

# Research Article

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## Cancer Incidence in Nigeria and Border Countries

Isa Abdullahi Baba<sup>1\*</sup>, Evren Hincal<sup>2</sup>

<sup>1</sup>PhD Student, Mathematics Department, Near East University, Lefcoca, Nicosia 99010, CYPRUS

<sup>2</sup>Associate Professor, Mathematics Department, Near East University, Lefcoca, Nicosia 99010, CYPRUS

\*Email for Correspondence: [isababa7@yahoo.com](mailto:isababa7@yahoo.com)

### ABSTRACT

Many inequalities in cancer incidence exist between Nigeria and border countries. This information is absent or largely unavailable.

Benin, Cameroun, Chad, Niger, and Nigeria cover a population of more than 224,922,000. Globocan data base supplied incidence for 132,939 cases of cancer for these countries. The prevalence of Bladder, Colorectum, Kaposi sarcoma, Larynx, Leukaemia, Lip, oral cavity, Liver, Lung was estimated for the year 2012. The prevalence of Nasopharynx, Non – Hodgkin, Lymphoma, Pancrease, Prostrate, Stomach combined was also estimated for the same year.

The most common male cancer found in Nigeria and border countries is Prostate cancer, seconded by Liver. In this study also we found Breast cancer to be the most common in females, followed by Cervical Cancer. Larynx and Kaposi sarcoma are found to be the least common cancer for both males and females in the population.

In conclusion, the findings of this study gave lights to some guidelines to aid the design of cancer control programs in Nigeria and border countries. The spectrum of the cancers is dominated by the breast & Cervix uteri for females, while Prostate & Liver for males.

**Key words:** Globocan, Nigeria, border countries, incidence, percentages

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### INTRODUCTION

Cancer is among the major health problem globally with an estimated 10 million incidences and 6 million cancer mortality annually (Parkin, 2000). Only in 2008, there were 12.7 million cases and 7.6 million cancer mortality (Ferlay et al, 2010). The projection shows that, by 2030, 70% of all new cases will be found in developing countries (Boyle and Levin, 2008). The reason being as a result of population growth and increased life expectancy.

There is no enough public policy pertaining cancer issues across Sub-Saharan African countries, (Akinde et al, 2015). Only in Nigeria, more than 10,000 cancer deaths and about 250,000 incidences are recorded every year (Ferlay et al, 2010).

The main aim of this work is to estimate the cancer incidence inequalities between Nigeria and border countries. Benin, Cameroun, Chad, Niger, and Nigeria have a combined population of more than 224,922,000. Despite the fact that, these countries belong to different entities, they have geographical proximity: Cameroun and Chad belong to Central Africa, whereas Benin, Niger, and Nigeria belong to West Africa. Benin covers a population of 9,351,000 (4.16%), Cameroun 20,468,000 (9.10%), Chad 11,830,000 (5.26%), Niger 16,644,000 (7.40%), and Nigeria alone covers 166,629,000 (74.08%).

The sources of data obtained by Globocan from these countries are: Benin by simple mean of the rates from West Africa. Cameroun from Yaoundé cancer registry (covers about 12.45% of the total population). Chad by simple estimate of Sudan, Niger, Nigeria and Cameroun rates. Niger from Niamey registry (covers about 7% of the total population). Finally, Nigeria from Abuja, Calabar, and Ibadan registry (covers about 3.75% of the total population).

Seventeen types of cancer are considered in the analysis. 12 for both sexes: bladder, colorectum, Kaposi sarcoma, larynx, leukemia, lip - oral cavity, liver, lung, nasopharynx, Nonhodgkin lymphoma, pancreas, and stomach. 4 for females only: breast, cervix uteri, corpus uteri, and ovary. The remaining 1 is pancreas, which is for males only.

## MATERIALS AND METHODS

The data are obtained from Globocan 2012 data base. These data include patient age group, sex, country, and type of cancer. Benin, Cameroun, Chad, Niger, and Nigeria cover a population of more than 224,922,000. Globocan data base supplied incidence for 132,931 cases of cancer for these countries. The prevalence of Bladder, Colorectum, Kaposi sarcoma, Larynx, Leukemia, Lip, oral cavity, Liver, Lung was estimated for the year 2012. The prevalence of Nasopharynx, Non - Hodgkin, Lymphoma, Pancrease, Prostrate, Stomach combined was also estimated for the same year. These cancer sites are chosen from the data base, based on their ASR (greater than 1 in either of the sexes and in the both sexes) values in Nigeria.

The data were analyzed statistically using simple figures, percentages, tables, and graphs.

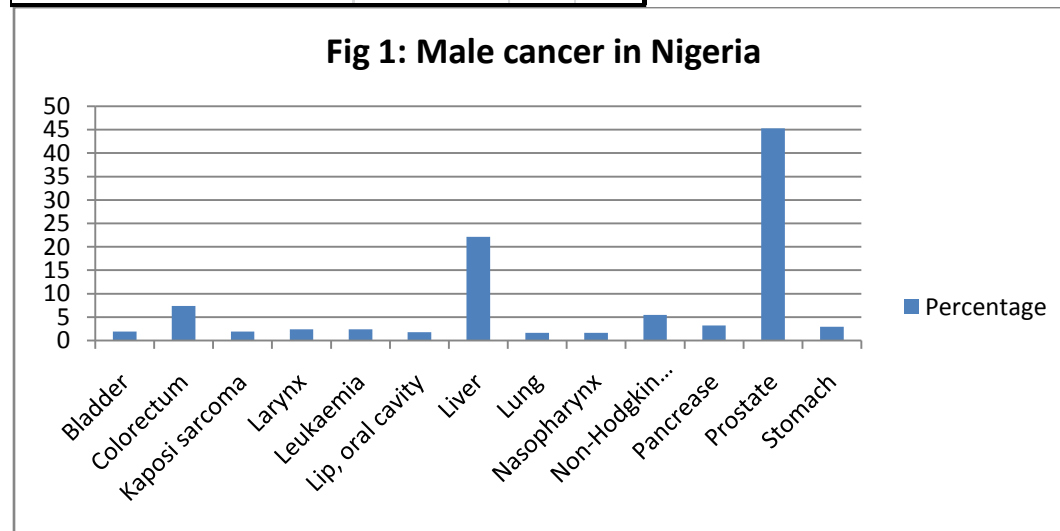
## RESULTS

Table 1 presents a summary of Male cancer in Nigeria based on cancer site, ICD code, ASR values and percentage of each cancer. Prostate cancer (45.3%) has the higher prevalence, followed by Liver (22.1%). The types of cancer with less prevalence are Lung (1.62%) and Nasopharynx (1.62%). Figure 1 presents bar charts showing the percentage of male cancer in Nigeria.

Table 1: Male cancer in Nigeria by cancer site, ICD code, ASR values and percentages

Cancer Site	ICD 10	ASR	%
Bladder	C67	1.3	1.92
Colorectum	C18 - 21	5	7.37
Kaposi sarcoma	C46	1.3	1.92
Larynx	C32	1.6	2.36
Leukaemia	C91 - 95	1.6	2.36
Lip, oral cavity	C00 - 08	1.2	1.77
Liver	C22	15	22.1
Lung	C33 - 34	1.1	1.62
Nasopharynx	C11	1.1	1.62
Non - Hodgkin Lymphoma	C82 -85, C96	3.7	5.46
Pancrease	C25	2.2	3.24
Prostrate	C61	30.7	45.3
Stomach	C16	2	2.95
Total		67.8	100

Fig 1: Male cancer in Nigeria



For females, the type of cancer with the highest prevalence is Breast (45.7%), followed by Cervix uteri (26.3%). The cancer with less prevalence is Larynx (0.09%), followed by Nasopharynx (0.54%). Table 2 presents these summaries while figure 2 presents bar charts showing the percentages.

**Table 2:** Female cancer in Nigeria by cancer site, ICD code, ASR values and percentages

Cancer Site	ICD 10	ASR	%
Bladder	C67	0.8	0.73
Breast	C50	50.4	45.7
Cervix uteri	C53	29	26.3
Colorectum	C18 - 21	4	3.63
Corpus uteri	C54	3.4	3.08
Kaposi sarcoma	C46	0.8	0.73
Larynx	C32	0.1	0.09
Leukaemia	C91 - 95	1.4	1.27
Lip, oral cavity	C00 - 08	1.2	1.09
Liver	C22	8.1	7.34
Lung	C33 - 34	1.1	1
Nasopharynx	C11	0.6	0.54
Non - hodgkin lymphoma	C82 - 85, C96	2.8	2.54
Ovary	C56	3.1	2.81
Pancrease	C25	1.5	1.36
Stomach	C16	2	1.81
Total		110	100

**Fig 2: Female cancer in Nigeria**

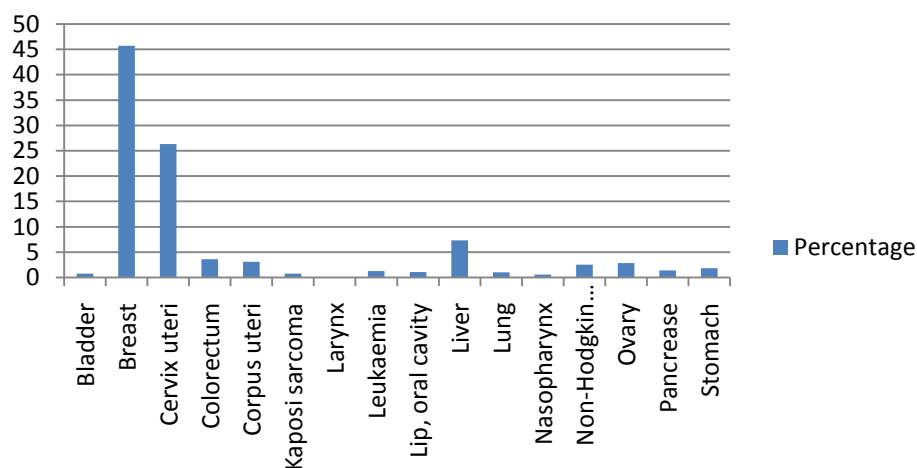


Table 3 shows the inequality in Male cancer for Nigeria and the border countries. It can be seen from the table, that the most common cancer in both countries is Prostate cancer. Nigeria is the highest among them with 45.3%, followed by Cameroun 38%, then Benin 36.8%, then Chad 32.6%, and finally Niger 23.6%. The second most common Male cancer found in Nigeria is Liver 22.1%. It is also the case in Benin 27.5%, Chad 16.5%, and Niger 23.1%. In Cameroun the second serious case is found in Non - Hodgkin Lymphoma 14%. Cumulatively, there is a higher percentage (36.5%) of Prostate followed by 20.4% Liver cancer for Men, in Nigeria and neighbor countries.

The least common Male Cancer in Nigeria is Lung 1.62 % and Nasopharynx 1.62%, followed by Lip, oral cavity 1.77%. It is not the same for the rest of the countries. In Benin, the least common is Kaposi sarcoma 0.57%, followed by Pancrease 1.14%. In Cameroun the least common is found in Larynx 0%, and then Bladder 1.8%. The least common cancer in Chad is found in Larynx 2.31%, followed by Kaposi sarcoma and Lung both 2.67%. Lastly in Niger

the least common is found in Kaposi sarcoma 0.79% and then Lung 1.31%. Cumulatively, there is least percentage (1.68%) of Larynx cancer, followed by 1.99% Kaposi sarcoma cancer for Men, in Nigeria and neighbor countries.

**Table 3: Male cancer in Nigeria and border countries by cancer site, ICD code, ASR values and percentages**

Cancer Site	ICD 10	Benin		Cameroun		Chad		Niger		Nigeria		Total	
		ASR	%	ASR	%	ASR	%	ASR	%	ASR	%	ASR	%
Bladder	C67	2.6	3.72	1.1	1.8	2.1	3.74	2.5	6.56	1.3	1.92	9.6	3.29
Colorectum	C18 - 21	5.2	7.44	3.2	5.3	4.6	8.19	5	13.1	5	7.37	23	7.88
Kaposi sarcoma	C46	0.4	0.57	2.3	3.8	1.5	2.67	0.3	0.79	1.3	1.92	5.8	1.99
Larynx	C32	0.9	1.29	0	0	1.3	2.31	1.1	2.89	1.6	2.36	4.9	1.68
Leukaemia	C91 - 95	1.3	1.86	2.4	4	3	5.34	1.7	4.46	1.6	2.36	10	3.42
Lip, oral cavity	C00 - 08	2.9	4.15	3.1	5.2	2.5	4.45	1.9	4.99	1.2	1.77	11.6	3.97
Liver	C22	19.2	27.5	7.3	12	9.3	16.5	8.8	23.1	15	22.1	59.6	20.4
Lung	C33 - 34	2.2	3.15	2	3.3	1.5	2.67	0.4	1.05	1.1	1.62	7.2	2.47
Nasopharynx	C11	0.9	1.29	3.2	5.3	2	3.56	0.5	1.31	1.1	1.62	7.7	2.64
Non - Hodgkin Lymphoma	C82 -85, C96	3.9	5.58	8.2	14	5.6	9.96	1.9	4.99	3.7	5.46	23.3	7.98
Pancrease	C25	0.8	1.14	1.5	2.5	2	3.56	2.7	7.09	2.2	3.24	9.2	3.15
Prostate	C61	25.7	36.8	23	38	18.3	32.6	9	23.6	31	45.3	107	36.5
Stomach	C16	3.9	5.58	2.7	4.5	2.5	4.45	2.3	6.04	2	2.95	13.4	4.59
Total		69.9		60		56.2		38.1		68		292	

In Table 4, the inequalities in Female Cancer for Nigeria and border countries are presented. It can be observed from the table, that the most common cancer in both countries is Breast Cancer. Nigeria is the highest among them with 45.7%, and then Chad 41.5%, then Niger 41.2%, then Cameroun 36%, and lastly Benin 34%. The second most common Female cancer in these countries is Cervix uteri. Benin and Cameroun have highest percentage of 31% each, followed by Nigeria, Chad and Niger with 26.3%, 22.9%, and 14.9% respectively. In total, there is a higher percentage of Breast cancer 39.9%, followed by Cervix uteri 26.2% in Nigeria and border countries.

The least common Female Cancer in Nigeria is Larynx 0.09%, it is the same in Cameroun 0%, Chad 0%. In Benin, the three least common Female cancers are Kaposi sarcoma, Larynx, and Nasopharynx each 0.22%. In Niger, the least common Female cancer is Lung 0%. The second to the least in Nigeria is Nasopharynx 0.54%. In Niger, the two second to the least common is Larynx and Nasopharynx 0.17% each. Whereas the second to the least common in Benin, Cameroun, and Chad are Pancrease 0.45%, Pancrease 0.3%, and Kaposi sarcoma 0.61% respectively. In general, the least common cancer in Nigeria and border countries is Larynx 0.09%, followed by Kaposi sarcoma 0.6%.

**Table 4: Female cancer in Nigeria and border countries by cancer site, ICD code ASR values and percentages**

Cancer Site	ICD 10	Benin		Cameroun		Chad		Niger		Nigeria		Total	
		ASR	%	ASR	%	ASR	%	ASR	%	ASR	%	ASR	%
Bladder	C67	1.1	1.24	0.5	0.5	0.9	1.09	1.2	2.08	0.8	0.73	4.5	1.03
Breast	C50	30.2	34	35	36	34.1	41.5	23.8	41.2	50	45.7	174	39.9
Cervix uteri	C53	27.6	31	30	31	18.8	22.9	8.6	14.9	29	26.3	114	26.2
Colorectum	C18 - 21	3.7	4.16	3.3	3.4	3.8	4.62	4.6	7.97	4	3.63	19.4	4.45
Corpus uteri	C54	3.4	3.82	2.8	2.9	3	3.65	3.1	5.37	3.4	3.08	15.7	3.6
Kaposi sarcoma	C46	0.2	0.22	0.9	0.9	0.5	0.61	0.2	0.35	0.8	0.73	2.6	0.6
Larynx	C32	0.2	0.22	0	0	0	0	0.1	0.17	0.1	0.09	0.4	0.09
Leukaemia	C91 - 95	1	1.12	1.3	1.3	1.6	1.95	0.8	1.39	1.4	1.27	6.1	1.4
Lip, oral cavity	C00 - 08	2.1	2.36	2.3	2.4	1.8	2.19	1.6	2.77	1.2	1.09	9	2.07
Liver	C22	8.9	10	2.5	2.6	4.1	4.99	3.1	5.37	8.1	7.34	26.7	6.13
Lung	C33 - 34	0.9	1.01	1	1	0.9	1.09	0	0	1.1	1	3.9	0.9
Nasopharynx	C11	0.2	0.22	1.5	1.6	0.9	1.09	0.1	0.17	0.6	0.54	3.3	0.76
Non - hodgkin lymphoma	C82 - 85, C96	2.2	2.47	8	8.3	4.1	4.99	1.3	2.25	2.8	2.54	18.4	4.22
Ovary	C56	3.2	3.6	4.9	5.1	5.4	6.57	7.3	12.7	3.1	2.81	23.9	5.49
Pancrease	C25	0.4	0.45	0.3	0.3	0.7	0.85	0.4	0.69	1.5	1.36	3.3	0.76
Stomach	C16	3.6	4.05	2	2.1	1.6	1.95	1.5	2.6	2	1.81	10.7	2.46
Total		88.9		97		82.2		57.7		110		436	

Table 5 summarizes these inequalities for most common and least common cancer in Nigeria and border countries for both males and females, the cumulative result is given.

Table 5: Summary of most common and least common cancer types for males and females							
	Males	Benin	Cameroun	Chad	Niger	Nigeria	All countries
Most common	1st	Prostate (36.8%)	Prostate (32.6%)	Prostate (32.6%)	Prostate (23.6%)	Prostate (45.3%)	Prostrate (36.5%)
	2nd	Liver (27.5%)	Non-Hodkin Lymphoma (14%)	Liver (16.5%)	Liver (23.1%)	Liver (22.1%)	Liver (20.4%)
Least common	1st	Kaposi sarcoma (0.57%)	Larynx (0%)	Larynx (0%)	Kaposi sarcoma (0.79%)	Lung and Nasopharynx (1.62%)	Larynx (1.68%)
	2nd	Pancrease (1.14%)	Bladder (1.8%)	Kaposi sarcoma & Lung (2.67%)	Lung (1.31%)	Lip, oral cavity (1.77%)	Kaposi sarcoma (1.99%)
	Females						
Most common	1st	Breast (34%)	Breast (36%)	Breast (41.5%)	Breast (41.2%)	Breast (45.7%)	Breast (39.9%)
	2nd	Cervix uteri (31%)	Cervix uteri (31%)	Cervix uteri (22.9%)	Cervix uteri (14.9%)	Cervix uteri (26.3%)	Cervix uteri (26.2%)
Least common	1st	Kaposi sarcoma, Larynx & Nasopharynx (0.22%)	Larynx (0%)	Larynx (0%)	Lung (0%)	Larynx (0.09%)	Larynx (0.09%)
	2nd	Pancrease (0.45%)	Pancrease (0.3%)	Kaposi sarcoma (0.61%)	Larynx & Nasopharynx (0.17%)	Nasopharynx (0.54%)	Kaposi sarcoma (0.6%)

## DISCUSSION

### All the Five countries

In this research, the most common male cancer found in Nigeria and border countries is Prostate cancer. This result is in agreement with the finding by Lisa W. Chu et al. which shows that the most frequent cancer rates for Africans is Prostate cancer (Lisa et al, 2011). The second most common male cancer is Liver Cancer, in agreement with the study by World Bank in 2006, which shows the second most leading cancer in African men is Liver cancer (Jamison et al, 2006).

Research by Ahmed Jemal et al. shows the most common female cancer worldwide is Breast cancer (Ahmed et al, 2011). In this study also we found Breast cancer to be the most common in the population, followed by Cervical Cancer. It is in line with the finding by AN Fiander in 2011, which shows that Cervical cancer poses health burden in Africa (Fiander, 2011).

Larynx and Kaposi sarcoma are found to be the least common cancer for both females and males in the population. This result is in agreement with the findings by Samuel W.B., Marshall M., Roy R.C (Samuel et al), Iseh KR (Iseh et al, 2011), and Krown SE (Krown, 2011).

### Nigeria

The most common male cancer cases are the Prostate and Liver. This result is in line with the finding by Elima Jeddy – Agba et al. in 2012. The least common male cancer in Nigeria is Lung and Nasopharynx, which agrees with the findings in Kano State by Mohammed et al (2008).

The most common female cancer in Nigeria is Breast and then Cervix. This result is not far from the findings in Lagos Nigeria 2012 by Akinde et al (2015). The least common cancer being Larynx and Nasopharynx, which is also in agreement with the findings in Kano State (Mohammed et al, 2008).

### Benin and Niger

They are both West African countries. The most common male cancer for both is Prostate then Liver, where the least common is Kaposi sarcoma then Pancrease in Benin, and Kaposi sarcoma then Lung in Niger. The above result is not far from the study of Prostate Cancer in West - Africa by Hsing et al, (2014). It is also in line with the study of World Wide burden of cancer in 2008 by Ferlay et al, (2010).

The most common female cancer in Benin and Niger is Breast cancer, followed by Cervix uteri. The least common case is found in Kaposi sarcoma, Larynx, and Nasopharynx, followed by Pancrease in Benin and Lung followed by Larynx and Nasopharynx. The above result tallies with the findings in Cancer burden in Africa and opportunities for prevention by Ahmed et al (2011).

### Cameroun and Chad

They are both Central African countries. The most common male cancer for both is Prostate. Seconded by Liver in Chad, and Non – Hodgkin Lymphoma in Cameroun. The least common is Larynx then Bladder in Cameroun, and Larynx then Kaposi sarcoma and Lung in Chad. The above result is in contrast with the findings in 1986 - 1991 in Cameroun (Central Africa), where the leading cancer for men is Liver followed by Skin (Mbakop et al, 1992).

The most common female cancer in Cameroun and Chad is Breast cancer, followed by Cervix uteri. The least common case is found in Larynx for both countries, followed by Pancrease in Cameroun and Kaposi sarcoma in Chad. This result agrees with the findings in Cameroun from 2004 – 2011 by Z. Sando et al.

## CONCLUSION

In conclusion, the findings of this study gave lights to some guidelines to aid the design of cancer control programs in Nigeria and border countries. The spectrum of cancers is dominated by breast & Cervix uteri for females, and Prostate & Liver for males.

There is need for a quick plan to develop a national cancer screening program for the prevention and early detection of the major cases of the Breast, Prostate, Liver, and Cervix uteri. This involves public awareness on the importance of lifestyle and dietary modification as a component of health campaigns in decreasing cancer incidence.

The need for development of regional oncology centers affiliated to tertiary health facilities for cancer treatment and research cannot be overemphasized. Current cancer registries in Nigeria and border countries should also be organized into well-structured networks of population-based cancer registry systems coordinated by a national cancer registry. There is also need for the establishment of a National cancer institute in these countries, but that requires the support of National and International agencies for cancer research and control.

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