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RELATIONSHIP BETWEEN SOCIO-DEMOGRAPHIC FEATURES AND CANCER IN PORT HARCOURT, NIGERIA.

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ABSTRACT

Background: Cancer is a public health menace and has high morbidity and mortality rate in Nigeria. Socio-demographic features of affected victims are pertinent to the formulation of effective cancer control programmes. **Objective:** To determine the relationship between selected socio-demographic features and cancer in Port Harcourt and its environs. **Materials and Method:** Port Harcourt cancer registry data from 2008 to 2017 were reviewed for socio-demographic variables of cancer patients. Information on dates of incidence, level of education, occupation, place of domicile, ethnicity, gender, age, topography of cancer, morphology and the degree of differentiation were retrieved. Cases were coded using the International Classification of Disease for Oncology, 3rd Edition (ICD-O3) and analyzed using SPSS version 23. Chi-Square test statistics with p-value of <0.05 was considered significant. **Result:** Of the 2682 cases, mean age was 51.85 ± 7.7 years, male:female ratio was 0.8:1. The frequency of the cancers were "other" cancers > breast > prostate > cervical > leukemia > lymphoma > ovary. Prostate (676cases) and breast (741cases) were most common among males and females respectively. Sixty three and a half percent (63.5%) were older than 45 years while 32.5% were 45 years and younger. Patients native to the indigenous ethnic groups of Rivers State were in majority - 51.6%. Ibos constituted - 33.7% while Hausa and other northern ethnicities constituted 9.7%. The Yorubas made up 5.1%. Self-employed patients constituted 35.2%, 28.2% were civil servants while 21.7% were retired from active service and 6.9% were students. Majority of the patients - 54.9% attained tertiary level of education while those without formal education constituted 3.2%. Majority - 67.6% were urban dwellers while 32.4% were rural dwellers. **Conclusion:** There is statistically significant relationship between socio-demographic variables and cancer in Port Harcourt. Overall, the educated, economically active, urban dweller is more likely to present with cancer than the uneducated, economically inactive rural dweller. Therefore, strategists involved with cancer intervention programs should take cognizance of the socio-demographic factors in the proper planning of intervention programmes in our environment.

KEYWORDS: Socio-demographic, education, occupation, ethnicity, cancer, Port Harcourt.

1.0 INTRODUCTION

Malignancies, also commonly referred to as cancers are disease conditions that arise from uncontrolled division of cells in the body.[1] They are a group of disorders that involve different categories of cells in the body and are designated according to the cell type.[2] Although cancers strictly refers to such proliferations involving only the epithelial cells, but it is generally used to represent all malignancies, including those of other cells.[3] Cancers commonly metastasize to contiguous or distant tissues or organs, although they may be localized to the primary site.[4] Globally, cancer incidence and mortality have

continued to increase. In 2012, World Health Organization (WHO) reported about 14.1 million new cases and 8.2 million cancer deaths, up from the 12.7 million and 7.6 million cases respectively in 2008.[5] Mortality from cancer was further reported to have increased from 8.2 million in 2013 to 8.8 million in 2015.[6] These records show a worrisome increase in the trend of cancer incidence and mortality worldwide.

In Africa, Cancer has become a public health problem - constituting one of the leading causes of death.[7] It is projected that the annual incidence would be 1.28 million cases and the mortality would be 970,000 deaths by

2030.[8] This trend has been attributed to aging, growth of the population and increased incidence of smoking, obesity, physical inactivity, poor diet, and reproductive factors.[9,10] The cancer problem of the low- to middle-income countries including Nigeria is complicated by the grossly inadequate diagnostic and treatment infrastructure.[11]

Despite the increasing rate of cancers in Nigeria, its public health policy is largely non-functional or at best inadequate.[12] Socio-demographic features are important factors in the making of efficient public health policies on cancers. Few studies on socio demographic features of cancer have been carried out in Nigeria. For example Olusegun in his study on Spatial and socio-demographic disparities of cancer morbidity in Nigeria, showed a positive correlation between cancer pattern and indices of urbanization, industrialization and biomass energy utilization and that inequality in the development levels of the states influenced their cancer pattern.[13]

This study evaluated the relationship between selected socio-demographic features and cancer in Port Harcourt and its environs.

2.0 MATERIALS AND METHOD

The data covers the period between 1st January 2008 and 31st December 2017 for the two most populous local government areas of Rivers state of Nigeria – Port Harcourt City and Obio Akpor. These together constitute the geographic capital of Rivers state. These council areas are upland by topography and have mixed rural and urban settlement patterns. The joint population of the areas in 2006 census was 1,000,908 (19.3% of Rivers state population).[14] The cancer registry is domiciled at the University of Port Harcourt Teaching Hospital, (UPTH) Port Harcourt. Generally, cancer cases were defined by histology, cytology and hematology smear reports as well as patients' physical examination findings, clinical impressions and autopsy/death certificate review findings. Notification sources were: out-patients' departments and wards of the tertiary, general and private hospitals that were involved in the diagnosis and treatment of cancer patients as well as radiology and pathology diagnostic centres. At the notification centers, cases were abstracted onto a Federal Ministry of Health (FMOH) designed register and stored electronically using the Institute of Human Virology, Nigeria (IHVN) issued Canreg 4 software. The International Classification of Disease for Oncology, 3rd Edition (ICD-O3) formed the basis of classification and coding of cases.[15] As much as possible completeness of case identification and prevention of duplication were ensured through regular visits to case notification centers and reviews of the electronic data. The data was exported to statistical package for social sciences (SPSS) software for analysis. Of interest in every case were the dates of incidence, patient's socio demographic features including: level of education, occupation, place of domicile, gender and age. Also, information on topography, morphology and the degree of differentiation were sought. The Chi – Square test statistics was use to analyze the relationship between various cancer types and the socio demographic features considered for this study and the level of significance was at p – value < 0.05.

3.0 RESULTS

Among 2682 cancer cases reviewed in this study with mean age of 51.85 ± 17.70 years, females constituted 1491 cases (55.59%) while 1191 cases (44.41%) were males – giving male: female ratio of 0.8:1. Majority – 1702 cases (63.5%) were older than 45 years while 980 cases (32.5%) were 45years and younger. Majority of the cancer Patients in this study were from the indigenous ethnic nationalities of Rivers state – 1383 cases, (51.6%) followed by those from Ibos, Hausa and other ethnicities from the northern part of Nigeria with 903 cases (33.7%) and 258 cases (9.7%) respectively. The Yorubas constituted the least with 138 cases (5.1%). Patients who were self-employed other than farmers constituted 945 cases (35.2%) followed by civil servants with 757 cases (28.2%) while for 74 cases (2.8%) their occupations were not specified. In terms of educational attainment, majority of the patients - 1473 cases (54.9%) attained tertiary level of education while those without formal education constituted 98 cases (3.2%). Majority - 1812 cases (67.6%) were urban dwellers while 870 cases (32.4%) were rural dwellers (table 1).

The commonest six cancers were cross-tabulated with the socio-demographic variables. Cancers which affect both males and females generally showed very narrow gender gap except breast cancer that was strongly skewed to the females - 95.4% vs. 4.6% for females and males respectively.

Leukemia and breast cancer displayed preponderance of cases among young patients of 45 years and less in a proportion of 60% and 54.4% respectively as against prostate - 97.3%, cervix – 75.5%, ovary – 59.8%, lymphoma – 56.5%, and the relatively uncommon cancers grouped together as "others" – 54% which all showed preponderance of older patients aged above 45 years. The commonest cancers among the Ibos was prostate cancer – 32.1% followed by breast cancer – 27.1% while the relatively uncommon cancers grouped together as "others" constituted 25%, while for the Yorubas, breast cancer was much more common – constituting 44.2%, followed equally by prostate and "others" group of cancers with 26% each. Also for ethnic groups indigenous to Rivers state, the uncommon cancers grouped as "others" topped the list with 29%, followed by breast cancer – 28.5%, while prostate constituted 23%. Similar trend as with ethnicities of Rivers state was observed for the Hausa and other northern ethnic groups as the uncommon cancers grouped together as "others" constituted 36.4%, followed by breast with 29.8% and prostate with only 12%. For patients who were retired at the period of diagnosis,

prostate cancer was very predominant with 61.3%, distantly followed by "others" – 16.7% and breast with 11.7%. The "others" cancer group affected the civil servants majorly – constituting 40%, followed by breast with 27.5% and prostate with 13.9%. Among farmers, prostate cancer predominated with 50.4%, followed by the "others" group of cancer with 21.6% and breast cancer with 10.8%. Breast cancer was the bane of the "self employed other than farmers" as it constituted 49.3%, followed by "others" with 17.1% and prostate cancer with 15.1%. Students were mainly affected by the "others" group of cancers with 59.7% followed by leukemia with 18.8% and breast cancer with 10.2%. The highest specific proportion of leukemic patients were found among students with 18.8%, while the retired and self-employed were the least involved with 1.5% and 1.3% respectively. Breast cancer significantly affected all occupational groups in this study but majorly affected the self employed and civil servants - constituting 49.3% and 27.5% of their respective group sums. Similarly, prostate cancer involved all groups but majorly affected retired patients and farmers – constituting 61.3% and 50.4% of the groups. Majority (36.7%) of those without formal education were affected by the "others" group of

cancers followed by leukemia with 14.2% then cervix and prostate each of which constituted 13.3%. Those with elementary/primary education were mostly affected by prostate cancer (42.7%) followed by the "others group - 25.8% and breast cancer with 13.5%. For patients that attained secondary/high school education, the "others" group predominated with 32.6%, followed by prostate and breast cancers with 25.3% and 24.3% respectively. Those who attained tertiary level of education had breast and prostate cancers as the most frequent specified cancers with 35.1% and 23.8% respectively of their sums, while the "others" group constituted 25.3%. Overall, leukemia was more common among those without formal education and those with only primary/basic education. Breast and prostate cancers were more common among patients who attained secondary/high school and tertiary/college education. For the rural dwellers, breast and prostate were the commonest specific cancers with 24.1% each while the "others" constituted 32.4%. The urban dwellers also showed predominance of breast and prostate cancers with 31.3% and 25.7%, while the "others" group constituted 26.3%.

Table 1: Distribution of socio-demographic features of cancer.

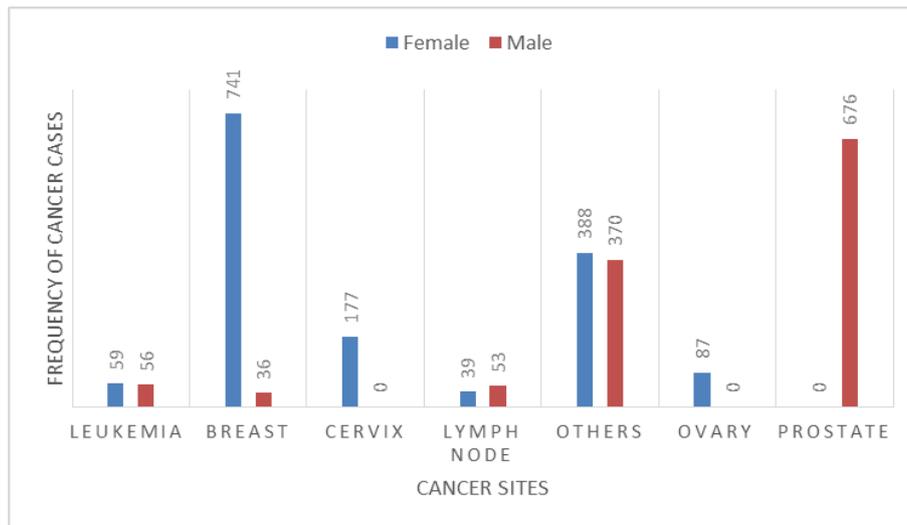| Scio Demographic Variables		Frequency	Percentage	Total
Gender	Male	1191	44.41	2682 (100)
	Female	1491	55.59	
Age Group	> 45yrs	1702	63.5	2682 (100)
	0 – 45yrs	980	36.5	
Ethnicity of Patients	Igbo	903	33.7	2682 (100)
	Yoruba	138	5.1	
	Ethnic groups indigenous to Rivers state	1383	51.6	
	Hausa & other northern ethnicities	258	9.7	
Occupation	Not stated	74	2.8	2682 (100)
	Retired from active service	581	21.7	
	Civil Servants	757	28.2	
	Farming	139	5.2	
	Self Employed, other than faming	945	35.2	
	Students	186	6.9	
Place of domicile	Rural	870	32.4	2682 (100)
	Urban	1812	67.6	
Level of education	Without formal education	98	3.7	2682 (100)
	Primary Education	178	6.6	
	Secondary/high school Education	933	34.8	
	Tertiary/college Education	1473	54.9	

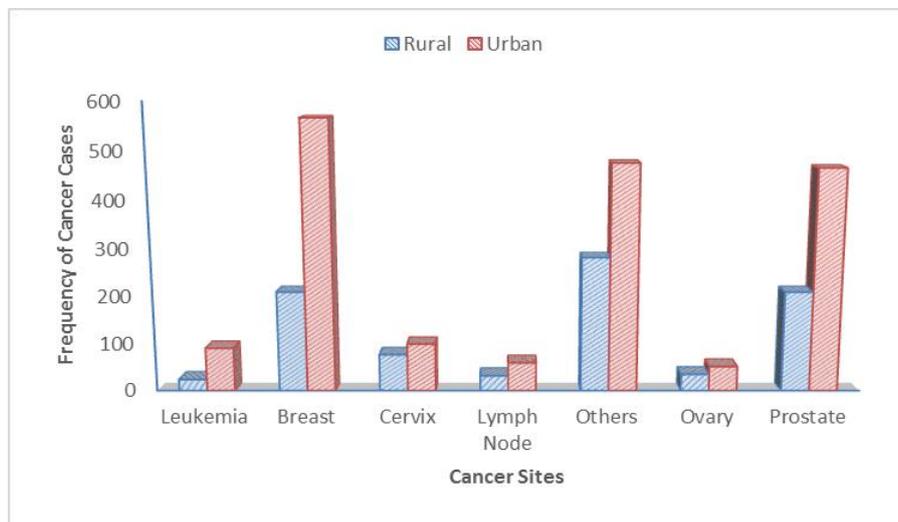**Figure 1: Distribution of cancer sites and gender.**

Figure 2: Distribution of cancer sites and place of domicile.

4.0 DISCUSSION

In this study, Socio demographic features of cancers in our environment such as age, sex, ethnicity, place of abode, occupation and level of education were considered to see their relationship with the various primary cancer sites. Although most cancer related studies involve age and gender in the statistical analyses, none from our environment has critically and holistically evaluated socio-demographic variables in relation to cancer as was done in this work.

A statistically significant relationship (p – value < 0.05) was noted between the socio-demographic variables and the cancer at 95% confidence interval.

Females showed a significantly higher burden of overall cancers in this study. Other cancer registry based studies in Nigeria have also reported similar trend.[16,17] However, this is contrary to global trends which report overall preponderance of males in cancer incidence.[18–21] Only lymphoma showed male predominance - 57.6%.

The preponderance of females among Nigerian cancer patients have been among other things, attributed to the better health-seeking behavior of women compared to men.[22]

The overall mean age of cancer patients was 51.9 ± 17.7 years with majority of patients – 97.3% being above 45 years of age at presentation. Specifically, only leukemia and breast cancer showed predominance of young patients composing 60% and 54% respectively of patients who were 45 years and younger. This observation is consistent with the established body of knowledge that cancer is commonly age-related.[23,24] That leukemia is predominantly a childhood malignancy is already established but that breast cancer is predominantly presenting among fairly young patients is a feature which has been reported among some Nigerian patients. Specifically, previous breast cancer studies in Nigeria indicated relatively low patient mean age (42.7 - 50 years) and peak age (36 - 45 years).[25–27] On the contrary, studies in Australia and South Korea reported

that among breast cancer patients, those aged 40 years and below constituted only 6 and 9.6% respectively.[28,29]

It was also observed that the mean age at presentation of Ibos and the Hausas were higher (53.9 and 53.3 years respectively) than those of the Yorubas and the indigenous ethnicities of Rivers state (51.1 and 50.3 respectively). Ethnicity is recognised risk factor in the etiology of some cancers.[30,31] A study carried out by Sapira et al on ethnicity and prostate cancer in Southern Nigeria observed that the Ibos presented with higher mean age (71 years) than the Ikwerres and Ogonis of Rivers state (67 years).[32] More studies are necessary to explore the ethnic differences in the profile of cancers in our environment.

Place of abode of patients showed significant association with cancer (p − value < 0.05). This followed from the observation that majority of the patients were urban dwellers. This concurs with other Nigerian and international studies, suggesting that cancer rates are higher in urban than rural areas.[13,30,33] This may be the result of the drift of cancer patients from rural areas to Port Harcourt and Obio-Akpor local government areas in search of the needed specialised treatment. This is because the two local government areas constitute the capital of Rivers state and houses the major functional state and federal government owned tertiary hospitals as well as privately owned specialist hospitals and diagnostic centres capable of diagnosing and treating cancer patients. Superstitious beliefs, cultural barriers and pervading poverty prevalent in the rural areas discourage cancer patients in rural areas from presenting to health facilities, which are mainly located in the cities. This finding may be confounded by urban bias in cancer reporting due to the location of cancer registries in urban areas and better cancer awareness among urban residents. Also urban dwellers are more exposed to industrial and vehicular pollutants and indulge more in cancer-prone westernized diets.[34]

Ethnic distribution showed a predominance of the ethnicities indigenous to Rivers state with 1383 cases, followed by the Ibos with 903 cases, Hausa and other northern ethnicities with 258 cases and the Yorubas having the least with 138 cases. This is understandable because the indigenes constitute the greater population of the settlement in the catchment areas, followed by the Ibos because of their highly itinerant nature as well as the geographic contiguity of the Ibo native states to Rivers state. While prostate cancer predominated among the Ibos, breast cancer did among the Yorubas. The "others" group of cancers predominated among patients of ethnicities indigenous to Rivers state, as well as those of Hausa and other northern ethnicities. Although the population of the composite ethnicities involved in this study may not be representative enough, these findings may give clue to differing cancer profiles of the different ethnic groups in Nigeria. However a more holistic national study is warranted.

This study also showed an inverse relationship between patients' economic productivity (dependent on their occupations) and the incidence of cancer (p − value < 0.05). Majority of the patients - 63.4% (35.2% self employed and 28.2% civil servants) were economically productive, while the less economically productive – students and those who were retired from active service constituted far less. This highlights not just the indirect costs of cancer such as loss of income or productivity due to illness or premature death but direct costs such as those of treatment and time spent by caregivers. Overall, the costs of cancer constitute huge personal and societal economic derailment especially for our poor economy.[35]

Late age of childbearing and low parity are commonly associated with higher levels of education and socio-economic status (SES), due to postponement of childbearing until after education and the attendant increase of maternal age. Also, there is a positive correlation between social class and prevalence of behavior-related risk factors like overweight.

This study also revealed that patients' educational level significantly associated with cancer incidence (p − value < 0.05). Patients who attained tertiary level of education recorded the highest incidence of cancer (54.9%) while those without formal education constituted the least (3.7%). Since educational attainment is a factor in determining economic empowerment and urban dwelling which are in-turn strong indicators of high socioeconomic status (SES), we therefore argue that there is predominance of patients with relatively high SES in our study. Consistent with our findings are other studies, which revealed higher incidence of cancer among patients of high SES.[36–38] Besides, those with tertiary education will more likely have appropriate cancer awareness that will prompt them to patronize cancer screening as well as recognize some of the specific symptoms of cancer earlier.[39,40]

This study was limited by the generally poor record keeping of medical and surgical practice in our environment. Patients information are manually recorded and stored. This makes for inaccurate, inconsistent and incomplete documentation of such information. Also the relatively low population of some of the ethnic groups that were discussed in this study, makes the generalized opinions on their socio-demographic features needing revalidation, which a national study will obviate.

5.0 CONCLUSION

There is statistically significant relationship between socio-demographic variables and cancer in Port Harcourt. Overall, the educated, economically active, urban dweller is more likely to present with cancer than the uneducated, economically inactive rural dweller. The high costs of cancer management are also highlighted. Therefore, strategists involved with cancer intervention programs should take cognizance of the socio-

demographic factors in the proper planning of intervention programmes in our environment.

REFERENCES

1. Cooper, G. M. The Development and Causes of Cancer. *Cell Mol. Approach 2nd Ed.*, 2000.
2. Zhang, P.-W. *et al.* Classifying Ten Types of Major Cancers Based on Reverse Phase Protein Array Profiles. *PLoS ONE* 10, 2015.
3. Feitelson, M. A. *et al.* Sustained proliferation in cancer: mechanisms and novel therapeutic targets. *Semin. Cancer Biol.,* 2015; 35: S25–S54.
4. Sarkar, S. *et al.* Cancer Development, Progression, and Therapy: An Epigenetic Overview. *Int. J. Mol. Sci.,* 2013; 14, 21087–21113.
5. Organization, W. H. Latest world cancer statistics Global cancer burden rises to 14.1 million new cases in 2012: Marked increase in breast cancers must be addressed. *LyonGeneva Press Release*, 2013.
6. Fitzmaurice, C. *et al.* Global, Regional, and National Cancer Incidence, Mortality, Years of Life Lost, Years Lived With Disability, and Disability-Adjusted Life-years for 32 Cancer Groups, 1990 to 2015: A Systematic Analysis for the Global Burden of Disease Study. *JAMA Oncol,* 2017; 3: 524–548.
7. WHO. Cancer. *World Health Organization | Regional Office for Africa* Available at: https://www.afro.who.int/health-topics/cancer. (Accessed: 21st May 2019), 2017.
8. Busolo, D. S. & Woodgate, R. L. Cancer prevention in Africa: a review of the literature. *Glob. Health Promot,* 2015; 22: 31–39.
9. Otang-Mbeng, W., Otunola, G. A. & Afolayan, A. J. Lifestyle factors and co-morbidities associated with obesity and overweight in Nkonkobe Municipality of the Eastern Cape, South Africa. *J. Health Popul. Nutr,* 2017; 36.
10. Thun, M. J., DeLancey, J. O., Center, M. M., Jemal, A. & Ward, E. M. The global burden of cancer: priorities for prevention. *Carcinogenesis,* 2010; 31: 100–110.
11. Price, A. J., Ndom, P., Atenguena, E., Mambou Nouemssi, J. P. & Ryder, R. W. Cancer care challenges in developing countries. *Cancer,* 2012; 118: 3627–3635.
12. Private Sector Health Alliance of Nigeria. Improving cancer care management in Nigeria, 2018.
13. Olusegun, O. Spatial and socio-demographic disparities of cancer morbidity in Nigeria: Patterns and factors. *Geogr.-Malays. J. Soc. Space,* 2017; 10.
14. National Population Commission, Federal Republic of Nigeria. 2006 Population and Housing Census. Priority Table Vol IV. Assessed online via www.population.gov.ng on 1st Aug. 2018.
15. Percy, C., Holten, V. van, Muir, C. S. & Organization, W. H. International classification of diseases for oncology, 1990.
16. Ukah, C. O. & Nwofor, A. M. Cancer incidence in south-east Nigeria: a report from Nnewi Cancer Registry. *Orient J. Med,* 2017; 29: 48–55.
17. Jedy-Agba, E. *et al.* Cancer incidence in Nigeria: a report from population-based cancer registries. *Cancer Epidemiol,* 2012; 36: e271–e278.
18. Torre, L. A. *et al.* Global cancer statistics, 2012. *CA. Cancer J. Clin,* 2015; 65: 87–108.
19. Cartwright, R. A., Gurney, K. A. & Moorman, A. V. Sex ratios and the risks of haematological malignancies. *Br. J. Haematol,* 2002; 118: 1071–1077.
20. Cook, M. B. *et al.* Sex disparities in cancer incidence by period and age. *Cancer Epidemiol. Prev. Biomark,* 2009; 18: 1174–1182.
21. Edgren, G., Liang, L., Adami, H.-O. & Chang, E. T. Enigmatic sex disparities in cancer incidence. *Eur. J. Epidemiol,* 2012; 27: 187–196.
22. Group, U. C. S. W. US cancer statistics: 1999–2009 incidence and mortality web-based report. *Atlanta GA USDHHS CDC Natl. Cancer Inst.*, 2013.
23. Deeks, S. G. HIV infection, inflammation, immunosenescence, and aging. *Annu. Rev. Med,* 2011; 62: 141–155.
24. Campisi, J. Aging, cellular senescence, and cancer. *Annu. Rev. Physiol,* 2013; 75: 685–705.
25. Ikpatt, O. F., Kuopio, T., Ndoma-Egba, R. & Collan, Y. Breast cancer in Nigeria and Finland: epidemiological, clinical and histological comparison. *Anticancer Res.,* 2002; 22: 3005–3012.
26. Adetifa, F. A. & Ojikutu, R. K. Prevalence and trends in breast cancer in Lagos State, Nigeria. *Afr. Res. Rev.,* 2009; 3.
27. Ukah, C. O. *et al.* The Immunohistochemical Profile of Breast Cancer in Indigenous Women of Southeast Nigeria. *Ann. Med. Health Sci. Res.,* 2017; 7.
28. Kim, J. K. *et al.* Do very young Korean breast cancer patients have worse outcomes? *Ann. Surg. Oncol,* 2007; 14: 3385–3391.
29. Australian Institute of Health and Welfare & Australasian Association of Cancer Registries. *Cancer in Australia 2001*. (Australian Institute of Health and Welfare, 2004.
30. Haddock, R. L., Whippy, H. J., Talon, R. J. & Montano, M. V. Ethnic disparities in cancer incidence among residents of Guam. *Asian Pac. J. Cancer Prev. APJCP,* 2009; 10: 57.
31. Verkasalo, P. K., Kaprio, J., Koskenvuo, M. & Pukkala, E. Genetic predisposition, environment and cancer incidence: a nationwide twin study in Finland, 1976–1995. *Int. J. Cancer,* 1999; 83: 743–749.
32. Sapira, M. K., Eke, N. & Nwofor, A. M. Ethnicity and prostate cancer in Southern Nigeria: A preliminary report. *Niger. J. Surg,* 2015; 21: 96–101.
33. Wilkinson, D. & Cameron, K. Cancer and cancer risk in South Australia: what evidence for a rural–urban health differential? *Aust. J. Rural Health,* 2004; 12: 61–66.

34. Ana, G. R., Sridhar, M. K. & Asuzu, M. C. Environmental risk factors and hospital-based cancers in two Nigerian cities. *J. Public Health Epidemiol,* 2010; 2: 216–223.

35. Torre, L. A., Islami, F., Siegel, R. L., Ward, E. M. & Jemal, A. Global Cancer in Women: Burden and Trends. *Cancer Epidemiol. Biomark. Prev. Publ. Am. Assoc. Cancer Res. Cosponsored Am. Soc. Prev. Oncol,* 2017; 26: 444–457.

36. Kunze, U. & Böhm, G. Breast Cancer and Socioeconomic Status in Austria. *Breast Care,* 2009; 4: 263–267.

37. Strand, B. H., Tverdal, A., Claussen, B. & Zahl, P.-H. Is birth history the key to highly educated women's higher breast cancer mortality? A follow-up study of 500,000 women aged 35–54. *Int. J. Cancer,* 2005; 117: 1002–1006.

38. Danø, H., Andersen, O., Ewertz, M., Petersen, J. H. & Lynge, E. Socioeconomic status and breast cancer in Denmark. *Int. J. Epidemiol,* 2003; 32: 218–224.

39. Bish, A., Ramirez, A., Burgess, C. & Hunter, M. Understanding why women delay in seeking help for breast cancer symptoms. *J. Psychosom. Res.,* 2005; 58: 321–326.

40. Grunfeld, E. A., Hunter, M. S., Ramirez, A. J. & Richards, M. A. Perceptions of breast cancer across the lifespan. *J. Psychosom. Res.,* 2003; 54: 141–146.