

Patterns and Trends of Mortality in Nigeria: A Tertiary Health Care Perspective in South-Eastern Nigeria

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Abstract

Background: Morbidity and Mortality analyses with an exposition on the patterns, trends, and frequencies are relevant parameters for documentation of the geographical burden of disease and for public health planning, involving essential health needs, assessing intervention programs, and the re-evaluation of health policies in any organized society, both in developed and developing countries worldwide. Of all mortality measures, the infant mortality rate is the most frequently used indicator of broad socioeconomic well-being. The general pattern occurs in all human populations; however, the precise configuration of the mortality schedule depends on both the level of mortality and the relative importance of different age-specific causes of death. The relative contributions of mortality at different ages (the age-related pattern of mortality) have important implications for policy formulation, for the allocation of resources, and for targeting interventions. **Aim:** To determine the burden on healthcare due to the major causes of death and their related patterns from our clinical reviews and death certifications of all cases of mortality in our teaching hospital in Uburu. **Result:** A total of 291 mortalities between March 2022 and June 2025 occurred in DUFUTH. Out of these, 34 (11.7%) cases were brought-in-dead (BID) to the hospital, while 257 (89.3%) cases were hospitalised patients. 118 (41%) and 173 (59%) were female and male, respectively. Cardiovascular causes of death ac-

counted for the highest proportion of all deaths in DUFUTH from March 2022 to June 2025. It accounted for 72 (24.7%), followed by neoplasms, which accounted for 54 (19%). Paediatric diseases accounted for 51 (17.5%), and respiratory pathology accounted for 14 (4.8%). Infective causes of death accounted for 15 (5.2%), while gastrointestinal deaths accounted for 9 (3.1%) and hepatobiliary deaths amounted to 11 (3.8%). Deaths due to metabolic diseases accounted for 7 (2.4%), and maternal mortality stood at 3 (1.0%); diseases of the central nervous system accounted for 2 (0.7%), trauma-causing deaths 14 (4.8%), and renal diseases 5 (1.7%), respectively. Stroke was the overall commonest cause of death, followed by prostatic carcinoma and sepsis. **Conclusion:** The invaluable insights into the patterns and nature of death provided in this research reawakened the need for targeted interventions to reduce mortality due to cardiovascular diseases, cancers, and all other implicated diseases in this research, as no man is immune to death. Understanding these patterns is a vital tool in developing effective public health policies and interventions in our locality, as well as the entire nation at large.

Keywords

Pattern of Death, Mortality, Brought-In Dead, Hospital Patients, Policy

1. Introduction

Morbidity and mortality analysis, with an exposition on patterns, trends, and frequencies, is a relevant parameter for documentation of the geographical burden of diseases and for public health planning, involving essential health needs, assessing intervention programs, and the re-evaluation of health policies in any organized society, both in developed and developing countries worldwide [1].

In addition, death analysis is a relevant tool for keeping track of the well-being of populations, as well as for effective health interventions to changes in disease epidemiology. It also serves as a tool for quality control in any healthcare facility. For instance, amenable mortality is an indicator of the national level of personal healthcare access and quality healthcare to the populace [2].

The mortality level of a society is closely linked to the health and well-being of the population. A resource-sufficient society is likely to experience lower mortality rates than one with little or no available resources. There are, however, countries with limited resources that attain lower-than-expected mortality levels due to cultural factors, institutions, and programs that mitigate the consequences of poverty.

Of all mortality measures, infant mortality rate is the most frequently used indicator of broad socioeconomic well-being. It stands as a basic measure of how well a society meets the needs of its people. However, in many developing countries, especially those in sub-Saharan Africa, about 50 percent of early childhood deaths occur after infancy, and the risk of dying is highest in the period immediately after birth, remains high but at a lower level through infancy, and drops fur-

ther until about age 10 to 15 years, after which mortality increases with increasing age [2]. This general pattern occurs in all human populations; however, the precise configuration of the mortality schedule depends on both the level of mortality and the relative importance of different age-specific causes of death. The relative contributions of mortality at different ages (the age pattern of mortality) have important implications for policy formulation, for the allocation of resources, and for targeting of interventions.

According to a United Nations report, Nigeria's health system is an inconsolable 187th out of 191 nations. Despite various reforms to increase the provision of healthcare to the Nigerian people, health access is only 43.3% [2]. The inadequacy of the healthcare delivery system in Nigeria could be attributed to the peculiar demographics of the Nigerian populace; about 55% of the population lives in rural areas and only 45% live in urban areas [2]. Nigeria's health outcome indicators are still unacceptably high, despite modest improvements.

The overall maternal mortality ratio in Nigeria is 814 per 100,000, and the mortality rates for infants and children under five years are 70 and 104 per 1,000 live births, respectively [2].

Communicable diseases still constitute a major public health problem in our locality, and a greater proportion of developing countries have mortality patterns that show a larger proportion of infectious diseases and the risk of death during pregnancy and childbirth, whereas cardiovascular diseases, chronic respiratory diseases, and cancers account for most deaths in the developed world [3].

Global projections of mortality and burden of disease up to 2030 have indicated a significant shift from infectious/communicable diseases to non-communicable diseases worldwide, and this transition is expected to affect developing countries like Nigeria [4]. Improving health around the world today is an important social objective, which has obvious advantages in terms of longer life expectancy and indirectly accelerating economic growth [3].

A significant disparity in health status exists across states, regions, and zones in Nigeria; this difference also exists across rural and urban dwellers, as well as among educated individuals and various social statuses. Recently, the flight of medical professionals out of the country has added to the burden of care, leading to the exhaustion of the few professionals on the ground. This has greatly affected the increase in mortality and morbidity in Nigeria, as a paucity of healthcare professionals currently exists in almost all healthcare facilities in Nigeria. For example, in Ile Ife, infection constitutes about 26.1% as the leading cause of death, followed by trauma, which is a 20.4% cause of mortality [3]. Findings in Abeokuta are similar, with a combination of malaria infestation and infectious diseases accounting for 18.3% as the leading cause of death, followed by diarrhea and gastroenteritis 8.5%, tuberculosis 7.8%, COVID-19 5.5%, and HIV 0.2% [3], respectively.

Disease morbidity serves as a direct effect of mortality in our locality, as disease burden tends to have a direct effect on mortality. The morbidity of malaria accounts for 27% of the global disease burden, and the devastating effects of TB and HIV are still very much felt in our locality.

In Maiduguri, Borno State, a state being troubled by terrorism, kidnapping, and other forms of violent deaths, 79.7% hospital deaths were recorded out of 713 deaths, and 20.3% were brought-in-dead cases. In these findings, male deaths slightly outnumbered female deaths, with a ratio of 1.2:1. The highest frequency of hospital deaths occurred in the age group of 30 - 39 years, while the age groups 50 - 59 and 60 - 69 had the highest frequency of brought-in-dead cases. In addition, chronic kidney disease served as the most frequent clinical condition associated with hospital deaths, while cardiopulmonary arrest was the most common condition for brought-in-dead cases, with hospital deaths more in April and brought-in-dead cases more in December than in any other month of the year [5].

Mortality rates in Northeastern Nigeria are among the highest in the country, with a recent study showing that the region accounts for more than half of all deaths due to violent conflict in Nigeria [5].

Nigeria recorded no fewer than 169,033 violent deaths between 2006 and 2021, with 2014 reporting the highest number (22,873) and Borno State being the most affected, followed by Lagos, Kaduna, Zamfara, Plateau, Delta, Benue, Rivers, and Adamawa. The highest number of deaths (51,425) was attributed to crime, followed by insurgency (50,252) and road crashes (27,645). Other significant causes of death were political issues (8324) and cattle grazing (5501) [6].

In Irrua Specialist Teaching Hospital, many terminally ill patients often end up in the ICU, with an overall ICU mortality rate of 49.2%. This was significantly associated with age, duration of admission, and type of case [7].

In Sagamu, Ogun State, a larger proportion of patients (75.0%) who had mechanical ventilation in the ICU died, compared to 25.0% who survived, and many medical conditions had high mortality rates, and outcomes were notably poor for mechanically ventilated patients [8].

In Enugu, the mortality rate during the study period was 34.1%, and this was significantly associated with patient age and the type of illness at presentation. Stratified by year of admission, the highest rate of mortality was noted in the year 2020 (46.7%). There was a high level of mortality among ICU admissions in Parklane [9].

The death rate in Ahmadu Bello University Teaching Hospital, Zaria, among admitted patients is 470 (9%) deaths among the 5193 admitted patients, with an age range of 15 - 92 years [10], while in Abakaliki, out of the 174 (male 113, female 71) patients admitted over 12 months, with a mean age of 46.31 ± 12.28 years, 40.8% of the patients died predominantly from stroke, acute abdomen, trauma, sepsis, renal failure, acute diabetic complications, and cancer, in descending order. Acute diabetic complications had a 100% case fatality rate, followed by stroke (71%), renal failure (62.5%), cancer (60%), sepsis (55.5%), acute abdomen (34%), and trauma (23%) [11]. The high mortality rate among ICU-admitted patients consisted mainly of stroke, acute abdomen, and trauma, which are essentially preventable if the health system is optimal.

The situation is not far-fetched in Delta State, where retroviral disease, stroke, heart failure, pulmonary tuberculosis, diabetes, and renal disease were recorded

as the common diseases leading to deaths for both males and females alike, at rates of 10.6% and 15.9% for females and males, respectively. The major causes of mortality were infectious diseases and circulatory disorders for both genders [12].

Worldwide, reports have shown that more than 40 million people die annually from NCDs, which account for 70% of global deaths; of these, more than 15 million die at a younger age [13]. Premature death also accounts for greater than 80% of the burden in low- and middle-income countries [14].

In the emergency department at FETHA, a total of 4270 patients were seen over the study period, with 184 deaths, giving a mortality rate of 4.31%. The mortality included 104 men and 80 women. The age range and mean age of the mortality were 20 - 108 years and 50.54 ± 12.42 years, respectively. Stroke accounted for 23% of the mortality. Others were heart failure, chronic liver disease, chronic kidney disease, diarrhoea disease, diabetes mellitus, and others, in descending order of frequency. When the causes of mortality were grouped according to the systems affected, neurological disorders accounted for about 30% of the mortality, while gastrointestinal, cardiovascular, respiratory, and renal disorders accounted for 17%, 14%, 10%, and 7%, respectively. Non-communicable diseases accounted for 70%, while communicable diseases accounted for 30% of the mortality [15].

In FMC Umuahia, of a total of 18,107 patients admitted, 2172 deaths, representing a 12% mortality rate and comprising 1230 (56.6%) males and 942 (43.4%) females, were recorded, with the most affected age range being the 25 - 44 years age group. The leading cause of death was infections, which accounted for 837 (37.6%) deaths. Other major causes were cardiovascular system-related deaths, 534 (24.7%), neonatal causes, 173 (8.0%), trauma, 155 (7.1%), diabetes mellitus complications, 144 (6.6%), and neoplasia, 76 (3.5%) [4].

In Aminu Kano University Teaching Hospital, the common morbidities and mortalities were neonatal sepsis, prematurity, and birth asphyxia among the 522 cases analyzed. The highest mortality (44.8%) occurred within 24 h of admission, and neonatal tetanus had the highest case fatality rate of 42.8%. The study concluded that neonatal sepsis, prematurity, and birth asphyxia were the major causes of morbidity among children. The mortality rate was high (13.2%), and tetanus had the highest case fatality rate [16].

It has been estimated that more than 4 million newborns die each year within the first 4 weeks of life, with 3 million of these deaths occurring in the early neonatal period. Unfortunately, 98% of these deaths occur in developing countries. Worldwide, in 2013, it was estimated that 6.3 million children died before their fifth birthday, and 44% of them died within the first 28 days of life [5]. In addition, 73% of all neonatal deaths occurred within the early neonatal period, with 36% occurring on the day of birth [16].

In developing countries, the risk of death in the newborn period is six times greater than in developed countries, and over 8 times higher in the least developed countries [2]. Africa has the highest risk of neonatal death, with a figure of 41 neonatal deaths per 1000 live births [2]. Nigeria has the highest neonatal death rate in Africa, with an

estimated 700 babies dying daily (around 30 every hour), and the second highest in the world. Hence, Nigeria contributes about 8% of the world's annual neonatal deaths [17]. Early neonatal deaths are due to obstetric complications, while intrapartum deaths are closely linked to place of delivery and care at delivery [2]. In most developing countries, about 40% of deliveries occur in health facilities, and few actually take place with the assistance of trained health personnel [16].

Nigeria alone contributed 23% of the global burden of maternal mortality in 2015 [18], and Nigeria was classified as having made "No progress" in reducing maternal mortality by the United Nations [18].

Surprisingly, autopsy practice continues to decline globally; therefore, analyses and reviews of clinical information and death certificates issued by doctors using the standards stipulated by the International Classification of Diseases (ICD-10) have become a major source of insight into mortality and morbidity in our population [1]. Essential hospital record-keeping by health information departments in our various health institutions has become another valuable source of mortality and morbidity records in Nigeria; hence, there is a need for an effective and efficient medical records department supported by an electronic medical record system in tertiary health facilities.

In most developing countries, more than half of all deaths occur outside hospitals. Since out-of-hospital deaths are rarely medically certified, most of the physician-certified deaths come from hospital deaths. Unfortunately, even in countries where hospital data are the only source of cause-of-death information, data quality is rarely evaluated [19].

To carry out a validation study of cause-of-death data collected in hospitals, we need a gold standard against which the hospital cause-of-death reports can be compared. While autopsy findings provide the ideal gold standard for cause-of-death evaluations, this approach is expensive, rarely applied, and likely to be based on a biased sample of deaths assigned to coroners. It would not be practical to carry out autopsies for all of the deaths occurring in a country, or even for all of the hospital deaths in a country. Instead, researchers have reviewed the medical records of people who have died in hospitals as a reference standard for validating the accuracy of the causes of death recorded by the hospitals [19].

Nigeria, just like many other developing countries with poor healthcare innovations and facilities, has continued to depend on non-autopsy, clinical diagnosis-based studies to evaluate mortality patterns [1]. Although this is difficult in many cases of brought-in-dead to the hospital, healthcare researchers, especially in developing countries, have continued to rely on clinical information and management to analyze causes of death in our locality due to shortcomings in relatives' giving consent to autopsy examinations of their diseased loved ones.

Globally, ischemic heart disease and stroke are the leading causes of death, accounting for a combined 15.2 million deaths in 2016, and have remained the leading causes of death year in and year out [2].

However, a greater proportion of developing countries have death patterns and

trends that favour infectious diseases as a leading cause and the risk of death during pregnancy and childbirth, whereas cardiovascular diseases, chronic respiratory diseases, and cancers account for most deaths in the developed world. Population-based data on patterns of morbidity and mortality are often lacking in developing countries; hospital-based patterns of morbidity and mortality often offer the best alternative [2].

The health system of a country needs to be adjusted to patterns of morbidity and mortality to mitigate the income-erosion consequences of prolonged ill-health and the premature death of adults. Population-based data on mortality by virtue of their cause of death are keys to modifying the health system of a country; unfortunately, these data are scarce, particularly for rural populations in developing countries like Nigeria.

Referral to the coroner under the Notifications of Deaths Regulations came into force in October 2019. These made it a legal requirement for certain deaths to be reported to the coroner. Briefly, a registered medical practitioner has a duty to notify the coroner if any death is suspected to be caused by poisoning, exposure to a toxic substance, use of a medicinal product, a controlled drug or psychoactive substance, violence, trauma or injury, self-harm, neglect (including self-neglect), the person undergoing a treatment or procedure of a medical or similar nature, an injury or disease attributable to any employment held by the person during the person's lifetime, unnatural death, death whose cause is unknown, death in custody, and unidentified deceased, etc. [3]

It is worrisome that global life expectancy continues to stagger, and this worsened with the COVID-19 pandemic in 2021, with the most significant decreases in life expectancy seen in subnational locations such as Mexico City, KwaZulu-Natal and Limpopo Provinces in South Africa; and countries including Peru and Bolivia [17]. Despite the devastating impact of this pandemic, the long-term view shows sustained global progress in reducing mortality worldwide, with life expectancy increasing by 22.7 years from 1950 to 2021 [17]. However, the COVID-19 pandemic underscores the fragility of health gains and highlights the need for continued vigilance and preparedness at all times.

In countries with developing and transitional economies, non-communicable diseases (NCDs), along with a few emerging and re-emerging diseases, such as malaria and tuberculosis, show increasing trends. Results of studies on mortality in South Asian countries indicated a transition in patterns of mortality with an increase in the share of NCDs [20]. This is also similar to findings in rural India and Bangladesh [20].

The World Health Organization (WHO) (2008) projected that NCDs, as well as injuries, both intentional and non-intentional injuries, would account for at least 7 of 10 deaths individually in developing countries and regions by 2020 [20]. Sadly, this projection is coming to reality, especially that of injuries, with the advent of industrialization and an increase in infrastructures like good roads and automobiles in our locality.

Most chronic NCDs, including diabetes and hypertension, require continuous care, which costs money that is scarcely available in developing countries. Unmet needs for medical care are critically higher for chronic illnesses than for acute illnesses in rural Bangladesh [20]. Most of these deaths in rural communities involve young adults who are predominantly breadwinners in their households. Thus, control of NCDs has an important role in alleviating poverty [20].

The incidence of home deaths, unwitnessed deaths, and brought-in-dead in most health facilities in developing countries is on the rise and, with the absence or decline in autopsy practices, has made analysis of these deaths very cumbersome, as the cause of death is scarcely arrived at in these conditions without autopsy. In Bangladesh, 90% of deaths in rural areas occurred in the home and had no death certificates from which one could derive the cause of death [20]. The cause of death is often determined by verbal narratives provided by relatives who are often not present during the terminal events of their lives, especially for aged patients and people who live in isolation.

However, in most developing countries, where registration of deaths is far-fetched and real autopsies are not feasible, verbal autopsy (VA) is a surrogate for population-based death certification to derive cause of death; nevertheless, this is also hardly done in our localities. Studies in India, China, and South Africa validated VA for the assessment of COD for adults and the elderly, and concluded that VA-derived COD is reliable with respect to the broader cause categories [20]. In Bangladesh, where registration of deaths is incomplete and death certification does not exist, VA is a practical low-cost option to generate population-based death certificates and COD [20].

In 2004, an estimated 58.8 million deaths occurred globally, of which 27.7 million were among females and 31.1 million among males, and, of every 10 deaths, six were due to non-communicable conditions; three were due to communicable, reproductive, or nutrition-related conditions; and one was due to injuries [20].

The number of deaths from ischaemic heart diseases (IHD) and cerebrovascular disease has decreased over time. IHD and strokes remain the leading causes of death in males, regardless of countries' incomes.

Causes of death in females are often asymmetrical and sometimes depend on the country and population of studies. In some developed regions like England, because of longevity and an increase in the population of aged people, the number of deaths caused by dementia and Alzheimer's disease is gradually becoming the leading cause of death, accounting for 16.5% of all female deaths in 2018 [21].

Measuring how many people die each year and why they died, along with measuring how diseases and injuries are affecting people, is one of the most important means for assessing the effectiveness of a country's health system. Cause-of-death statistics help health authorities determine the focus of their public health actions. They may be used to determine which preventive and medical curative measures, or which focus on research, might increase the life expectancy of the population [22].

Circumstances surrounding death have changed drastically over the past 50 years.

However, studies show that the leading causes of death differ depending on the countries' income. Lower respiratory infections were among the leading causes of death across all income groups. Non-communicable diseases (NCDs) caused 70% of deaths globally, ranging from 37% in low-income countries to 88% in high-income countries [22].

In some places, one in three deaths was due to communicable diseases, nutritional deficiencies, and health problems in pregnant women, new mothers, fetuses, or newborns. More than half (52%) of all deaths in low-income countries in 2010 were caused by conditions, which included communicable diseases, maternal causes, conditions arising during pregnancy and childbirth, and nutritional deficiencies [22]. In Iraq, it was reported that the leading causes of death for age groups 5 years and over were cardiovascular diseases, cancer, renal diseases, respiratory diseases, and diabetes. For age groups under 5 years, diarrheal diseases, respiratory infections, other communicable diseases, and congenital malformations represent major causes of death [22]. There is clear evidence that cardiovascular diseases have been the leading cause of death since the 1970s. Major achievements were made in reducing child mortality during the sixties and seventies; the infant mortality rate fell from about 117 per 1000 live births in 1960, to 90 in 1970, 80 in 1974, around 40 deaths per 1000 live births in 1989, and about <40 per 1000 live births in 2006 [22]. Therefore, irrespective of the country and whether autopsy practice is acceptable or not, all deaths should be registered; unfortunately, registration is not universal and death certification is not accurate.

2. Problem Statement

In developing countries such as Nigeria, limited resources require that health priorities be selected wisely, and death-related research is clearly warranted [23]. Hence, this study is aimed at bridging this gap by reviewing comprehensive data on mortality in David Umahi Federal University Teaching Hospital, Uburu, Ebonyi State, so as to develop the death pattern and common causes of death in our locality for effective health resource allocation and policy formulation.

3. Aim

The aim of this study was to determine the burden on healthcare facilities due to major causes of death patterns from our clinical reviews and death certification of all cases of mortality in our teaching hospital in Uburu.

Objectives

- 1) To determine the social demography of all mortality cases in DUFUTH.
- 2) To determine the pattern and causes of death of all cases of mortality in David Umahi Federal University Teaching Hospital between 2022 and 2025.

4. Materials and Methods

4.1. Study Design

This was a descriptive, cross-sectional, retrospective study that analyzed the cases

of mortality in David Umahi Federal University Teaching Hospital, Uburu.

4.2. Study Area

This study was conducted at David Umahi Federal University Teaching Hospital, Uburu, Ebonyi State, Nigeria. DUFUTH is a 500-bed capacity tertiary healthcare institution with active clinics and wards, respectively. It is generally stratified into a health care service department and administration, with effective mortuary services.

4.3. Study Population

Patients who were admitted or died (while in admission) from March 2022 to June 2025 were included in the study. More so, it is pertinent to note that mortalities following labour and delivery were part of the study population, including patients brought in dead (BID) to the hospital.

Data collection

Causes of death were retrospectively extracted from the health records department as well as the mortuary unit of the Anatomic Pathology department of the hospital, where they are coded based on the International Classification of Diseases-10 (ICD-10). This is the globally recognized system for coding and classifying diseases and health issues.

Inclusion criteria and exclusion criteria.

All inpatient, emerging deaths, and BID cases were included.

All cases with poor documentation and missing records were excluded, and in cases of double admission and readmission, only one entry of admission was included in the study.

The various ICD classifications were allotted by the staff of the health records department. The data are usually updated daily via outgoing and returning patient case notes (folders). The data entry into a spreadsheet from the original report book was performed with the assistance of trained research assistants.

4.4. Data Analysis

Statistical analysis of data generated in this study was entered and analyzed using SPSS version 22 (IBM Corp., Armonk, NY, USA). Frequencies and percentages were used to represent the categorical variables. Pearson chi-square test was used to assess association between variables.

Ethical clearance and approval

Ethical approval was sought and obtained from the Research and Ethics Department of David Umahi Federal University Teaching Hospital, Uburu.

5. Results

5.1. General Result

DUFUTH recorded a total of 291 mortalities between March 2022 and June 2025 out of 2610 admissions within the study period, giving a mortality rate of 11.1%.

Out of the 291 mortalities, 34 (11.7%) cases were brought in dead (BID) to the hospital, while 257 (89.3%) cases were managed at various wards and departments in the hospital before their death (**Figure 1**).

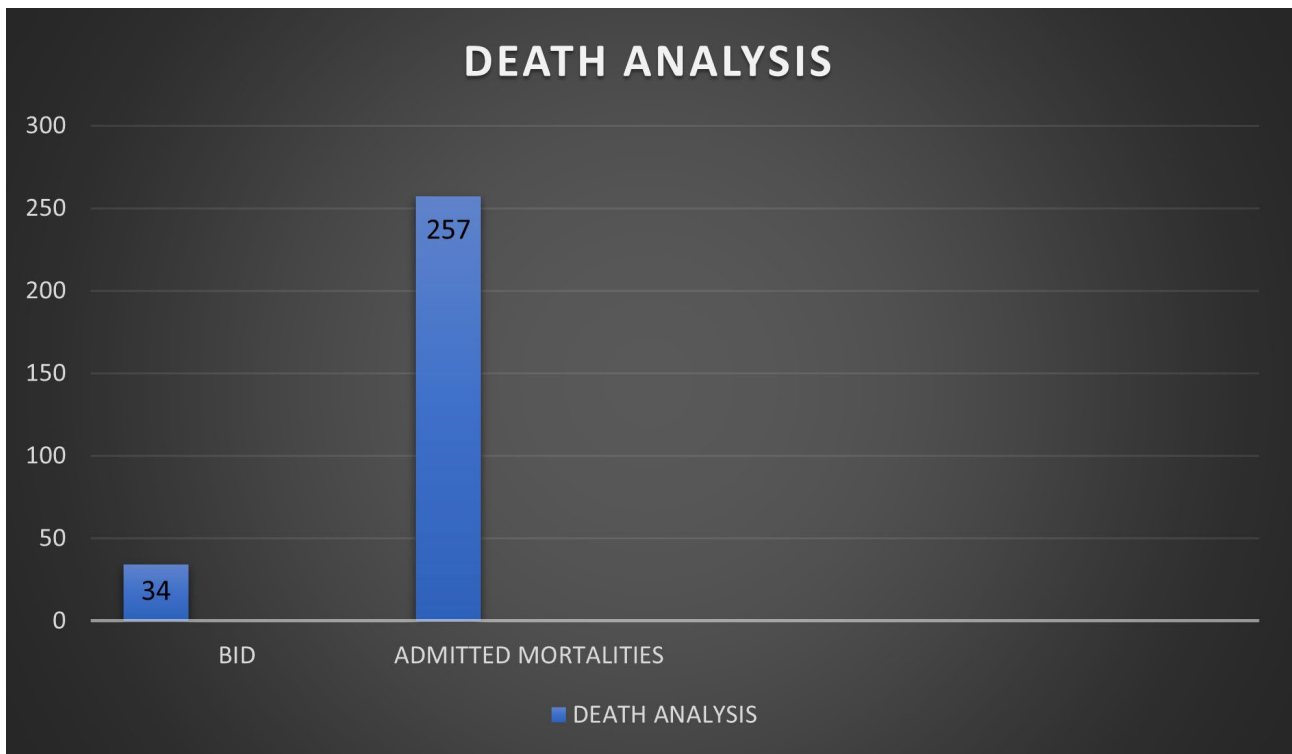


Figure 1. Showing the number of admitted mortalities vs. cases that were brought in dead into the hospital within the study period.

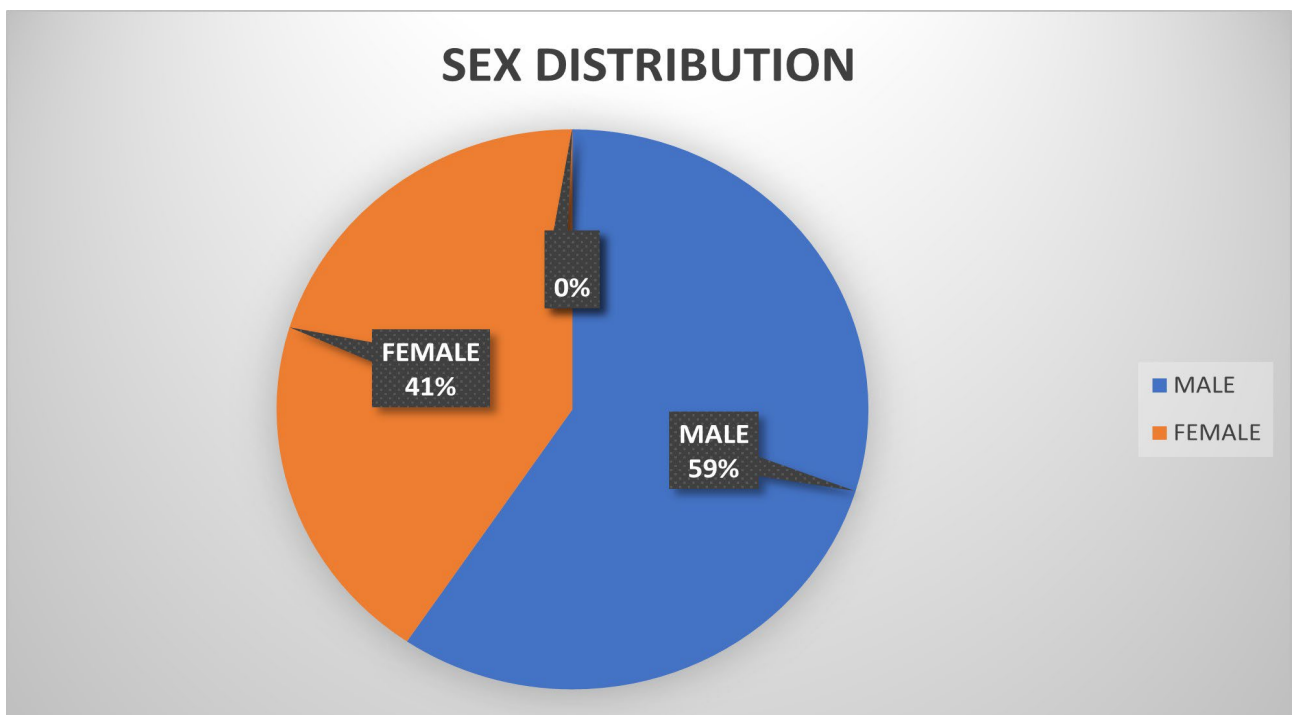


Figure 2. Showing the sex distribution of the cases of mortality.

5.2. Deaths by Sex Distribution of Mortalities

Out of the 291 cases of mortality recorded, 118 (41%) and 173 (59%) were of female and male distribution, respectively (**Figure 2**).

5.3. Death by Age Distributions

The age distribution of the mortalities is shown in **Table 1** below. It displays ages 71 and above (elderly) having the highest number of mortalities, amounting to 56 (19.2%), followed by ages 41 - 50, 45 (15.5%), and 31 - 40, 42 (14.4%). Ages 61 - 70 and ages 51 - 60 have 30 (10.3%) and 39 (13.4%) of the mortalities, respectively.

Table 1. Showing age distribution of the mortalities.

AGE RANGE	NUMBER	PERCENTAGE
0 - 10	39	13.4
11 - 20	12	4.2
21 - 30	17	5.8
31 - 40	42	14.4
41 - 50	45	15.5
51 - 60	39	13.4
61 - 70	30	10.3
71 AND ABOVE	56	19.2
NO DOCUMENTED AGE	11	3.8
TOTAL	291	100

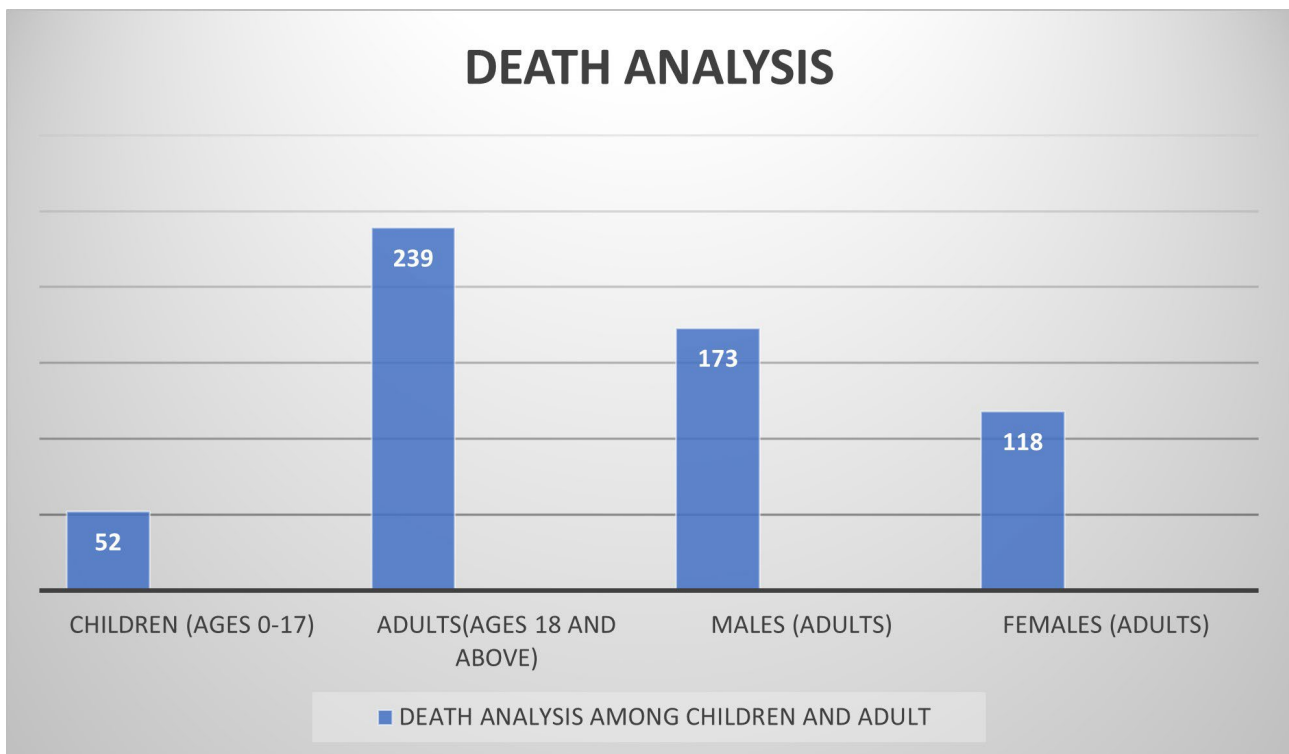


Figure 3. Showing death analysis between children and adults.

Ages 0 - 10 have 39 (13.4%), ages 11 - 20 have 12 (4.2%), and ages 21 - 30 have 17 (5.8%); 11 (3.8%) had no age documentation in their archival record.

5.4. Death Analysis among Children vs. Adults

Among the deaths, 52 (17.5%) were children aged 0-17 years, while 239 (82.5%) were adults. Among the adult population, 113 (54%) were males, while 96 (46%) were females. (Figure 3)

5.5. Summary of the Causes of Death by the ICD-10 Systematic Approach

Cardiovascular diseases, as causes of death, accounted for the highest number of deaths in DUFUTH from March 2022 to June 2025. They accounted for 72 (24.7%). This was closely followed by deaths due to neoplasms, which accounted for 54 (19%). Paediatric diseases accounted for 52 (17.5%), and respiratory pathology accounted for 14 (4.8%). Infective causes of death accounted for 15 (5.2%), while gastrointestinal deaths accounted for 9 (3.1%) and hepatobiliary deaths amounted to 11 (3.8%). Deaths due to metabolic diseases accounted for 7 (2.4%), maternal mortality stood at 3 (1.0%), diseases of the central nervous system 2 (0.7%), trauma-causing deaths 14 (4.8%), renal diseases 5 (1.7%), and BID 34 (1.7%), respectively. (Figure 4)

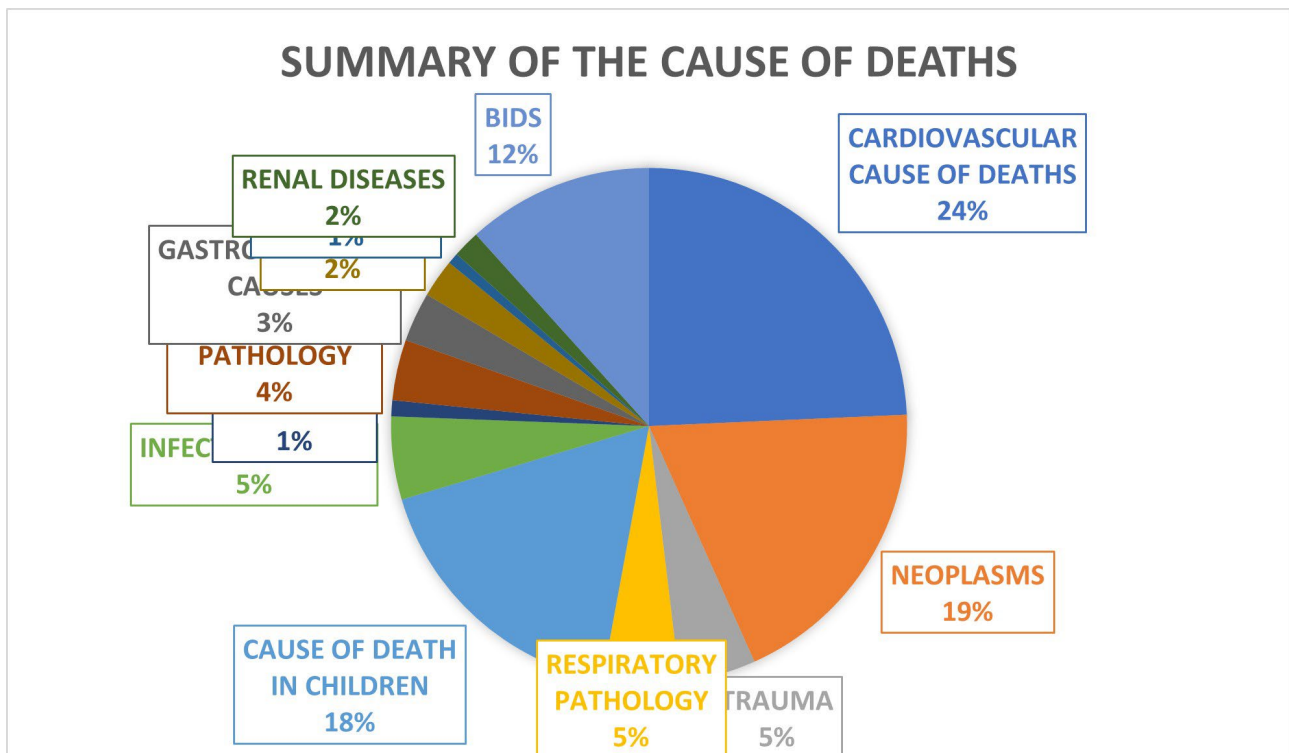


Figure 4. Showing the summary of causes of mortality analysis by systemic diseases

5.6. In Decreasing Order, the First 14 Most Common Diseases Causing Death in Dufuth

See Table 2.

Table 2. Showing the first fifteen causes of death in decreasing order.

DISEASES	NUMBER	PERCENTAGES
CEREBRO-VASCULAR ACCIDENT (STROKE)	34	11.6
NEONATAL SEPSIS	18	6.2
PROSTATIC CARCINOMAS	18	6.2
SEVERE SEPSIS (ADULT)	18	6.2
SEVERE MALARIA	16	5.5
CONGESTIVE CARDIAC FAILURE	12	4.1
HYPOVOLAEMIC SHOCK	11	3.7
BREAST CARCINOMAS	11	3.7
HEPATIC ENCEPHALOPATHY	9	3.1
TRAUMATIC HEAD INJURY	8	2.7
PULMONARY TUBERCULOSIS	7	2.4
LIVER CANCERS	6	2.1
DIABETIC FOOT GANGRENE	5	1.7
CHRONIC KIDNEY DISEASES	5	1.7

5.7. Details of Systemic Analysis of Causes of Death

Cardiovascular Diseases: Causes of Death

Among the cardiovascular causes of death, deaths due to cerebrovascular accident (stroke) were the highest, accounting for 11.6% out of 24.72% of all the mortalities due to cardiovascular causes. These were closely followed by hypovolemic shock and congestive cardiac failure, amounting to 3.8% and 4.1% each, respectively. Post-operative cardiac arrest accounted for 2.1%, while myocardial infarction and hypertensive emergencies accounted for 1.8% and 1.7%, respectively (**Table 3**).

Table 3. Showing the analysis of deaths due to cardiovascular diseases.

CAUSES OF DEATH	NUMBER	PERCENTAGES
HYPOVOLEMIC SHOCK	11	3.8
CONGESTIVE CARDIAC FAILURE	12	4.1
POST-OPERATIVE CARDIAC ARREST	6	2.1
CEREBROVASCULAR ACCIDENT	34	11.6
MYOCARDIAL INFARCTION	4	1.8
HYPERTENSIVE ENCEPHALOPATHY	5	1.7
TOTAL	72	24.7

5.8. Analysis of Neoplasm/Malignancy: Cause of Death

Death due to neoplasm accounted for 19% of all mortalities, and death due to prostatic carcinoma was the highest cause of death, which accounted for 6.2%. This was followed by breast cancers, which accounted for 3.8% (11 deaths). Liver

cancer is the third most common cause of cancer deaths, accounting for 2.1% (6 deaths), while this was closely followed by intracranial meningioma 1.4% (4 deaths). Cases of Leiomyosarcoma, Fibrosarcoma of the spine, gastric cancer, colon cancer, lymphoproliferative disorder, bronchogenic carcinoma, and metastatic angiofibrosarcoma all stood at 0.34% (1 death) respectively. Osteosarcoma, cervical cancer, nasopharyngeal carcinoma, and endometrial cancer had a frequency of 1.7% (2 deaths) per case, respectively. (**Table 4**)

Table 4. Showing the causes of death among malignant neoplasms.

CAUSE OF DEATHS	NUMBER	PERCENTAGES
LEIOMYOSARCOMA	1	0.34
BREAST CA	11	3.8
LIVER CA	6	2.1
ANGIOFIBROMSARCOMA OF THE SPINE	1	0.34
OSTEOSARCOMA	2	0.7
PROSTATIC CA	18	6.2
GASTRIC CA	1	0.34
COLON CA	1	0.24
CERVICAL CA	2	0.7
NASOPHARYNGEAL CA	2	0.7
LYMPHO PROLIFERATIVE DISORDER	1	0.34
Intracranial Meningioma (WHO Grade 2).	4	1.4
BRONCHOGENIC CARCINOMA	1	0.34
METASTATIC ANGIOFIBROMA	1	0.34
ENDOMETRIAL CA	2	0.7
LYMPHOPROLIFERATIVE DISORDER	1	0.34
TOTAL	54	19%

Table 5. Showing causes of death among the traumatic causes.

CAUSES OF DEATH	NUMBER	PERCENTAGES
C4 TRAUMATIC MYOPATHY	1	0.3
SPINAL CORD INJURY	2	0.7
SCROTAL TRAUMA	1	0.3
BRAIN STEM INJURY	1	0.3
HEAD INJURY	4	1.5
TRAUMATIC BRAIN INJURY	2	0.7
MULTIPLY INJURED PATIENT	2	0.7
BURNS	1	0.3
TOTAL	14	4.8%

5.9. Traumatic Causes of Death

Traumatic deaths accounted for 4.8% of all the mortalities, and head injury was the highest cause of traumatic death, accounting for 1.5%, while spinal cord injury, scrotal trauma, and burns were the lowest causes of traumatic death, accounting for 0.7% respectively. Deaths due to C4 traumatic myopathy, scrotal trauma, brain stem injury, and burns all accounted for 0.35% accordingly. (Table 5)

5.10. Respiratory Causes of Death

Deaths due to respiratory pathologies accounted for 4.8% of all deaths, and pulmonary tuberculosis was the highest cause of death, accounting for 1.9%, followed by pulmonary embolism, which accounted for 1.1%. See Table 6 for the distribution.

5.11. Causes of Death in Children

Mortality in children accounted for 17.9% of all deaths, and neonatal sepsis ac

Table 6. Showing causes of death among the respiratory diseases.

CAUSE OF DEATHS	NUMBER	PERCENTAGES
BRONCHOPNEUMONIA	1	0.3
ASPIRATION PNEUMONIA	1	0.3
PULMONARY TUBERCULOSIS	5	1.9
PULMONARY EMBOLISM	3	1.1
LOBAR PNEUMONIA	1	0.3
CHRONIC OBSTRUCTIVE PULMONARY DISEASES (COPD)	1	0.3
ATYPICAL PNEUMONIA	1	0.3
COR PULMONALE	1	0.3
TOTAL	14	4.8

Table 7. Showing causes of death among children.

CAUSES OF DEATH	NUMBER OF CASES	PERCENTAGES
NEONATAL SEPSIS	14	4.8
ANAEMIC HEART FAILURE	10	3.5
PERI NATAL ASPHYXIA	5	1.8
ACUTE GASTROENTERITIS	3	1.1
LOW BIRTH WEIGHT	1	0.3
SEVERE MALNUTRITION	1	0.3
MALARIA	14	4.8
CEREBRAL MALARIA	2	0.7
FEBRILE SEIZURE	1	0.3
ACUTE WATERY DIARRHEA	1	0.3
TOTAL	52	17.9

counted for 4.8%, which was the commonest cause of death in children. This was followed by anaemic heart failure, accounting for 3.5%. See **Table 7** for the distribution.

5.12. Infective Causes of Death

Deaths due to infective processes amounted to 5.2% of all mortalities, with sepsis being the most common cause, accounting for 2.2%. This was followed by diabetic mellitus foot ulcer, accounting for 1.4%. See **Table 8** for the distribution.

Table 8. Showing causes of death among infective causes.

CAUSES OF DEATH	NUMBER OF CASES	PERCENTAGES
HIV	2	0.7
SEPSIS	6	2.2
GLUTEA ABSECESS	1	0.3
Diabetic Mellitus Foot Ulcer	4	1.4
DENTAL ABSCESS	1	0.3
SEVERE MALARIA	1	0.3
TOTAL	15	5.2

5.13. Maternal Mortality

Maternal mortality accounted for 0.9% of deaths in DUFUTH. See **Table 9** for the distribution.

Table 9. Showing the causes of deaths among maternal mortality causes.

CAUSES OF DEATH	NUMBER OF CASES	PERCENTAGE
PRE ECLAMPSIA	1	0.3
ECTOPIC PREGNANCY	1	0.3
RUPTURED UTERUS	1	0.3
TOTAL	3	0.9

5.14. Hepatobiliary Pathology

Hepatobiliary pathology accounted for 3.8% of all deaths, with hepatic encephalopathy due to chronic liver disease as the commonest cause of hepatobiliary death, accounting for 3.2%. See **Table 10** for the distribution.

Table 10. Showing the causes of death among hepatobiliary causes.

CAUSES OF DEATH	NUMBER OF CASES	PERCENTAGES
Hepatic Encephalopathy with CLD	9	3.2
HEPATITIS	1	0.3
CIRRHOSIS	1	0.3
TOTAL	11	3.8

5.15. Gastrointestinal Causes of Death

Gastrointestinal diseases accounted for 3.1% of all deaths, and gastroenteritis and intestinal obstruction were the commonest gastrointestinal causes of death, accounting for 0.8% respectively (Table 11).

5.16. Metabolic Diseases

Metabolic cause of death accounted for 2.4% of all deaths, and Hyperosmolar Hyperglycaemic State and Hypoglycaemic coma, diabetic emergencies, were the commonest causes of death, accounting for 0.75%. See Table 12 for the distribution.

5.17. Diseases of the Central Nervous System

Diseases of the central nervous system accounted for 0.7% of the overall cases of mortality. See Table 13 for the distribution.

Table 11. Showing causes of death among gastrointestinal causes.

CAUSES OF DEATH	NUMBER OF CASES	PERCENTAGES
PEPTIC ULCER DISEASE	1	0.3
TYPHOID PERFORATION	1	0.3
INTESTINAL OBSTRUCTION	2	0.8
GASTROENTERITIS	2	0.8
PERFORATED DUODENAL ULCER	1	0.3
LOWER GGASTOINTESTINAL BLEEDING	1	0.3
GASTRIC OUTLET OBSTRUCTION	1	0.3
TOTAL	9	3.1

Table 12. Showing causes of deaths among metabolic causes.

CAUSES OF DEATH	NUMBER OF CASES	PERCENTAGES
TYPE 2 DM	1	0.3
HHS	2	0.75
HYPOGLYCEMIC COMA	2	0.75
DKA	1	0.3
METABOLIC SYNDROME	1	0.3
TOTAL	7	2.4

Table 13. Showing causes of death among CNS causes.

CAUSES OF DEATH	NUMBER OF CASES	PERCENTAGES
LUMBAR SPONDYLOSIS	1	0.8
PSYCHOTIC DISORDER	1	0.8
TOTAL	2	0.7

5.18. Diseases of the Renal System

Chronic kidney disease was the only renal cause of death, and it accounted for 1.7% of the overall frequency of death. See [Table 14](#).

Table 14. Showing causes of death from the renal system.

CAUSE OF DEATHS	NUMBER OF CASES	PERCENTAGES
CHRONIC KIDNEY DISEASES	5	2.1
TOTAL	5	1.7

5.19. Brought-In-Dead (BID) Cases

11.7% of deaths were unwitnessed deaths, and, as such, the causes of death could not be determined without autopsy. See [Table 15](#).

Table 15. Showing BID cases.

CAUSES OF DEATH	NUMBER OF CASES	PERCENTAGES
BROUGHT IN- DEAD	34	11.7
TOTAL	34	11.7

5.20. BID vs. Managed Cases

See [Table 16](#).

Table 16. Showing BID and admitted cases.

	Number of cases	Percentages	MALE	FEMALE
BID	34	11.7	24	10
ADMITTED CASES	257	88.3	149	108
TOTAL	291	100%	173 (59.3%)	118 (40.7%)

5.21. Analysis of Deaths by Year

The year 2024 recorded the highest number of deaths, amounting to 47.4% of all deaths. This was closely followed by the year 2023, recording 31.3%, while from January to June 2025, 17.9% was recorded. The year 2022 recorded 3.4%. The number of deaths was more common in males in both 2024 and 2025, while 2023 and 2022 recorded higher female deaths than males. ([Figure 5](#))

5.22. Analysis of Deaths by Time of Day

In 2023 and 2024, most deaths occurred in the evenings between 5:00 - 11:00 pm, whereas in 2025 the highest number of deaths was recorded in the morning (12:00 am - 12:00 noon). The lowest number of deaths in 2023 was recorded in the morning, while 2024 recorded the fewest deaths at night and 2025 recorded the fewest in the afternoon. See [Table 17](#).

5.23. Analysis of Death by Tribe

Among all recorded deaths, 96.5 percent were Igbos, while non-Igbos were 3.5 per-

cent. See **Table 18**.

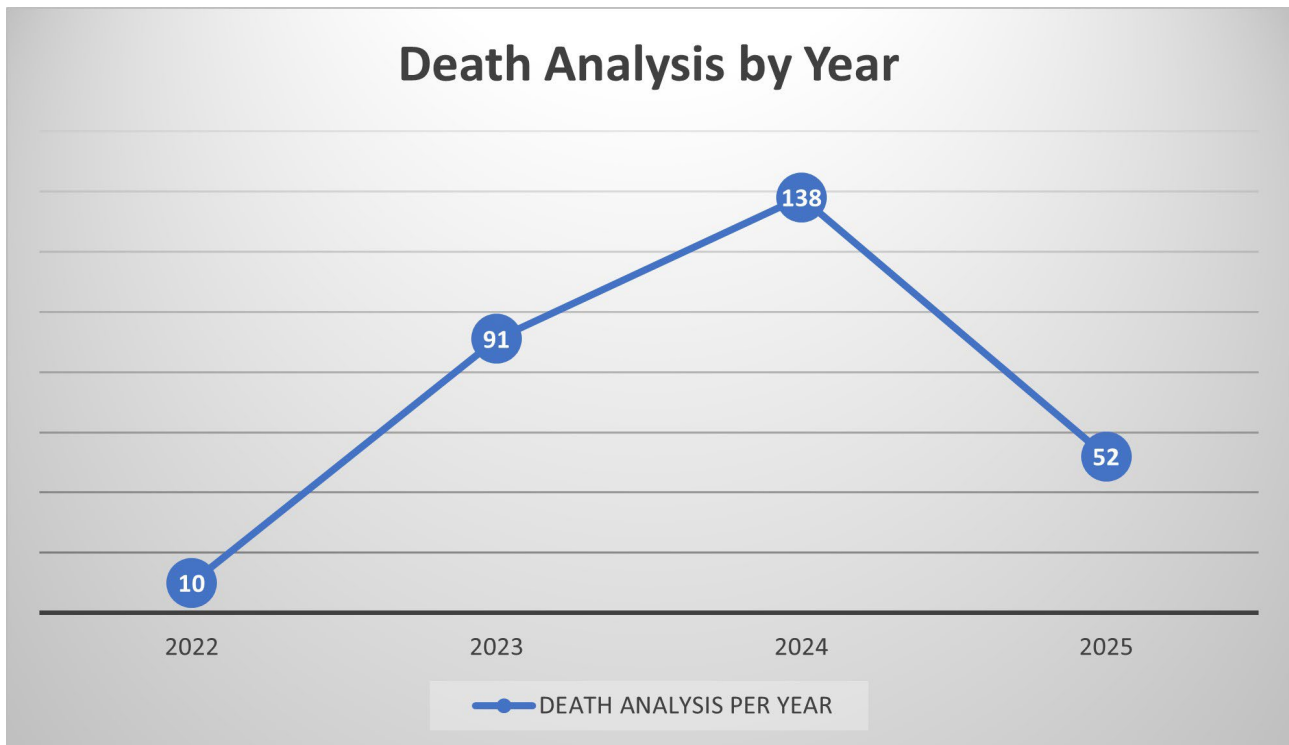


Figure 5. Showing trends of mortality over the study period.

Table 17. Showing the analysis of deaths according to time of day.

YEARS	MORNING (12AM - 12NOON)	AFTERNOON (12NOON - 5PM)	EVENING (5PM - 11PM)	MIDNIGHT (11PM - 12AM)
2023	19	15	23	19
2024	46	37	52	4
2025	23	7	7	10
TOTAL	88 (30.2%)	59 (20.3%)	99 (34.0%)	45 (15.5%)

Table 18. Showing the distribution of deaths by tribes.

TRIBES	NUMBERS	PERCENTAGE
IGBOS	281	96.5
Non-Igbos (Benue, Calabar, Plateau, Kogi, and Akwa Ibom)	10	3.5
TOTAL	291	100

Table 19. Showing the mortalities by locations of the patients.

LOCATION/ADDRESS	NUMBER	PERCENTAGES
EBONYIANS	246	84.5
NON-EBONYIANS	45	15.5
TOTAL	241	100

5.24. Analysis of Death by Location

The majority of deaths (84.5%) were among Ebonyians, while non-Ebonyians accounted for the remaining 15.5%. See **Table 19**.

6. Discussion

This study systematically analyzed the causes of deaths in a span of a 4-year period at David Umahi Federal University Teaching Hospital, Uburu, Ebonyi State. It is a hospital-based study that can provide a very important tool for healthcare planning and policy development by relevant authorities in order to re-appropriate priorities in keeping with current realities of our health sectors nationally.

Thus, the findings of this study inarguably revealed that 24.7% of the overall mortalities during the 4-year period were due to diseases of the cardiovascular system. This was closely followed by 19% of mortalities attributed to various malignant neoplasms. No doubt, DUFUTH is a hub within the southeast for the management of malignant neoplasms, as the center is equipped with a functional linear accelerator and equipment for brachytherapy, which are used for radiotherapeutic management of all kinds of cancers, especially inoperable ones. Patients from all walks of life come to DUFUTH for the management of various cancers due to the availability of radiotherapy; therefore, it is not surprising that malignant neoplasms recorded a significant percentage in the ranking of mortalities in our centre. Findings in Port Harcourt by Oyiora *et al.*, Nwanfor *et al.* in FMC Umuahia, and Chukwuemeka O. Eze in Abakaliki tally with the findings of this research, depicting cardiovascular diseases as the leading cause of death in our localities. This represents a sharp deviation from what was previously known over the years, as infectious diseases (communicable diseases) had taken centre stage in causing mortalities, whereas non-communicable diseases like cardiovascular disease are now taking over from communicable ones [1] [4] [11]. Global projections of mortality and burden of disease up to 2030 have indicated a significant shift from infectious/communicable to non-communicable diseases worldwide, and this transition is expected to affect developing countries like Nigeria [4]. On the contrary, studies done in Calabar by Henshaw *et al.*, Abeokuta by Ahmed AKII *et al.*, and Bello *et al.* in Zaria documented infectious diseases as the leading cause of death [2] [3] [10]. It suffices to note that there is no universal cause of death in Nigeria, as various centre-based studies have recorded different leading causes, ranging from cardiovascular diseases, chronic kidney disease, and infectious diseases to, in some places, trauma. These variations depend on geographical location, level of civilization, economic empowerment, and improved healthcare, all of which serve as important w factors that determine the cause of death in various localities.

Infectious diseases stood at a distant 6th [5.2%] position among causes of death in this study. Surprisingly, although DUFUTH is located in a remote village with poor access to basic amenities, infection remains not the main issue when it comes to mortalities and morbidities. This may be due to early presentation, availability of necessary antibiotics, and specialized health personnel available in the teaching

hospital to adequately combat infectious cases whenever they arise. Cardiovascular diseases, malignant neoplasms, diseases of childhood, and trauma come far above infection in the mortality profile of DUFTH patients.

Among the cardiovascular diseases, cerebrovascular accident (stroke) stood highest with a prevalence of 11.6%, followed by congestive cardiac failure accounting for 4.1%, while hypertensive encephalopathy, accounting for 0.4%, came the least in the ladder of cardiovascular death. All over the world, cardiovascular diseases remain the leading cause of death, predominantly in the Western world, and CVA remains one of the commonest causes of cardiovascular death. Much literature [8] [11] [12] [15] [17] [20]-[22] has reported the widespread occurrence of CVA-defining deaths across the globe as a major part of the non-communicable diseases, serving as the leading cause of death globally. Although infective cases could become a good competitor in some parts of our localities, cardiovascular diseases, especially CVA, in our environment remain troubling, leading to a number of significant deaths in our localities and even in many of the center-based studies in Nigeria. Vitalis *et al.* reported violence as a common cause of death in some states in Nigeria, especially in Borno, Lagos, and Adamawa, respectively [6]. Some of these states are bedeviled by terrorists, kidnappings, and unwarranted killings, which have become rampant occurrences in Nigeria since 2010. Chiwar H. M. *et al.*, in Maiduguri, reported chronic kidney disease as the commonest cause of death in their findings, even at the heart of terrorism.

Other important disease conditions leading to death in our environment include malignant neoplasms, mostly prostatic carcinomas; trauma, especially spinal cord injuries; pulmonary embolism; malaria parasite infestation, especially among children; sepsis, which is the commonest cause of death among infective causes in our study; chronic liver diseases; gastroenteritis; diabetes mellitus, especially type 2 DM; and chronic kidney diseases. Although mortality due to these various diseases may not be so common in some environments, studies have shown that some of the aforementioned diseases, depending on the location, are diseases to reckon with in mortalities across centers in Nigeria. For example, in OAU, according to Adeolu *et al.*, infection, trauma, and neoplasm have been reported to occur as the leading causes of death in this centre [23]. In Ado Ekiti, according to Olusoji A. Solomon *et al.*, malaria infestation was the leading cause of death in their study [14], and in ABU Zaira, according to Bello Yusuf Jamoh *et al.*, infection and gastrointestinal pathologies were reported as the commonest causes of death in their locality [10]. Even in FMC Umuahia, Nwafor CC *et al.* also reported infectious diseases, most especially HIV & AIDS and malaria, as significant causes of death in FMC Umuahia [4].

The leading causes of death among children in this study were severe malaria and neonatal sepsis. This is corroborated by findings by Umar *et al.* in Jigawa Specialist Hospital, and many other findings reported that neonatal sepsis and other infection-related diseases served as the leading causes of death among children [16] [22] [23].

11.7% of cases were brought in dead (BID), while 88.3% were hospital-managed cases. This could be due to the presence of a tertiary health facility in the locality, as well as improved health awareness among the populace, leading to significantly decreased BID cases when compared with hospital-managed cases. Most comparable studies have variable percentages of BID, as 20.3% of mortalities in Maiduguri were BID in a comparative study [5].

The commonest social demographic figure in this study was male, standing at a prevalence of 59% males compared to 41% of females. All over the world and across Nigeria, mortality is usually more common among males than among females. This is widely reported [1]-[5] [8] [10] [11] [15]. This is obviously due to increased exposure, the search for daily bread, and the nonchalant attitude of men towards their own health, which is more of a sacrifice for the well-being of their family. Although Ehi-Iyoha *et al.* in Ekpoma and Olusoji A., Solomon *et al.* in Ekiti reported more mortalities in females than in males in their studies, this is, however, not widespread and remains an unpopular opinion and finding [7] [14].

Mortality was highest among the elderly, with a percentage of 19.2% among the cases of mortality in DUFUTH. This was closely followed by the 40 - 50-year age group with 15.5% and the 31 - 40-year age group with 14.4%. Much literature [1] [3] [5] [11] [16] [18] [20] [23] has recorded variable percentages of mortality across age groups, with no unified mortality in any particular age group. However, it suffices to note that deaths among adults and the elderly are very rampant, and significant mortalities among these age groups are documented across many pieces of literature and research findings. This is because of increased disease manifestations in these age groups and poor healthcare, coupled with decreased life expectancy in Nigeria due to the poor socioeconomic well-being of the populace.

When we talk about time of death, variable time comes to mind, but for this study, the majority of the mortalities occurred during the evening period (5 - 11:59 pm) and morning hours (12 am - 11:59 am). A combined percentage of 66.4%, more than half of the mortalities occurred during these periods. Although the reason for this is not known, one could guess this to be due to inadequate light supply at night, which is capable of putting health workers in a difficult situation that could lead to poor health care as a result of the inadequate functionality of resuscitation equipment that is light-dependent. In addition, health workers' fatigue can also be a contributing factor due to inadequate healthcare personnel, which is barely enough to cover 24-hour shifts, most especially in the night hours. This is generally now a condition facing all the healthcare facilities in Nigeria due to the "japa" syndrome. More importantly, the few health workers who sacrifice themselves daily to stem the tide of the increasing population of diseased patients are not properly motivated. Poor healthcare facilities and inadequate advanced medical equipment are also not helping the situation.

7. Conclusions

Diseases of the cardiovascular system constituted the most common systemic

cause of mortality, followed by malignant neoplasms. Mostly implicated are stroke and prostatic carcinoma. It is expedient that appropriate health resources be channeled towards reducing risk factors for such diseases and providing adequate diagnostic and treatment infrastructure, including expert manpower training to mitigate the rising trend of these diseases.

The invaluable insights into the patterns and nature of death provided in this research reawakened the need for targeted interventions to reduce mortality due to cardiovascular diseases and all other implicated diseases in this research, as no man is immune to death. Understanding these patterns is a vital tool for developing effective public health policies and interventions in our locality, as well as in the entire nation at large.

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Conflicts of Interest

The authors have declared no conflicts of interest.

Recommendation

We recommend comprehensive preventive and interventional programs aimed at reducing these trends, especially those of diseases of the cardiovascular system and cancers.

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