

4 **Prevalence of cancer in the different age groups in Cross**
5 **River State**

6 **ABSTRACT:**

7 **Aims:** The aim of this study is to find out the prevalence of cancer in the different age groups in the rest
8 of Cross River state not covered by the Calabar cancer registry.

9 **Study Design:** Descriptive retrospective study involving a trend analysis of the cancers incident in the
10 University of Calabar Teaching Hospital, and of persons from the rest of Cross River State not covered by
11 the Calabar cancer registry. Such cases as occurred between 1st of January 2004 to October 31st, 2013
12 were included.

13 **Place and duration of study:** The department of Pathology, University of Calabar Teaching hospital;
14 between April and May 2019.

15 **Methodology:** A trend analysis of cancer cases from the rest of Cross River State outside the range of
16 the Calabar cancer registry over the period was studied.

17 **Results:** Nine hundred and forty-one (941) cases of cancer were seen outside Calabar in Cross River
18 State, within January 2004 and December 2013. Mean age was 49.18 ± 18.9 years, ranging from 1 to 100
19 years, and female: male ratio was 1: 0.97. The commonest age range cancer occurred is 40 to 64 years
20 overall, 40 to 64 years in males and 40 to 64 years in females. The commonest cancers sites were breast
21 cancer (21.9%), prostate (21.3%), lymphohaematopoietic (9.2%). The commonest cancers in males were
22 prostate (43.1), lymphohaematopoietic (12.9%), soft tissue (11.4%). In females' breast 41.1% and cervix
23 15.9% were the dominant sites. Cancer in the 0 to 17 age range were remarkably similar and were
24 dominated by lymphohematopoietic sites, soft tissue, eye and urinary system. Cancer in the older ages
25 65 years and above is overwhelmingly dominated by prostate 60% followed by breast 18%

26 **Conclusion:** Cancer in the rest of Cross River State is dominated by breast, prostate and cervical sites.
27 This is like the GLOBOCAN estimates for Nigeria.

28
29 **Keywords:** Cancer, age range, Cross River.
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32 **INTRODUCTION:** Cancer data in sixteen out of eighteen local governments areas of Cross River is not
33 population- based. The only cancer registry in the State covers two local governments 100%;these are
34 Calabar municipality and Calabar South both in the capital city(1) Cross River State is located in the Niger
35 delta region of Nigeria, it is bounded to the south by the Atlantic coast and to the east by the Republic of
36 the Cameroun. The climate is tropical and the vegetation ranges from mangrove forest in its
37 southernmost reaches, through tropical rainforest spanning the south through the central zone and
38 guinea savanna in its northern reaches. Endowed with high rainfall and populated by Ekoi tribes of the
39 Bantoid classification and has many linguistic groups. This is a topographical survey of cancer prevalence
40 in the different age ranges in the rest of Cross River State, outside the coverage of Calabar cancer
41 registry.

42 In the United states, it was reported that in the 15 to 30 age range, cancer occurs 2.7 times more
43 commonly than in the first fifteen years of life, but incidence is much lower than in older age groups(2).In
44 all, cancer in this age range accounts for 2% of the cancer incidence(2).Hodgkin's, melanoma, Testicular,
45 female genital, thyroid, soft tissue, NHL,leukaemia, brain and spinal cord, breast bone, sarcomas and
46 non-gonadal germ cell tumours accounted for 95% of cancers in this age range(2).In this age range, the
47 frequency of cancers changes dramatically from the youngest15 to the oldest in that age range 30 such
48 that the pattern at 15 does not resemble the pattern at 30(2).This underscores the need to study the
49 prevalence of different cancers in different age segments. In the United Kingdom, cancer incidence in the

50 different age strata was presented in a detailed House of Commons report. Notably, they reported that
51 cancer incidence is substantially higher among, the older population; between ages 29 to 60 women are
52 more likely to contact cancer, after 60, men become more likely(3).In the same study, prostate cancer
53 was the commonest cancer in men ,breast cancer in women, while lung and colorectum were common in
54 both gender(3).They reported that although cancer is less common in those age 15 to 29, testicular cancer
55 is common in males of this age range ,Hodgkin lymphoma in both sexes, while incidence of cervical
56 cancer in 25 to 29 age group has been increasing(3).That a man 80 to 88 years is 27 times more likely to
57 have cancer than a man 40 to 44 years while a woman 80 to 88 years, is 8 times more likely to have
58 cancer than a woman 40 to 44 years(3).

59 Developing countries share a high cancer burden and an unusually high case fatalities (4-6).WHO report
60 on developing countries, has observed that with the progress achieved in the control of infectious
61 diseases and attendant improvement in life expectancy, incidence of cancers is rising (6, 7).In the United
62 states it is reported that the incidence of cancers such as, lung, prostate, colorectum and female breast is
63 decreasing, by comparison in developing countries rates of these cancers are increasing due to adoption
64 risky lifestyles like, physical inactivity, tobacco smoking and high calorie diets(8, 9).Added to these
65 problems are weak health institutions and policy implementation. A typical example is lack of population-
66 based cancer registration, which militates against cancer control programmes in resource poor
67 settings(6, 10-14).GLOBOCAN 2018 fact sheet on Nigeria estimates that 115,950 new cases of cancers
68 occurred in Nigeria in 2018 with more than 70,000 deaths (15).Breast cancer, cervix, prostate cancer,
69 Non Hodgkin lymphoma, liver and colon are the commonest cancers in both sexes combined
70 (15).Prostate, colorectum are top in males while breast, cervix and colorectum are the top three in
71 females(15).

72 Only about 5% of Nigeria is covered by population -based cancer registration. Ekanem and Parkin 2013
73 published cancer incidence in Calabar municipality indicating that, women were on the average younger
74 than men at diagnosis (43.6 vs 52.3)(1).They found out that the commonest age range of diagnosis of
75 cancer in women was 30-39(46%),while in males 50-59(41%);and that 6% of cancers occurred in
76 childhood 0-14(1).Work from the other two population-based cancer registries in Abuja- north central
77 Nigeria and Ibadan south-west also show that the mean ages for the diagnosis of cancer in males and
78 female in both registries was 49.1 vs 45.4 and 51.1 vs 49.9 respectively(16).In both registries breast and
79 cervical cancers were the commonest cancers in females while prostate cancer was the commonest in
80 males(16). A survey of institutional registries cutting across 15 states in the 6 geopolitical zones of
81 Nigeria, reported that in both sexes, breast cancer, cervical, liver prostate and colorectum in that order
82 were the commonest among Nigerians(17).In males, prostate cancer, liver , Non Hodgkin lymphoma
83 colorectum and pancreas in that order, while in females, breast cancer, cervical, liver, colorectum and
84 Non Hodgkin lymphoma in that order were the commonest(17). The pattern of childhood cancer in Nigeria
85 is somewhat similar in most of the reported cases; Lymphomas(Hodgkin and Non Hodgkin),are the
86 commonest followed by Retinoblastomas and or Soft tissue tumours, or nephroblastoma(1, 18-23).

87 **MATERIALS AND METHODS:** A retrospective study involving a trend analysis of cancers from the
88 rest of Cross River State, not covered by the population based Calabar cancer registry. Cancer cases
89 incident in the departments of Pathology and Hematology of the University of Calabar Teaching Hospital,
90 between 1st of January 2004 to 31st December 2013 were selected. The data extraction forms were
91 entered for each of the selected cases and each contained clinical, demographical and pathology
92 information's. The data so collected is entered the Statistical package for social sciences (SPSS) version
93 21 for analysis.

94 **RESULTS:** Nine hundred and forty-one (941) cases of cancer were seen outside Calabar in Cross River
95 State, within January 2004 and December 2013. Mean age was 49.18 ± 18.9 years, ranging from 1 to 100
96 years, and female: male ratio was 1: 0.97. Overall, the commonest age group was 40 to 64 years
97 (46.3%), followed by 18 to 39 years (25.5%), and 65 years or greater (23.0%) (table 1). Among males,
98 the commonest age group was 40 to 64 years (40.1%) followed by 65 years or greater (35.1%). Among
99 females, the commonest age group was also 40 to 64 years (52.4%) and followed by 18 to 39 years
100 (32.7%). Significantly higher proportion of females compared with males were less than 40 years old

101 (36.5% vs. 24.8%), while males were more commonly 65 years or older compared with females (75.2%
 102 vs. 63.5%, p=0.00).

Table 1: Age distribution of all cancer cases by gender (N=941)

	Male n (%)	Gender Female n (%)	Total n (%)	Chi- square (p-value)
Age groups (in years)				
0-4	10 (2.2)	6 (1.3)	16 (1.7)	Fisher's Exact 0.00
5-12.	14 (3.0)	7 (1.5)	21 (2.2)	
13-17	7 (1.5)	5 (1.0)	12 (1.3)	
18-39	84 (18.1)	156 (32.7)	240 (25.5)	
40-64	186 (40.1)	250 (52.4)	436 (46.3)	
≥65	163 (35.1)	53 (11.1)	216 (23.0)	
Total	464 (100)	477 (100)	941 (100)	
Age group (at 18 years)				
<18	31 (6.7)	18 (3.8)	49 (5.2)	4.0
≥18	433 (93.3)	459 (96.2)	892 (94.8)	0.05
Total	464 (100)	477 (100)	941 (100)	
Age groups (at 40 years)				
<40	115 (24.8)	174 (36.5)	289 (30.7)	15.1
≥40	349 (75.2)	303 (63.5)	652 (69.3)	0.00
Total	464 (100)	477 (100)	941 (100)	

103
 104 Considering both sexes for all ages, the common sites for cancer were breast (21.9%), prostate (21.3%),
 105 and lymphohaematopoietic tissue (9.2%) (table 2). Other less common sites were cervix (8.1%), soft
 106 tissue (8.0%), skin (5.4%), and head and neck (4.9%). Among males, common sites for cancer were
 107 prostate (43.1%), lymphohaematopoietic tissue (12.9%), and soft tissue (11.4%). Other sites were head
 108 and neck (6.7%), skin (5.0%), and colorectal (4.1%). Among females, common sites were breast (41.1%),
 109 cervix (15.9%), and skin (5.9%). Other less common sites were lymphohaematopoietic (5.7%), soft tissue
 110 (4.6%), and head and neck (3.1%).

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 Table 2: Frequency distribution of top-10 cancer sites for all ages by gender (N=941)

s/n	All cases		Male cases only		Female cases	
	Organ/tissue site	n (%)	Organ/tissue site	n (%)	Organ/tissue site	n (%)
1	Breast	206 (21.9)	Prostate	200 (43.1)	Breast	196 (41.1)
2	Prostate	200 (21.3)	Lymphohaematopoietic	60 (12.9)	Cervix	76 (15.9)
3	Lymphohaematopoietic	87 (9.2)	Soft tissue	53 (11.4)	Skin	28 (5.9)
4	Cervix	76 (8.1)	Head and Neck	31 (6.7)	Lymphohaematopoietic	27 (5.7)
5	Soft tissue	75 (8.0)	Skin	23 (5.0)	Soft tissue	22 (4.6)
6	Skin	51 (5.4)	Colorectal	19 (4.1)	Head and Neck	15 (3.1)
7	Head and Neck	46 (4.9)	Hepatobiliary	11 (2.3)	Colorectal	14 (2.9)
8	Colorectal	33 (3.5)	Eye	10 (2.2)	Ovarian	13 (2.7)
9	Eye	21 (2.2)	Breast	10 (2.2)	Uterus	11 (2.3)
10	Hepatobiliary	19 (2.0)	Urinary tract	9 (1.9)	Eye	11 (2.3)
	Unknown primary site	34 (3.6)	Unknown primary site	19 (4.1)	Unknown primary site	15 (3.1)
	Others	93 (9.9)	Others	19 (4.1)	Others	49 (10.4)
	Total	941 (100)	Total	464 (100)	Total	477 (100)

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113 Among all cases of under-5 children, lymphohematopoetic (37.5%), eye (25.0%), and soft tissue (12.5%),
 114 were the common sites of cancer (table 3). These were also the common sites for male and females
 115 within 0-4 years old.

Table 3: Frequency distribution of cancers for 0-4 years age group by gender (n=16)

s/n	Organ/tissue site	All cases		Male cases only		Female cases	
		Organ/tissue site	n (%)	Organ/tissue site	n (%)	Organ/tissue site	n (%)
1	Lymphohematopoetic	Lymphohematopoetic	6 (37.5)	Lymphohematopoetic	4 (40.0)	Lymphohematopoetic	2 (33.3)
2	Eye	Eye	4 (25.0)	Eye	2 (20.0)	Eye	2 (33.3)
3	Soft tissue	Soft tissue	2 (12.5)	Soft tissue	1 (10.0)	Soft tissue	1 (16.7)
4	Urinary tract	Urinary tract	1 (6.2)	Urinary tract	1 (10.0)	-	-
	Unknown primary site	Unknown primary site	3 (18.8)	Unknown primary site	2 (20.0)	Unknown primary site	1 (16.7)
	Total	Total	16 (100)	Total	10 (100)	Total	6 (100)

116

117 Among children that were 5 years and older (5-12 years), lymphohematopoetic tissue (52.4%), eye
 118 (14.2%), urinary tract (9.5%), and soft tissue (9.5%), were the common sites for cancer (table 4). These
 119 were also the common sites among teenagers within 13-17 years old (table 5).

Table 4: Frequency distribution of cancers for 5-12 years age group by gender (n=21)

s/n	Organ/tissue site	All cases		Male cases only		Female cases	
		Organ/tissue site	n (%)	Organ/tissue site	n (%)	Organ/tissue site	n (%)
1	Lymphohematopoetic	Lymphohematopoetic	11 (52.4)	Lymphohematopoetic	7 (50.1)	Lymphohematopoetic	4 (57.1)
2	Eye	Eye	3 (14.2)	Eye	2 (14.3)	Eye	1 (14.3)
3	Urinary tract	Urinary tract	2 (9.5)	Soft tissue	2 (14.3)	Urinary tract	1 (14.3)
4	Soft tissue	Soft tissue	2 (9.5)	Urinary tract	1 (7.1)	Skin	1 (14.3)
5	Skin	Skin	1 (4.8)	Small intestine	1 (4.8)	-	-
6	Small intestine	Small intestine	1 (4.8)	-	-	-	-
	Unknown primary site	Unknown primary site	1 (4.8)	Unknown primary site	1 (7.1)	-	-
	Total	Total	21 (100)	Total	14 (100)	Total	7 (100)

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Table 5: Frequency distribution of cancers for 13-17 years age group by gender (n=12)

s/n	Organ/tissue site	All cases		Male cases only		Female cases	
		Organ/tissue site	n (%)	Organ/tissue site	n (%)	Organ/tissue site	n (%)
1	Lymphohematopoetic	Lymphohematopoetic	5 (41.7)	Lymphohematopoetic	2 (28.6)	Lymphohematopoetic	3 (60.0)
2	Soft tissue	Soft tissue	2 (16.7)	Soft tissue	1 (14.3)	Soft tissue	1 (20.0)
3	Urinary tract	Urinary tract	1 (8.3)	Urinary tract	1 (14.3)	-	-
4	Skin	Skin	1 (8.3)	Skin	1 (14.3)	-	-
	Unknown primary site	Unknown primary site	3 (25.0)	Unknown primary site	2 (28.6)	Unknown primary site	1 (20.0)
	Total	Total	12 (100)	Total	7 (100)	Total	5 (100)

121

122 Among adults that were at least 18 years old for both sexes, the common sites for cancer were breast
 123 (23.1%), prostate (22.4%), and cervix (8.5%) (table 6). Among male adults, common sites were prostate
 124 (46.2%), soft tissue (11.3%), and lymphohematopoetic tissue (10.9%). Among female adults' common
 125 sites were breast (42.7%), cervix (16.6%), and skin (5.9%).

Table 6: Frequency distribution of top-10 cancers for ≥18 years age group by gender (n=892)

s/n	Organ/tissue site	All cases		Male cases only		Female cases	
		Organ/tissue site	n (%)	Organ/tissue site	n (%)	Organ/tissue site	n (%)
1	Breast	Breast	206 (23.1)	Prostate	200 (46.2)	Breast	196 (42.7)
2	Prostate	Prostate	200 (22.4)	Soft tissue	49 (11.3)	Cervix	76 (16.6)
3	Cervix	Cervix	76 (8.5)	Lymphohematopoetic	47 (10.9)	Skin	27 (5.9)
4	Soft tissue	Soft tissue	69 (7.7)	Head and Neck	31 (7.2)	Soft tissue	20 (4.4)

5	Lymphohematopoetic	65 (7.3)	Skin	22 (5.1)	Lymphohematopoetic	18 (3.9)
6	Skin	49 (5.5)	Colorectal	19 (4.4)	Head and Neck	15 (3.3)
7	Head and Neck	46 (5.2)	Hepatobiliary	11 (2.5)	Colorectal	14 (3.1)
8	Colorectal	33 (3.5)	Breast	10 (2.3)	Ovarian	13 (2.8)
9	Eye	14 (1.6)	Eye	6 (1.4)	Uterus	11 (2.4)
10	Hepatobiliary	14 (1.6)	Stomach	6 (1.4)	Genitalia	10 (2.2)
	Unknown primary site	27 (3.0)	Unknown primary site	14 (3.2)	Unknown primary site	13 (2.8)
	Others	93 (10.6)	Others	18 (4.1)	Others	46 (9.9)
	Total	892 (100)	Total	433 (100)	Total	459 (100)

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127 Among young adults within 18 to 39 years old, breast (32.5%), soft tissue (16.2%), and head and neck
 128 (9.6%) were the common sites of cancer (table 7). Among males the common sites were soft tissue
 129 (34.5%), head and neck (16.7%), and lymphohematopoetic tissue (14.3%). Among females, breast
 130 (48.7%), skin (9.0%), and cervix (6.4%) were the common sites.

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Table 7: Frequency distribution of top-10 cancers for 18-39 years age group by gender (n=240)

s/n	Organ/tissue site	All cases n (%)	Male cases only		Female cases	
			Organ/tissue site	n (%)	Organ/tissue site	n (%)
1	Breast	78 (32.5)	Soft tissue	29 (34.5)	Breast	76 (48.7)
2	Soft tissue	39 (16.2)	Head and Neck	14 (16.7)	Skin	14 (9.0)
3	Head and Neck	23 (9.6)	Lymphohematopoetic	12 (14.3)	Cervix	10 (6.4)
4	Skin	19 (7.9)	Colorectal	6 (7.1)	Soft tissue	10 (6.4)
5	Lymphohematopoetic	15 (6.2)	Hepatobiliary	5 (6.0)	Head and Neck	9 (5.8)
6	Colorectal	12 (5.0)	Eye	5 (6.0)	Colorectal	6 (3.8)
7	Cervix	10 (4.2)	Skin	5 (6.0)	Ovary	5 (3.2)
8	Hepatobiliary	9 (3.8)	Breast	2 (2.4)	Hepatobiliary	4 (2.6)
9	Eye	8 (3.3)	Lung	1 (1.1)	Urinary tract	4 (2.6)
10	Ovary	5 (2.1)	Urinary tract	1 (1.1)	Lymphohematopoetic	3 (1.9)
	Unknown primary site	9 (3.8)	Unknown primary site	4 (4.8)	Unknown primary site	5 (3.2)
	Others	13 (5.4)	-	-	Others	10 (6.4)
	Total	240 (100)	Total	84 (100)	Total	156 (100)

135

136 Among older adults within 40 to 64 years breast (25.5%), prostate (16.3%), and cervix (11.7%) were the
 137 common sites for cancer (11.7%) (table 8). Among males common sites were prostate (38.2%),
 138 lymphohematopoetic (15.6%), and soft tissue (10.2%). Among females, common sites were breast
 139 (42.0%), cervix (20.4%), and lymphohematopoetic tissue (5.2%).

Table 8: Frequency distribution of top-10 cancers for 40-64 years age group by gender (n=436)

s/n	Organ/tissue site	All cases n (%)	Male cases only		Female cases	
			Organ/tissue site	n (%)	Organ/tissue site	n (%)
1	Breast	111 (25.5)	Prostate	71 (38.2)	Breast	105 (42.0)
2	Prostate	71 (16.3)	Lymphohematopoetic	29 (15.6)	Cervix	51 (20.4)
3	Cervix	51 (11.6)	Soft tissue	19 (10.2)	Lymphohematopoetic	13 (5.2)
4	Lymphohematopoetic	42 (9.6)	Head and Neck	11 (5.9)	Skin	8 (3.2)
5	Soft tissue	27 (6.2)	Skin	11 (5.9)	Soft tissue	8 (3.2)
6	Skin	19 (4.4)	Colorectal	11 (5.9)	Ovarian	8 (3.2)

7	Colorectal	17 (3.9)	Hepatobiliary	6 (3.2)	Colorectal	6 (2.4)
8	Head and Neck	16 (3.7)	Breast	6 (3.2)	Lungs	6 (2.4)
9	Hepatobiliary	9 (2.2)	Stomach	3 (1.6)	Head and Neck	5 (2.0)
10	Ovary	8 (1.8)	Urinary tract	3 (1.6)	Hepatobiliary	3 (1.2)
	Unknown primary site	14 (3.2)	Unknown primary site	7 (3.8)	Unknown primary site	7 (2.8)
	Others	51 (11.6)	Others	9 (4.9)	Others	30 (12.0)
	Total	436 (100)	Total	186 (100)	Total	250 (100)

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142 Among the elderly that were 65 years or older, prostate (59.7%), breast (7.9%), and cervix (6.9%), were
 143 the common sites of cancer (table 9). Males had prostate (79.1%), skin (3.7%), lymphohematopoetic
 144 (3.7%), and head and neck (3.7%), as the common sites. Common sites among females were breast
 145 (28.3%), cervix (28.3%), skin (9.4%), and eye (5.7%).

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Table 9: Frequency distribution of top-10 cancers for ≥65 years age group by gender (n=216)

s/n	All cases		Male cases only		Female cases	
	Organ/tissue site	n (%)	Organ/tissue site	n (%)	Organ/tissue site	n (%)
1	Prostate	129 (59.7)	Prostate	129 (79.1)	Breast	15 (28.2)
2	Breast	17 (7.9)	Skin	6 (3.7)	Cervix	15 (28.2)
3	Cervix	15 (6.9)	Lymphohematopoetic	6 (3.7)	Skin	5 (9.4)
4	Skin	11 (5.1)	Head and Neck	6 (3.7)	Eye	3 (5.7)
5	Lymphohematopoetic	8 (3.7)	Stomach	3 (1.9)	Lymphohematopoetic	2 (3.8)
6	Head and Neck	7 (3.2)	Colorectal	2 (1.2)	Colorectal	2 (3.8)
7	Colorectal	4 (1.9)	Urinary tract	2 (1.2)	Soft tissue	2 (3.8)
8	Eye	4 (1.9)	Breast	2 (1.2)	Uterus	2 (3.8)
9	Stomach	3 (1.4)	Eye	1 (0.6)	Pancreatic	2 (3.8)
10	Urinary tract	3 (1.4)	Lung	1 (0.6)	Head and Neck	1 (1.9)
	Unknown primary site	4 (1.9)	Unknown primary site	2 (1.2)	Unknown primary site	2 (3.8)
	Others	11 (5.0)	Others	3 (1.9)	Others	2 (3.8)
	Total	216 (100)	Total	163 (100)	Total	53 (100)

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148 **DISCUSSIONS:** Cancer occurs in a relatively younger average age range in the rest of Cross River
 149 State 49.18 ± 18.9 , this compares with the Calabar where Ekanem and Parkin reported 43.6 in females
 150 and 52.3 in males(1). This pattern is commonly reported in many Nigerian studies (16, 24-26) and in
 151 some African studies as well as among Blacks in the diaspora (27, 28). It has been argued that African
 152 populations are generally young and this is reflected in the mean populations affected by non-
 153 communicable diseases such as cancer. It appears the main driver of the reduced age of
 154 cancer incidence in our study is breast cancer in females. The mean age reported for female breast
 155 cancer in Nigerian women and black women is low (29-31). In our study, the 40 to 60 years age group and
 156 18 to 39 year age ranges which dominated the cancer prevalence in women (52% vs 33%) were
 157 accounted for by mainly breast cancer. The aetiological factors accounting for the observed lower age of
 158 incidence of breast cancer in our women is beyond the scope of this study. Although Anyanwu et al in
 159 South east Nigeria in their series reported an increasing age of occurrence(70) (32) as is often the case in
 160 western countries.

161 Considering both sexes, breast cancer, prostate cancer and cervical cancer are the commonest in that
 162 order, in the rest of Cross River. This is similar to the report by GLOBOCAN 2018 Fact sheet on
 163 Nigeria(15). It is also similar to other Nigerian studies from the south of the country with a few variations
 164 (1, 16, 26). Although the pattern is somewhat different from that seen in the North of the country in which
 165 bladder cancer alternates with prostate cancer in some centers(33, 34). Our pattern is different from
 166 literature from the west which often feature prominence of lung cancers in both sexes(4). The pattern of

167 cancer in males in our study show Prostate, lymphohaematopoietic, soft tissue and head and neck and
168 females, breast cancer, cervix, skin and lymphohaematopoietic as the commonest. These are similar to
169 the pattern in Calabar(1).Our pattern appears to be in conformity with most developing countries where
170 the so called infection/poverty associated cancers(cervix,Kaposi,some lymphomas and hepatocellular
171 carcinoma) are occurring side by side with the so called cancer of affluence(Prostate,breast and
172 colorectal) (27, 35).

173 The pattern of cancer of cancer revealed in our study, is similar in the 0 to 4 age range as well as 5 to 12-
174 year age range. In both sexes, cancer of the lymphohaematopoietic,eye and soft tissue or urinary tract
175 cancer are the commonest cancer in both sexes and in either males or females. The pattern in the 13 to
176 17 age group is similar to the 0-4 and 5 to 12, except that eye tumours do not feature in this age group.
177 These are replaced in the second position by soft tissue tumours and lymphohaematopoietic tumours
178 maintain the first position in overall and in both sexes. This pattern are similar to the report from Calabar,
179 the capital city of Cross River State(1).The pattern is similar to reports from other Nigerian studies(18-
180 20),except that CNS tumours are not seen in the rest of Cross River perhaps because Neurosurgical
181 units are under developed in the reference Hospitals these data is collated from.

182 Among adults 18 years and above, common cancers in both sexes are breast, prostate, cervical, soft
183 tissue and Lymphohaematopoietic cancers are the dominant cancers, with skin cancer, head and neck
184 hepatobiliary following in that order. Among adult males, prostate cancer, soft tissue,
185 lymphohaematopoietic and head and neck are the dominant cancer, with breast and stomach cancer
186 featuring in the 8th and 9th positions. In adult females, breast, cervix, skin and soft tissue are the dominant
187 and differ from males in that hepatobiliary cancers are not in the first ten and ovarian, uterine and cancer
188 from the rest of the genitalia feature in the first ten. The cancers of affluence (Breast, prostate) seems to
189 have marginally overtaken infection(36) /poverty related cancers (cervix and hepatobiliary cancers) in our
190 environment. This is the pattern reported in many African and Caribbean studies(5, 27, 37, 38). Perhaps
191 due to the changing economic outlook(5).Notable difference from the reports in western countries is the
192 rarity of lung cancer which may be due to low tobacco use in contrast to the west. In the 18 to 39 age
193 group, notable difference in both sexes, prostate cancer is not seen, breast cancer still dominates, while
194 cervical cancer occupies the 7th position and ovarian cancer is in the first ten. The dominance of breast
195 cancer in this age range is keeping with the widely reported low mean age of occurrence in Nigeria(29,
196 39, 40). In males 18 to 39, soft tissue, head and neck lymphohaematopoietic,and colorectal are the
197 dominant while breast, skin, cervix and soft tissue are the dominant in females. In contrast an American
198 report in a 15 to 29 age group found lymphomas, skin male genital and endocrine were the commonest in
199 that age range(2).

200 The pattern in the 40 to 64 years age range resembles the adult pattern 18 years and above in both
201 sexes combined and in males and females. In the 65 years and above (both sexes) Prostate cancer
202 dominates. Why prostate cancer is a disease of the old and breast cancer a disease of relatively younger
203 subjects in Calabar is unknown for now. But the tumour biology may be different in both cases.It is also
204 possible that population dynamics may be responsible. Both scenarios are beyond the scope of this work.

205 **ETHICAL APPROVAL:** Ethical approval was granted by the institutional ethical review board.

206 **COMPETING INTEREST:** The authors declare no competing interest.

207 **REFERENCES:- standardize the font style as in the text**

- 208 1. Ekanem IO, Parkin DM. Five year cancer incidence in Calabar, Nigeria (2009-2013). Cancer
209 Epidemiol. 2016;42:167-72.
- 210 2. Archie Bleyer AV, BS Ronald Barr, . Cancer Epidemiology in Older Adolescents and Young Adults
211 15 to 29 Years of Age SEER AYA Monograph page 1-204.
- 212 3. Alex Bate CB. Cancer Statistics: In Detail House of Commons Library. 2015;Number SN02677,
213 :3,8-9.

- 214 4. Global Burden of Disease Cancer C, Fitzmaurice C, Dicker D, Pain A, Hamavid H, Moradi-Lakeh M,
215 et al. The Global Burden of Cancer 2013. *JAMA Oncol.* 2015;1(4):505-27.
- 216 5. Adebamowo CA, Akarolo-Anthony S. Cancer in Africa: opportunities for collaborative research
217 and training. *Afr J Med Med Sci.* 2009;38 Suppl 2:5-13.
- 218 6. Busolo DS, Woodgate RL. Cancer prevention in Africa: a review of the literature. *Glob Health*
219 *Promot.* 2015;22(2):31-9.
- 220 7. Chuwa C. WHO cancer control programme in the African region. *IARC Sci Publ.* 1984(63):263-9.
- 221 8. Ahmedin Jemal MMC, Carol DeSantis, et al. . Global Patterns of Cancer Incidence and Mortality
222 Rates and Trends. *Cancer Epidemiol Biomarkers Prev;* . 2010 19 ((8)):1893–907. .
- 223 9. Maiyoh GK, Twei VC. Rising Cancer Incidence and Role of the Evolving Diet in Kenya. *Nutr Cancer.*
224 2019:1-16.
- 225 10. Fatunmbi M, Saunders A, Chugani B, Echeazu I, Masika M, Edge S, et al. Cancer Registration in
226 Resource-limited Environments-Experience in Lagos, Nigeria. *J Surg Res.* 2019;235:167-70.
- 227 11. Malami SA, Mungadi IA, Pindiga UH, Abimiku BA. Cancer registration in a developing country:
228 problems and prospects of the new UDUTH Cancer Registry, Sokoto, Nigeria. *Trop Doct.*
229 2004;34(2):126-7.
- 230 12. Jedy-Agba EE, Oga EA, Odutola M, Abdullahi YM, Popoola A, Achara P, et al. Developing National
231 Cancer Registration in Developing Countries - Case Study of the Nigerian National System of
232 Cancer Registries. *Front Public Health.* 2015;3:186.
- 233 13. Omolara KA. Feasible Cancer Control Strategies for Nigeria: Mini-Review *American Journal of*
234 *TROPICAL MEDICINE & Public Health.* 2011;1(1):1-10.
- 235 14. Jedy-Agba EE, Curado MP, Oga E, Samaila MO, Ezeome ER, Obiorah C, et al. The role of hospital-
236 based cancer registries in low and middle income countries-The Nigerian Case Study. *Cancer*
237 *Epidemiol.* 2012;36(5):430-5.
- 238 15. GLOBOCAN. <566-nigeria-fact-sheets.pdf>. 2018.
- 239 16. Jedy-Agba E, Curado MP, Ogunbiyi O, Oga E, Fabowale T, Igbinoba F, et al. Cancer incidence in
240 Nigeria: a report from population-based cancer registries. *Cancer Epidemiol.* 2012;36(5):e271-8.
- 241 17. Saibu G. Morounke JBA, Adu O. Benedict, Faduyile F. Adedayo, Fadaka O. Adewale, Iyapo
242 Oluwadamilare, Soyemi S. Sokunle, and Adekunle Benjamin Epidemiology and Incidence of
243 common Cancers in Nigeria. *J Cancer Biol Res* 2017; 5:(3):1105.
- 244 18. Utuk EO, Ikpeme EE. Childhood cancers in a referral hospital in south-south Nigeria: a review of
245 the spectrum and outcome of treatment. *Pan Afr Med J.* 2015;22:325.
- 246 19. Babatunde TO, Akang EE, Ogun GO, Brown BJ. Pattern of childhood cancer in University College
247 Hospital, Ibadan during 1991-2010 and comparison with the previous three decades. *Paediatr*
248 *Int Child Health.* 2015;35(2):144-50.
- 249 20. Ibrahim M, Abdullahi SU, Hassan-Hanga F, Atanda A. Pattern of childhood malignant tumors at a
250 teaching hospital in Kano, Northern Nigeria: A prospective study. *Indian J Cancer.*
251 2014;51(3):259-61.
- 252 21. Akhiwu WO, Igbe AP, Aligbe JU, Eze GI, Akang EE. Malignant childhood solid tumours in Benin
253 City, Nigeria. *West Afr J Med.* 2009;28(4):222-6.
- 254 22. Abudu EK, Akinbami OS. Cancers in Young Patients in Uyo (Niger-delta Region of Nigeria):
255 Magnitude of the Problem and Histopathological Prolife. *Rare Tumors.* 2016;8(1):6124.
- 256 23. Ochicha O, Gwarzo AK, Gwarzo D. Pediatric malignancies in Kano, Northern Nigeria. *World J*
257 *Pediatr.* 2012;8(3):235-9.
- 258 24. Nwafor CC, Nwafor NN. The pattern and distribution of cancers in Akwa Ibom State, Nigeria.
259 *Niger J Clin Pract.* 2018;21(5):603-8.
- 260 25. Arodiwe EB, Ike SO, Nwokediuko SC, Ijoma CK, Ulasi, II. Pattern of cancer deaths in the medical
261 wards of a teaching hospital in South East Nigeria. *Niger J Clin Pract.* 2013;16(4):505-10.

- 262 26. Okobia MN, Aligbe JU. Pattern of malignant diseases at the University of Benin Teaching
263 Hospital. *Trop Doct.* 2005;35(2):91-2.
- 264 27. Parkin DM. Cancer in developing countries. *Cancer Surv.* 1994;19-20:519-61.
- 265 28. Warner WA, Lee TY, Badal K, Williams TM, Bajracharya S, Sundaram V, et al. Cancer incidence
266 and mortality rates and trends in Trinidad and Tobago. *BMC Cancer.* 2018;18(1):712.
- 267 29. Ikpat OF, Kuopio T, Ndoma-Egba R, Collan Y. Breast cancer in Nigeria and Finland:
268 epidemiological, clinical and histological comparison. *Anticancer Res.* 2002;22(5):3005-12.
- 269 30. Chiedozi LC, Iweze FI, Aboh IF, Ajabor LN. Breast cancer in pregnancy and lactation. *Trop Geogr*
270 *Med.* 1988;40(1):26-30.
- 271 31. Abudu EK, Banjo AA, Izegebu MC, Agboola AO, Anunobi CC, Musa OA. Malignant Breast Lesions
272 At Olabisi Onabanjo University Teaching Hospital (O.O.U.T.H), Sagamu-a Histopathological
273 Review. *Niger Postgrad Med J.* 2007;14(1):57-9.
- 274 32. Anyanwu SN. Temporal trends in breast cancer presentation in the third world. *J Exp Clin Cancer*
275 *Res.* 2008;27:17.
- 276 33. Mohammed AZ, Edino ST, Ochicha O, Gwarzo AK, Samaila AA. Cancer in Nigeria: a 10-year
277 analysis of the Kano cancer registry. *Niger J Med.* 2008;17(3):280-4.
- 278 34. Sani Abubarar Malami UHP, Bawa Ahmed Abimiku, Ismaila Arzika Mungadi, Abubakar Danjuma
279 Abdulahi, Ayuba Dauda, and Sadiku Malami Sahabi. Descriptive retrospective study of the pattern
280 of Malignant diseases in Sokoto, North West Nigeria (1999-2004). *J Med Sci.* 2007;7(6):1033-8.
- 281 35. Donald Maxwell Parkin SN, Fred Wabwire-Mangen and Henry R. Wabinga. Changing cancer
282 incidence in Kampala, Uganda, 1991–2006. *International Journal of Cancer* 2010
283 126,:1187–95
- 284 36. Odutola M, Jedy-Agba EE, Dareng EO, Oga EA, Igbino F, Otu T, et al. Burden of Cancers
285 Attributable to Infectious Agents in Nigeria: 2012-2014. *Front Oncol.* 2016;6:216.
- 286 37. Joachim C, Veronique-Baudin J, Ulric-Gervaise S, Pomier A, Pierre-Louis A, Vestris M, et al.
287 Cancer burden in the Caribbean: an overview of the Martinique Cancer Registry profile. *BMC*
288 *Cancer.* 2019;19(1):239.
- 289 38. Brooks SE, Wolff C. Cancer in the Caribbean and environs. A comparison of age-standardized
290 rates for 9 population groups. *West Indian Med J.* 1992;41(3):103-10.
- 291 39. Ikeri NZ, Oguntunde OA, Igbokwe U, Abdulkareem FB, Banjo AA. Breast Cancer in a Lagos
292 Facility: Implications for the Institution of a Cancer Screening Programme. *Pathobiology.*
293 2018;85(4):254-60.
- 294 40. Ozumba BC, Nzegwu MA, Anyikam A, Okoye I, Okafor OC. Breast disease in children and
295 adolescents in eastern Nigeria--a five-year study. *J Pediatr Adolesc Gynecol.* 2009;22(3):169-72.

296