40–49	47	44	91
50–59	80	45	125
60–69	67	38	105
70–79	35	19	54
80–89	14	11	25
90–99	5	1	6
100–109	0	1	1
Total	296	234	530

Table 2: Sex distribution, frequency, and percentage of the broad categories of the causes of natural death

Broad categories of the causes of natural death	Sex		Total	Percentage
	Male	Female		
Cardiovascular system	119	78	197	37.2
Immune system/infections	51	50	101	19.1
Gastrointestinal/hepatic system	36	28	64	12.1
Respiratory system	26	12	38	7.1
Central nervous system	24	13	37	7.0
Endocrine/metabolic system	15	14	29	5.4
Genitourinary system	9	8	17	3.2
Obstetric and gynaecological disorders	0	15	15	2.8
Haematological disorder	10	11	21	4.0
Miscellaneous	4	7	11	2.1
Total	296	234	530	100.0

Table 3: Causes of natural death

		Sex		Total
		Male	Female	
Cardiovascular system	Hypertensive heart disease	110	72	182
	Pericardial effusion	1	4	5
	Cardiomyopathy	5	0	5
	Pulmonary thromboembolism	1	1	2
	Rheumatic heart disease	1	0	1
	Senile myocardial degeneration	1	0	1
	Ruptured aortic aneurysm	0	1	1
	Total	119	78	197
Immune system/infections	Sepsis	40	36	76
	RVD	5	10	15
	Peritonitis	3	3	6
	Stevens–Johnson syndrome	1	1	2
	Viral haemorrhagic fever	2	0	2
	Total	51	50	101
	Gastrointestinal/hepatic system	Peptic ulcer disease	13	10
Liver cirrhosis		18	5	23
Primary liver cell carcinoma		2	4	6
Gastroenteritis		1	3	4
Intestinal obstruction		2	2	4
Colonic adenocarcinoma		0	3	3
Oesophageal carcinoma		0	1	1
Total		36	28	64

are as shown in Table 3. The mean age of subjects who died from cardiovascular system-related diseases was 58.03 ± 15.38 years with a peak age in the seventh decade (60–69 years).

Of the 101 subjects who died from immune system/infections-related causes of natural deaths, 75.25% (76/101 subjects) and 14.85% (15/101 subjects) were due to sepsis and retroviral disease (RVD), respectively. Other less common causes of natural death from immune system/infections-related causes are as shown in Table 3. The mean age of subjects who died from immune system/infections-related causes was 46.26 ± 16.77 years with a peak age in the sixth decade (50–59 years).

Of the 64 subjects who died from gastrointestinal/hepatic system-related diseases, 35.94% (23/64 subjects), 35.94% (23/64 subjects), and 9.38% (6/64 subjects) were due to liver cirrhosis, peptic ulcer disease, and primary liver cell carcinoma, respectively. See Table 3 for other less common causes of natural death from gastrointestinal/hepatic system-related diseases. The mean age of subjects who died from gastrointestinal/hepatic system-related diseases was 52.69 ± 14.50 years with a peak age in the sixth decade (50–59 years).

Of the 38 subjects who died from respiratory system-related diseases, pneumonia was the most prevalent, and it accounted for 39.47% (15/38 subjects) of cases. Other causes of natural deaths from respiratory system-related diseases are as shown in Table 4. The mean age of subjects

who died from respiratory system-related diseases was 52.79 ± 17.09 years with a peak age in the seventh decade (60–69 years).

Of the 37 subjects who died from central nervous system-related diseases, cerebrovascular disease was the most prevalent, and it accounted for 48.65% (18/37 subjects) of cases. Other causes of natural death from central nervous system-related diseases are as shown in Table 5. The mean age of subjects who died from central nervous system-related diseases was 46.46 ± 17.87 years with a bimodal peak age in the third (20–29 years) and sixth decade (60–69 years).

Twenty-nine subjects died from endocrine/metabolic system-related diseases; diabetes mellitus accounted for about 75.86% (22/29) of the causes of natural deaths. See Table 4 for other causes of natural deaths from endocrine/metabolic system-related diseases. The mean age and peak age of subjects who died from endocrine/metabolic system related diseases were 56.90 ± 15.21 years and the fourth decade (30–39 years), respectively.

Twenty-one subjects died from haematological disorders. Anaemia with anaemic heart failure accounted for 57.14% (12/21) of the causes of natural death due to haematological disorders. See Table 5 for other causes of natural death from haematological disorders. The mean age and peak age of subjects who died from haematological disorder were 45.21 ± 14.98 years and the fifth decade (40–49 years), respectively.

Table 4: Causes of natural death

		Sex		Total
		Male	Female	
Respiratory system	Pneumonia	10	5	15
	Pulmonary tuberculosis	6	0	6
	Bronchial asthma	1	2	3
	Chronic obstructive airway disease	2	1	3
	Bronchogenic carcinoma	2	1	3
	Laryngeal carcinoma	2	0	2
	Pleural carcinoma	0	1	1
	Adult respiratory distress syndrome	0	1	1
	Interstitial pneumonia	1	0	1
	Lung abscess	1	0	1
	Lung metastasis	0	1	1
	Thoracic empyema	1	0	1
	Total	26	12	38
	Endocrine/metabolic system	Diabetes	12	10
Pancreatic carcinoma		2	4	6
Metabolic death		1	0	1
Total		15	14	29

Table 5: Causes of natural death

		Sex		Total
		Male	Female	
Genitourinary system	Renal disease	9	7	16
	Urethral carcinoma	0	1	1
	Total	9	8	17
Obstetric and gynaecological disorder	Ovarian carcinoma	0	3	3
	Uterine rupture	0	3	3
	Primary postpartum haemorrhage	0	3	3
	Carcinoma of the cervix	0	2	2
	Ruptured endometriotic cyst	0	1	1
	Cervical laceration	0	1	1
	Submucosa fibroid	0	1	1
	Prolonged obstructed labour	0	1	1
	Total	0	15	15
Central nervous system	Bacterial meningitis (meningoencephalitis)	7	1	8
	Brain tumour	5	4	9
	Cerebrovascular disease	12	6	18
	Cerebral abscess	0	2	2
	Total	24	13	37
Haematological	Anaemic heart failure	5	10	15
	Malignant lymphoma	2	0	2
	Disseminated intravascular coagulopathy	2	1	3
	Sickle cell disease	1	0	1
	Total	10	11	21
Miscellaneous	Soft-tissue sarcoma	0	2	2
	Malignant melanoma	2	0	2
	Carcinomatosis	2	4	6
	Breast cancer	0	1	1
	Total	4	7	11

Seventeen subjects died from urinary system-related diseases; diseases of the kidneys were the most common and accounted for 94.12% (16/17 subjects) of cases. Urethral carcinoma accounted for the remaining 5.8% (1/17 subjects). The mean age of subjects who died from urinary system-

related diseases was 55.59 ± 21.56 years with a peak age in the sixth decade (60–69 years).

Fifteen subjects died from obstetric and gynaecological disorder; causes of natural deaths from obstetric and

gynaecological disorder are as shown in Table 5. The mean age of subjects who died from obstetric and gynaecological disorders was 43.07 ± 13.50 years with a peak age in the fourth decade (30–39 years).

Under miscellaneous causes of natural deaths were carcinomatosis, soft-tissue sarcoma, malignant melanoma, and breast cancer accounting for 54.46% (6/11 subjects), 18.18% (2/11 subjects), 18.18% (2/11), and 9.09% (1/11), respectively.

Discussion

The purpose of performing postmortems includes but not limited to the determination of the exact cause of death and by extension the circumstances of death (the manner of death).^[22] To this end, medicolegal postmortems come handy.^[23] This type of postmortem is performed at the instance of the law with the coroners tasked with the responsibility of unravelling the exact cause of death, time of death, and the manner of death.^[6,17,18,22,24]

This study shows that the death from natural causes (44.24%) was less common than the unnatural deaths (55.76%). It is important to note that these findings were from coroner's postmortem examinations, the purpose of which is not primarily for the diagnosis of natural deaths but to ensure that unnatural deaths that are identified are properly categorised for medicolegal processing. The finding of natural deaths only comes after the details of the medicolegal postmortem examination. This finding is consistent with previous studies from this same environment by Aligbe *et al.*^[10] and Ugiagbe and Ugiagbe^[17] that reported that the unnatural deaths were more common than the natural death. The former and latter studies reported that natural deaths were 37.2% and 26.6% of medicolegal deaths, respectively. In the same vein, a previous studies from Ile Ife by Odesanmi, Port Harcourt by Etebu and Nwosu, Jos by Mandong *et al.* reported that unnatural deaths were far more common than the natural deaths that accounted for 11%–19.8% of cases in medicolegal postmortems.^[18,25,26] Unlike the observation of our own study, Akhiwu *et al.* from the same environment as our own research work, Amakiri *et al.* from the University College Hospital, Ibadan, Tiemensma and Burger from Cape Town, South Africa, and Murai *et al.* (Tokyo) reported that natural deaths were more common than the unnatural deaths accounting for 65.5%, 55.6%, 79.0%, and 75% of natural deaths, respectively.^[11,14,16,24] The disparity between the findings of this study and those of Akhiwu *et al.* and Amakiri *et al.* may be related to the duration of these studies and their sample sizes. We had a sample size of 530 cases over a 3-year study period, whereas Akhiwu *et al.* and Amakiri *et al.* had sample sizes of 3928 adults cases over 20 years duration and 785 adult cases over a 2-year period, respectively.^[11,24] Despite this explanation, it may also be an indication of a change in the trend on the manner of death in our own environment.

More males died from natural causes than females in this study. This observation is consistent with that of previous studies from Nigeria, Spain, and Turkey.^[6,10,11,15,18,20,24,27]

The cardiovascular system-related diseases were the most common causes of natural death in this study accounting for 37.2% of cases. This is consistent with previous studies done in Nigeria that reported that cardiovascular diseases were the most common causes of natural death.^[10,15,17-20] These studies reported that between 26.9% and 87.6% of cases of natural deaths were the consequences of cardiovascular system-related diseases. Azmak in Turkey and Murai *et al.* in Tokyo collaborated this finding in their respective studies that reported that about 55%–75% of their study population died from cardiovascular system-related fatalities.^[14,27] Hypertensive heart disease was the most common cause of natural deaths from cardiovascular system-related diseases in this study, accounting for 92.4% of cases. This is comparatively similar to the findings of Rotimi *et al.* in Ile-Ife and Akakpo *et al.* from Central Region in Ghana who reported previously from their studies that hypertensive heart disease accounted for 80%–83.5% of cardiovascular system-related mortalities.^[8,19,20] In the same vein, hypertension and its associated complications accounted for most cases of cardiovascular system-related deaths from other previous studies that were done in Nigeria.^[10,15,17,24] These studies reported that 54.7%–96% of deaths from cardiovascular-related causes were due to hypertension and its associated complications.^[10,15,17,24] Contrary to the findings of this study, previous studies from the developed world have documented myocardial infarction (ischaemic heart disease) as the most common cause of natural deaths in non-blacks from cardiovascular system-related causes^[12,14,28-30]; however, Tiemensma and Burger from Cape Town, South Africa, reported that ischaemic heart disease was the most prevalent cause of cardiovascular disease-related mortalities in their study.^[16] In this study, no case of ischaemic heart disease was seen, and the less common causes of natural deaths from cardiovascular system-related diseases include pericardial effusion, cardiomyopathies, pulmonary thromboembolism, and rheumatic heart disease. In the same vein, Ugiagbe and Ugiagbe reported that valvular heart disease and cardiomyopathies were less common findings in their study.^[17]

Diseases of immunity/infections were the second most common causes of natural death in this study, and it accounted for 19.1% of the study population. Previous studies in Nigeria have also shown infections to be the second most common cause of natural death in their respective studies.^[10,11,17] In this study, sepsis and RVD (HIV/AIDS) were the leading causes of death in this category, with the former more prevalent. Although Ugiagbe and Ugiagbe reported that HIV/AIDS was the most common cause of death in this category, sepsis (septicaemia) was a key in causing deaths in these patients.^[17] The retroviral

status of those patient who died of sepsis in this study was not known.

Gastrointestinal/hepatic diseases were the third most common cause of natural deaths observed in this study. It accounted for 12.1% of the study population. In the same vein, comparative similar figures of between 10.4% and 14.1% have been reported in Nigeria, Turkey, and Sri Lanka.^[11,17,27,31] Of these figures, Amakiri *et al.* in Ibadan, Ugiagbe and Ugiagbe in Benin City, Azmak in Edirne, Turkey, and Fernando in Sri Lanka reported that gastrointestinal/hepatic diseases accounted for 11.9%, 14.1%, 10.4%, and 13.6%, respectively, of natural deaths. In this study, liver cirrhosis and peptic ulcer disease were jointly the most common cause of gastrointestinal/hepatic diseases, each accounting for 36% of cases. Ugiagbe and Ugiagbe reported a comparative similar figure of 30.7% for liver cirrhosis, whereas peptic ulcer disease was observed in 20% of cases in this group.^[17]

Respiratory system disease was the fourth most common cause of natural death, and it accounted for 7.1% of the study population. Similarly, Ugiagbe and Ugiagbe reported that respiratory system disease was the fourth most common cause of natural deaths; however, it accounted for a relatively higher percentage of 12.5% in comparison to 7.1% in this study.^[17] Bacterial pneumonia and pulmonary tuberculosis were the most common causes of respiratory system disease, accounting for 39.5% and 15.8% of cases, respectively. Similarly, these two diseases were the first and second most common causes of respiratory system disease in a previous study from the same environment by Ugiagbe and Ugiagbe.^[17] In their work, bacterial pneumonia accounted for 55% of cases, whereas pulmonary tuberculosis accounted for 18% of cases.^[17] Azmak in Edirne, Turkey, and Escoffery and Shirley, Jamaica, reported that pneumonia was a common cause of natural death in their respective study.^[27,29] Death from respiratory system disease is common in developing countries because of a lack of adequate health care facilities amongst other reasons.^[17] Severe asthma was a rare cause of death in this study, an observation in agreement with the findings of previous studies from this same environment.^[17,24]

Central nervous system was the fifth most common cause of natural deaths in this study. Cerebrovascular disease was the most common cause of natural death in this category. This is consistent with the reports of Escoffery and Shirley in Jamaica.^[29]

Diseases of the endocrine system were the sixth most common cause of natural death in this study; deaths from diabetes mellitus-related complications were more dominant and accounted for 75.9% of cases. In the same vein, Ugiagbe and Ugiagbe reported that diabetes-related complications were responsible for a 100% death in this category.^[17] The westernisation of our diet and life style in sub-Sahara Africa have been attributed to the rise of

diabetes mellitus amongst other noncommunicable diseases (NCDs).^[10] Pancreatic adenocarcinoma was a rare cause of natural death in this study. This is similar to the findings of Ugiagbe and Ugiagbe who reported that 1.6% of causes of natural deaths were due to this tumour.^[17]

Haematological disorder, urinary system diseases, and obstetric and gynaecological disorders were relatively less common in this study, and they represent the seventh, eighth, and ninth causes of natural death in this study. Anaemia with complications of anaemic heart failure was the most dominant cause of death in those subjects with lymphoreticular system (haematological) disorder.

Renal disease accounted for the most cases of natural deaths from urinary system-related disorders. Pyelonephritis was the dominant cause of renal disease; this is consistent with the findings of Ugiagbe and Ugiagbe from the same environment.^[17]

Obstetrics and gynaecological disorders were rare causes of natural deaths in this study. Deaths resulting from maternal mortality though rare were the most prevalent, and they accounted for most of the cases in this category. Similarly, Amakiri *et al.* had previously reported a low frequency of maternal deaths amongst causes of natural death in their study.^[11]

Thirty-eight cases of natural death were due to malignant neoplastic lesion in this study. This constitutes 7.2% of the study population. This finding is comparatively similar to the observation of Ugiagbe and Ugiagbe who reported that 5.1% of their study population died from malignant neoplastic lesions.^[17] Primary liver cell carcinomas and pancreatic adenocarcinomas were jointly the most common primary malignant lesions observed in this study, each accounting for 15.8% of malignant neoplastic lesion. Similarly, Ugiagbe and Ugiagbe reported that these aforementioned malignant tumours were the most prevalent tumours in their study.^[17] These tumours together constitute about one-third of malignant lesions in this study; however, this figure is much higher as reported by Ugiagbe and Ugiagbe in their study.^[17] They reported that both tumours constitute about two-third of malignant lesions.^[17]

In conclusion, the mean and peak ages of natural deaths in this study fell in the middle ages, a considerable proportion of those who died from natural deaths were males, and the NCDs including cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes comprise a great majority of the causes of natural deaths. The World Health Organization (WHO) has documented that the prevention and investing in the management of NCDs are key components of NCD response that can be delivered through a primary health care approach to strengthen early detection and timely treatment, which are aimed at the sustainable development goal (SDG) target of a one-third reduction of premature death from NCDs by

2030.^[32] It is our desire that our health administrators would consciously tailor health policies to provide for the prevention and/or management of some of these causes of natural death such as hypertensive heart disease and diabetes mellitus in line with SDGs of the WHO. This is more so that the documentation of autopsy-based data such as these is important in the planning of medical services in a developing country.^[29]

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- Browne C, Dorries CP. Autopsies and the law. In: Burton JL, Ruddy GN, editors. *The Hospital Autopsy*. 3rd ed. London: Hodder Arnold; 2010. p. 26-38.
- Knight B. The forensic autopsy. In: Knight B, editor. *Forensic Pathology*. London: Edward Arnold; 1991. p. 2.
- Snohomish County, Washington*. Cause & manner of death. Available from: <https://snohomishcountywa.gov/31/County-Services>. [Last accessed on 12 Feb 2022].
- Regional Medical Examiner's Office, WC, Nevada*. What is the difference between cause of death and manner of death? Available from: https://www.washoecounty.us/coroner/faq/difference_cause_and_manner_of_death.php. [Last accessed on 12 Mar 2022].
- Akhiwu WO, Nwafor CC. Coroner autopsies originating from complaints to the police in a Nigerian urban centre. *Kasr Al Ainy Med J* 2015;21:11-5.
- Imasogie DE, Udoh M. The manner of death in a tertiary institution, a window to life expectancy: A retrospective post-mortem study. *Int J Med Sci Appl Biosci* 2019;4:10-9.
- Sanchez O, Campuzano O, Fernández-Falgueras A, Sarquella-Brugada G, Cesar S, Mademont I, *et al*. Natural and undetermined sudden death: Value of post-mortem genetic investigation. *PLoS One* 2016;11:e0167358.
- Akakpo PK, Imbeah EG, Agyarko-Wiredu F, Awlavi K, Baah-Amoh K, Derkyi-Kwarteng L. Community causes of death in the central region of Ghana, the missing piece in mortality data. *Adv Public Health* 2020;2020:1-6.
- Akinwusi PO, Komolafe AO, Olayemi OO, Adeomi AA. Pattern of sudden death at Ladoke Akintola University of Technology Teaching Hospital, Osogbo, South West Nigeria. *Vasc Health Risk Manag* 2013;9:333-9.
- Aligbe JU, Akhiwu WO, Nwosu SO. Prospective study of coroner's autopsies in Benin City, Nigeria. *Med Sci Law* 2002;42:318-24.
- Amakiri CN, Akang EE, Aghadiuno PU, Odesanmi WO. A prospective study of coroner's autopsies in University College Hospital, Ibadan, Nigeria. *Med Sci Law* 1997;37: 69-75.
- Kochanek KD, Murphy SL, Anderson RN, Scott C. Deaths: Final data for 2002. *Natl Vital Stat Rep* 2004;53: 1-115.
- Morentin B, Suárez-Mier MP, Aguilera B. Sudden unexplained death among persons 1-35 years old. *Forensic Sci Int* 2003;135:213-7.
- Murai T, Baba M, Ro A, Murai N, Matsuo Y, Takada A, *et al*. Sudden death due to cardiovascular disorders: A review of the studies on the medico-legal cases in Tokyo. *Keio J Med* 2001;50:175-81.
- Obiorah CC, Amakiri CNT. Systemic analysis of sudden natural deaths at Braithwaite Memorial Specialist Hospital, Port Harcourt, Nigeria. *Niger Health J* 2012;2:47-51.
- Tiemensma M, Burger EH. Sudden and unexpected deaths in an adult population, Cape Town, South Africa, 2001-2005. *S Afr Med J* 2012;102:90-4.
- Ugiagbe EE, Ugiagbe RA. Causes of sudden natural death: A medico-legal autopsy study of medical cases in an African Referral Centre. *East Afr Med J* 2012;89:332-8.
- Mandong BM, Manasseh AN, Manasseh AN, Ugwu BT. Medico-legal autopsies in North Central Nigeria. *East Afr Med J* 2006;83:626-30.
- Rotimi O, Ajayi AA, Odesanmi WO. Sudden unexpected death from cardiac causes in Nigerians: A review of 50 autopsied cases. *Int J Cardiol* 1998;63:111-5.
- Rotimi O, Fatusi AO, Odesanmi WO. Sudden cardiac death in Nigerians—The Ile-Ife experience. *West Afr J Med* 2004;23:27-31.
- Azeke TA, Imasogie DE. A review of primary malignant cutaneous soft tissue tumours seen in a tertiary institution. *Niger J Basic Clin Sci* 2019;16:134-6.
- Ngbea JA, Dzuachii OD, Nyaga T, Otene BS, Vhritherhire RA, Ayuba MD, *et al*. A 18 year retrospective review of medico-legal autopsies in Jos, North Central Nigeria. *J Dent Med Sci* 2015;14:91-5.
- Laws of Nigeria on birth and death registration; cap 20 of 1948.
- Akhiwu WO, Nwafor CC, Igbe AP. A 20 year retrospective analysis of medicolegal deaths in a tertiary hospital setting in Nigeria. *Niger J Clin Pract* 2013;16:535-9.
- Etebu EN, Nwosu SO. Medicolegal autopsies in University of Port Harcourt, Nigeria. *Niger J Orthop Trauma* 2003;2:33-5.
- Odesanmi WO. Forensic pathology in Nigeria: The Ife experience. *Med Sci Law* 1982;22:269-74.
- Azmak AD. Sudden natural deaths in Edirne, Turkey from 1984 to 2005. *Med Sci Law* 2007;47:147-55.
- Anekwe O, David H, Amarnath A, Linda W, Daniel R, Steven S, *et al*. Hypertensive vascular disease as cause of deaths in blacks versus whites, autopsy findings in 587 adults. *Hypertension* 1998;31:1070-6.
- Escoffery CT, Shirley SE. Causes of sudden natural death in Jamaica: A medicolegal (coroner's) autopsy study from the University Hospital of the West Indies. *Forensic Sci Int* 2002;129:116-21.
- Pérez-Cárceles MD, Noguera J, Jiménez JL, Martínez P, Luna A, Osuna E. Diagnostic efficacy of biochemical markers in diagnosis post-mortem of ischaemic heart disease. *Forensic Sci Int* 2004;142:1-7.
- Fernando R. A study of the investigation of death (coroner system) in Sri Lanka. *Med Sci Law* 2003;43:236-40.
- World Health Organization. Management of noncommunicable diseases. Available from: <https://www.who.int/activities/management-of-noncommunicable-diseases>. [Last accessed on 5 Jul 2022].