

Cancer Mortality in the Niger Delta Region of Nigeria: A Case Study of the University of Port Harcourt Teaching Hospital

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Abstract

Aim: The aim of this study is to determine the pattern of cancer mortality (CM) seen in the University of Port Harcourt Teaching Hospital (UPTH) which is a cancer reference center in the Niger Delta Region. **Methodology:** This is a 6-year retrospective study of cancer-related deaths in UPTH using patients' admission registers in all the wards and emergency units. Furthermore, the death certificates of cases were reviewed. **Results:** Three hundred and sixteen cases of cancer-related deaths occurred, involving 174 females and 142 males, in a female-to-male sex ratio of 1.2:1. All age groups were affected, with age group 40–49 years accounting for the majority (20.6%). CM was seen in all the systems, except the central nervous system. Cancers of the gastrointestinal tract and its accessory organs (liver and gall bladder) caused most mortality (27.9%), in a female-to-male ratio of 0.8:1. The single most involved organ in CM is the female breast (20.6%), distantly followed by mortality due to prostate cancers and hematolymphoid cancers which accounted for 9.2% each. Colorectal cancers accounted for 7.3% of cancer deaths and ranked 4th. Cancers of both cervix and stomach each accounted for 5.7% of mortality. The major histologic diagnoses were carcinomas (adenocarcinoma; 36.7%, invasive ductal carcinoma; 20.3%, squamous cell carcinomas; 8.2% and hepatocellular carcinomas; 4.4%). Leukemias and lymphomas accounted for 9.2% of cases, whereas sarcomas accounted for 5.1% of cases. **Conclusion:** Infection-related and noninfection-related cancers cause most mortality in UPTH. The 5th decade was the most commonly affected, while female breast was the single most involved organ. Breast, prostate and hematolymphoid malignancies are common causes of CM with death from breast occurring earliest. Majority of the deceased were educated, working-class urban dwellers. More advocacies on public acceptance of cancer screening and cancer preventive lifestyles as well as governments' improvement on workforce training and treatment infrastructure will improve the current CM profile in Port Harcourt.

Keywords: Cancer, mortality, Port Harcourt, screening, treatment

INTRODUCTION

The greatest fear of cancer is the mortality associated with it. In developing or undeveloped countries, once a diagnosis of cancer is made, the patients and the relatives assume that a death sentence has been passed on the patient. There are many works on pattern and incidence of cancer, but there are few documented works on cancer mortality (CM).¹ Based on the report by the International Agency for Research on Cancer (IARC), CM resulted mainly from cancers of the following organ: lungs, colorectal, female breast, prostate, stomach, liver, esophagus, and uterine cervix, which are listed in their order of occurrence.¹ These findings were based on reports from 50 countries, spread across five continents and included six African countries, including Algeria, Egypt, Zimbabwe, Uganda, Malawi, and South Africa.¹ In a more recent CM study, using data from 67 countries spread across six

continents (with South Africa being the only African country), a general decline in CM has been observed except for liver cancer in both sexes and lung cancer in women.² This global decline though more significant in the United States of America, Europe, and in other high-income regions were mainly due to efforts on cancer prevention, screening programs, and treatment in those countries.^{1,2} In some low- and middle-income countries (LMICs), CM rates are observed to be increasing both for infection-related and noninfection-related cancers.¹

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There are few African studies on CM that encompasses all cancers.^{3,4} These African studies showed that the CM pattern observed in Africa is different when compared to the rest of the world.⁴ Many previous studies from Nigeria studied the pattern of individual (single) organ CM.⁵⁻⁸

In Ghana, CM was mainly due to cancer of the following organs in females: breast, hematolymphoid malignancies (HM), liver, and cervix and in males: liver, prostate, HM, and stomach.³ In Lagos, CM was due to the cancer of the following organs, in the order in which they occurred; breast, HM, uterine cervix, ovary, liver, and prostate.⁴

The aim of this work is to review CM seen at University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, as no such work have been done previously, to the best of our knowledge.

METHODOLOGY

This is a retrospective study between January 1, 2012 and December 31, 2017 of deaths from cancer-related complications. Patients' admission registers in all the wards and emergency units of the hospital were scrutinized for cases that were admitted with cancer-related ailments who died in the course of treatment. Further confirmation of the cases was undertaken through checks of the certificates of the cause of deaths issued by the medical/surgical/oncology teams that managed the deceased as documented in the hospitals mortuary. Usually, following any death in the hospital, certificate of the cause of death is issued by the team responsible for treating the deceased. This certificate documents the primary cause of death and the underlying secondary cause which necessitated the admission. This is in lieu of autopsies which has low acceptance rate in our environment. Information extracted were demographic data, occupation, tribe, diagnosis, and the primary site of cancer involvement. Cases with any missing demographic parameter were excluded. Also excluded were cancer cases, in which the individual died of noncancer-related deaths (e.g. deaths through road traffic accident). The extracted information was analyzed using the SPSS software version 18 (Statistical Package for the Social Science (SPSS) Inc., Chicago, Illinois United states of America).

RESULTS

Three hundred and sixteen cases of cancer-related deaths occurred, involving 174 females and 142 males, in a female-to-male sex ratio of 1.2:1. All age groups were affected, with age group 40–49 years accounting for the majority (20.6%), followed by age group 60–69 years (18.7%) and 50–59 years (17.1%). Age groups 30–69 years accounted for 72.9% of cases, as shown in Table 1. The mean age was 52.02 ± 17.01 . The youngest patient was 3 years, and the oldest was 88 years.

CM was seen in all the systems except the central nervous system, as shown in Table 2. Malignancies of the gastro intestinal tract and its accessory organs (liver and gall bladder) caused most mortality (27.9%), involved both females and males, in a

Table 1: Age group and sex distribution of cases

Age group	Female	Male	Total (%)
0-9	1	2	3 (0.9)
10-19	2	4	6 (1.9)
20-29	11	8	19 (6)
30-39	30	22	52 (16.5)
40-49	45	20	65 (20.6)
50-59	34	20	54 (17.1)
60-69	31	28	59 (18.7)
70-79	10	30	40 (12.7)
≥80	10	8	18 (5.7)
Total	174	142	316 (100)

Table 2: Systems and sex distribution of cases

Cancer system	Sex		Total (%)	Mean age
	Female	Male		
GIT/accessory organs	37	44	81 (27.9)	59.21±13.27
Genital tract	41	29	70 (22.2)	60.3±11.93
Female breast	65	-	65 (20.6)	47.23±15.32
Hematolymphoid	13	16	29 (9.2)	41.03±16.14
Endocrine	8	13	21 (6.6)	
Respiratory	3	13	16 (5.1)	48.25±21.26
Skin	2	11	13 (4.1)	39.08±11.08
Urinary tract	3	9	12 (3.8)	43.93±22.74
MSS	2	7	9 (2.8)	44.67±21.96
Total	174	142	316	52.02

GIT – Gastro intestinal tract; LRS – Lympho Reticular System; MSS – Musculo skeletal system

female-to-male ratio of 0.8:1 and caused death at a mean age of 59.21. Genital tract malignancies caused death in 22.2% of cases in a female-to-male sex ratio of 1.4: 1. Only prostate gland cancers were recorded among the other components of the male genital tract. The mean age for female genital tract cases was 50.6 and 70 for males. Breast malignancies accounted for 20.6% of cases and were only seen in females with a mean age of 47.23 years. Hematolymphoid system malignancies were the fourth-most common cause of death (9.2%) with a female-to-male ratio of 0.8:1.

Table 3 shows the various organs involved in different systems. The single most involved organ in CM is the female breast (20.6%). This is distantly followed by mortality due to prostate cancers and hematolymphoid cancers, which accounted for 9.2% each. Colon cancers accounted for 7.3% of cancer deaths and ranked 4th. Cancers of both cervix and stomach each accounted for 5.7% of mortality and ranked 5th.

The major histologic diagnoses were carcinomas (adenocarcinoma; 36.7%, invasive ductal carcinoma; 20.3%, squamous cell carcinomas; 8.2% and hepatocellular carcinomas; 4.4%). Leukemias and lymphomas accounted for 9.2% of cases, whereas sarcomas accounted for 5.1% of cases. More than 60% of cases were employed, either as civil servants or self-employed as shown in Table 4. About 57% of cases had tertiary education, whereas 25.3% of cases had

Table 3: Organ distribution of cases

System/organ involved	Frequency (%)
GIT (n=81)	
Colon	23 (7.3)
Stomach	18 (5.7)
Rectum	12 (3.8)
Esophagus	6 (1.9)
Anus	3 (0.9)
Lip/mouth	1 (0.3)
Liver	15 (4.7)
Gall bladder	3 (0.9)
Female breast (n=65)	65 (20.6)
Female genital tract (n=41)	
Cervix	18 (5.7)
Ovary	12 (3.8)
Endometrium	9 (2.8)
Myometrium	1 (0.3)
Vulva	1 (0.3)
Male genital system (n=29)	
Prostate	29 (9.2)
Hematolymphoid (n=29)	
Leukemias	17 (5.4)
Lymphomas	12 (3.8)
Endocrine (n=21)	
Pancreas	14 (4.4)
Thyroid	4 (1.3)
Adrenal	3 (0.9)
Respiratory (n=16)	
Lungs	8 (2.5)
Bronchus	4 (1.3)
Larynx	3 (0.9)
Nasopharynx	1 (0.3)
Skin (n=13)	
Blood vessels	10 (3.2)
Epidermis/adnexal structures	3 (0.9)
Urinary tract (n=12)	
Kidneys	7 (2.2)
Urinary bladder	4 (1.3)
Ureter	1 (0.3)
MSS (n=9)	
Bone	6 (1.9)
Skeletal muscle	1 (0.3)
Fibrous tissue	1 (0.3)
Blood vessel	1 (0.3)

GIT – Gastro intestinal tract; MSS – Musculo skeletal system

secondary education. Majority of the victims (63.3%) live in the urban areas. The cases were of all tribes in Nigeria, though the South-South region, followed by South-East region accounted for most cases (42.4% and 32.6%, respectively). There was no significant correlation between any of the following parameters; cancer site and tribe, cancer site and the area the individual was living or level of education and histologic diagnosis.

DISCUSSION

Irrespective of the income level of a country, cancer is a known leading cause of mortality, though its rate vary depending on

Table 4: Sociodemographic parameters

Parameter	Frequency (%)
Occupation	
Civil servant	126 (39.9)
Self employed	78 (24.7)
Retired	66 (20.9)
Student	32 (10.1)
Unemployed	14 (4.4)
Level of education	
Tertiary	181 (57.3)
Secondary	80 (25.3)
None	53 (16.8)
Primary	2 (8)
Residential area	
Urban	200 (63.3)
Rural	116 (36.7)
Region of country	
South-south	134 (42.4)
South east	103 (32.6)
North central	37 (11.7)
North East/West	24 (7.6)
Yoruba	18 (5.7)

the country.¹ Compared to the rest of the world, the mortality pattern due to cancer in Africa is different, and this may be due to difference in the climate, diet, genetic factors, and some other unknown factors.³ In recent comprehensive global studies for CM, Nigeria was not mentioned or included.^{1,2} Although the reason for noninclusion was not particularly given, the authors listed the following as criteria for a country to be included in their study: Registration of cause of death coverage of $\geq 50\%$, population of ≥ 2 million inhabitants, reporting of mortality data to the WHO and coding of cause of death according to the International Classification of Diseases, 9th or 10th Revision standard.² Apart from a population of >2 million inhabitants, the other criteria are not easily obtainable in most parts of Nigeria. In the absence of a standard population mortality registry, a hospital-based CM data like the index study can give some vital information, concerning a locality, though it will have many shortcomings.

The mean age of cases seen in this series is 52.02 years with a male-to-female ratio of 1:1.2. The mean age observed in Ghana was 49 years, whereas Akinde *et al.* in Lagos reported that most mortality cases were seen between 51 and 60 years.^{3,4} The mean age of cases seen in this series fall within the stated life expectancy of Nigerians, which is 55 years and 56 years for males and females, respectively, according to the WHO.⁹

Female breast CM topped the list in the index study. This is same with observations in Lagos; Nigeria and Ghana.^{3,4} Among females worldwide, cancer of the breast causes the greatest mortality. African American women in the USA have the highest mortality, whereas Korean women have the lowest.¹ Globally, breast cancer has a higher incidence, though associated with lower mortality in high-income countries,

compared to low- and medium-income countries, due to early detection and improved treatment. This is in contrast to its pattern in lower-income countries.^{2,10} Possible causes of increasing incidence noticed in low- and medium-income countries include: increasing awareness, screening, and changing reproductive patterns.¹¹ Other possible reasons for the high mortality associated with breast cancer in blacks may be due to racial genetic differences in metabolism of commonly used drugs and due to the p53 mutations in the 5–9 exons and adjacent introns which are common in black women than whites.^{12,13} The high mortality observed in our setting could be mainly due to late presentation (presentation in advanced stages), limited treatment options (like nonavailability of radiotherapy in our setting), and believe in alternative treatment. Mass screening (population-based screening programs) of women in our communities is still a dream; hence, the great need to continually teach about the self-breast examination and the early symptoms and signs of breast cancer.

HM ranked fourth and caused 9.2% of cases. This is different from observations in Ghana and Lagos, where they ranked second.^{3,4} HM was not listed among the major causes of CM by the global studies, and this may be due to the high survival rates.^{1,2} Proper treatment of HM, usually starts from accurate diagnosis and individualized treatment. In UPTH, just like most centers in Nigeria, the diagnosis is based on hematoxylin and eosin-stained sections coupled with limited markers for immunohistochemistry, which usually limits the diagnosis made. In few cases when the diagnoses are correctly made, the treatment is mainly by use of broad-based chemotherapeutic agents, which do not give targeted/desired effect.

Prostate cancer also ranked second, accounting for 9.2% of mortality cases and is higher than the rate of 4.5% and 7th cause of CM observed in Lagos.⁴ Although the index sample size is smaller than that of Lagos, this alone cannot explain the obvious different rates. The etiology of prostate cancer is not known, despite being the most common cancer of males, though the following risk factors are well established; advanced age, black race, a family history of the disease, and certain genetic polymorphisms.¹⁴ Most developed nations are either having decreasing incidence and decreasing mortality or increasing incidence and decreasing mortality mainly due to routine screening and advances in prostate cancer treatment (radical prostatectomy, hormonal therapy, and radiation therapy).^{15,16} Unfortunately, Caribbean countries such as Trinidad and Tobago and most African countries have the highest known mortality, with the lowest seen in Asian countries.^{1,15} This may be due to none availability of the treatment options. The low mortality in Asian countries may be due to the very low incidence which is believed to be due to genetic factors and environmental factors.¹⁷

According to IARC, colorectal cancer is the second-most common cause of CM after cancer of the lungs, with lowest rates seen in Africa, some Asian countries, Latin America, and the Caribbean.^{1,2} Although the incidence is rising in many

LMICs with prior low incidence due to rapidly changing diet, activity pattern, and increased smoking.^{18,19} The major causes of increasing mortality presently observed in these underdeveloped and developing nations with prior low incidence and mortality are none availability of screening programs and lack of proper treatment modalities.^{20,21} In this series, colon cancer was the 3rd-most common cause of mortality and accounted for 7.3% of cases. This is different from 5.3% (6th cause of mortality) observed in Lagos and 3.9% (9th cause of CM in Ghana females) and 2.6% (10th cause of CM in Ghana males).^{3,4} The reason for this observation cannot be explained and cannot be blamed solely on the small sample size. This calls for increased awareness about screening, healthy living, and avoidance of risk factors in our environment. Although colonoscopy is the most sensitive screening test, its use in our environment is highly limited due to cost, hence fecal occult blood test, which is inexpensive and easy to perform is the best practical option as done in many parts of the world with limited resources.¹

The 5th (cervix and stomach; 5.7% respectively) and 7th (liver; 4.7%) major cause of CM in this series are infection-related cancers, thus giving a mixed picture of cancer burden in Port Harcourt.

Cervical cancer is the third leading cause of cancer-related death in females in LMICs, but is rare in HICs.¹ The current rate of cervical cancers is less than observations in both Lagos and Ghana.^{2,3} The way HICs reduced incidence and mortality of these major infection-related cancers were mainly by early vaccination against human papilloma virus (the causative agent for cervical cancer), hepatitis B (causative agent for hepatocellular cancers) and proper treatment and eradication of *Helicobacter pylori* (causative agent for gastric carcinoma).^{1,22} This is yet to be archived in many African countries and until this is done, most African states and other LMICs will continue to have high incidence and mortality of these cancers.

Globally, lung cancer tops the list as the most common cause of CM in both sex.^{1,2} Due to its high rate of mortality, the incidence of lung cancer is almost equivalent to its mortality.¹ Although said to be on the decline, due to strict application of tobacco control measures, its mortality, especially in females is still high because women began smoking later.^{1,2} Fortunately, in the index study and other African studies mortality due to lung cancer were not among the leading causes of mortality.^{3,4} The index rate of 3.8% is higher than 2.6% observed in Lagos and maybe a pointer to gradual increment in this type of mortality that can be significantly prevented, by preventing smoking initiation (through taxation, ensuring smoke-free areas, education about the harms of tobacco, and bans on tobacco advertising), and promoting smoking cessation.^{23,24} At times seen in our setting are lung CM cases in patients that never smoked nor took any form of tobacco. Worse still, such cases have been seen in young- and middle-aged people. It is believed that genetic characteristics and carcinogenicity of outdoor pollutants may be the cause.²⁵

CM is dependent on many factors such as the presence of health insurance, adequacy of diagnostic, and therapeutic modalities. In Nigeria, the National Health Insurance Scheme, categorically excluded cancer care.²⁶ Due to the lack of health insurance for most of the populace or partial health insurance for government employees only and lack of sufficient and affordable treatment options, cancer patients in our environment do not live long. Other factors that may determine or affect CM directly or indirectly include the level of education, type of employment, and type of environment.^{27,28} We could not determine its effect on the survival of our cases and this may be due to the small sample size.

The major limitation of this study is the small sample size and as such conclusions and correlations may not strictly represent population features of the study area.

CONCLUSION

Although a hospital-based study and in the absence of a population-based series, the index presentation serves as raw material for meta-analysis of mortality pattern in Nigeria. In UPTH, both infection and noninfection-related cancers deaths are predominant.

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Conflicts of interest

There are no conflicts of interest.

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