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Review Article

Epidemiology and Incidence of Common Cancers in Nigeria

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• Cancer; Nigeria; Trend; Incidence; Screening

Abstract

Cancer is a public health problem worldwide affecting all ages. It is the second commonest cause of death in developed countries and among the three leading causes of death in developing countries. WHO reported that about 24.6 million people live with cancer world-wide. There are 12.5% of all deaths are attributable to cancer and if the trend continues, it is estimated that by 2020, 16 million new cases will be diagnosed per annum out of which 70% will be in the developing countries. There are 11 cancer registries in Nigeria; located in various tertiary hospitals in various parts of the country. Most of these Registries are poorly funded and cancer screening program is at minimal level except probably The Ibadan Cancer Registry, however they all produce hospital-based data. This review focuses on the current trend of cancer in Nigeria which may be used to adjust the cancer control programs in order to reduce cancer deaths in the country and also to call the attention of both the clinical research based organization, institution and in individual researchers and the government to use the trend of cancer in Nigeria for setting priorities in cancer control programs/researches.

ABBREVIATIONS

WHO: World Health Organization; ASR: Age Standardized Incidence Rates

INTRODUCTION

Cancer is a malignant disease condition arising from uncontrolled division of cells in the body to form mass of tissues (Figure 1) [1]. These cells have the capacity to infiltrate adjacent or surrounding structures or spread to distant site in the body where they can go on proliferating uncontrollably thus, causing significant morbidity and mortality. There are various types of human cancers. They derive their names either based on the cell of origin or site in the body. For example we have anal cancer, bladder cancer, bone cancer, breast cancer, cervical cancer, colon cancer, endometrial cancer, kidney cancer, leukemia, liver cancer lymphoma, ovarian cancer, pancreatic cancer and so on. The menace of cancer in our society today cannot be over emphasized. It has become such a chronic disease and it claims lots of lives every year to the tune of millions globally. The incidence of this disease keeps on rising from year to year and cancer death rate follows the same pattern. This review focuses on the current trend of cancer in Nigeria which may be used to adjust the cancer control programs in order to reduce cancer deaths in the country.

World Health Organization (WHO) reported in its fact sheet of February 2017, that cancer is one of the leading causes of morbidity and mortality worldwide, with nearly 14 million new cases in 2012, which is expected to rise by about 70% over the next two decades. With 8.8 million deaths recorded in 2015 as a result of cancer, WHO rated cancer as the second leading cause of death globally. Seventy percent of these deaths were from low and middle-income countries [2]. In 2008, a global estimation of 12.7 million new cases and 7.6 million cancer deaths were recorded [3]. These figures increased to 14.1 million new cases and 8.2 million cancer deaths in 2012 [4], 14.9 million cases and 8.2 million deaths in 2013 [5] and 8.8 million deaths in 2015 [2]. These records showed a worrisome increase in the trend of new cancer cases and deaths worldwide.

Cancer was ranked as the 7th leading cause of death in Africa in 2004, with an expected annual incidence of 1.28 million cases and 970,000 deaths by 2030 [3]. Cancer is becoming a public health problem in Africa because of the following factors: aging, growth of the population and increased incidence of economic transition-associated cancer risk factors such as smoking,

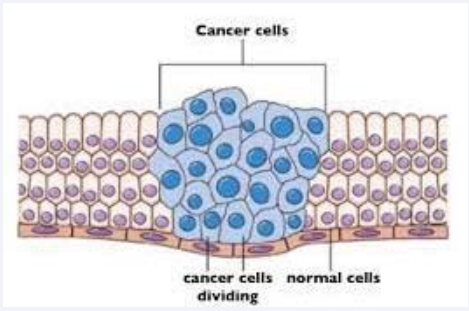

Figure 1 Cancer cells growing within normal cells [1].

Table 1: Estimate of cancer incidence, mortality and most common cancers in Nigeria as reported by GLOBOCAN, 2012.

Nigeria	Male	Female	Both Sexes
Population	84,398,000	82,231,000	166,629,000
Number of New Cancer Cases	37,400	64,700	102,100
Age Standardised rate (W)	79.0	121.7	100.1
Number of cancer deaths	30,900	40,600	71,600
Age Standardised rate (W)	67.4	78.0	72.1
5- year prevalent cases, adult population	67,000	165,000	232,000
proportion (per 100,000)	139.8	348.6	243.6
First five common cancers			
	Prostate	Breast	Breast
	Liver	Cervix Uteri	Cervix Uteri
	Non Hodgkin Lymphoma	Liver	Liver
	Colorectum	Colorectum	Prostate
	Pancreas	Non Hodgkin Lymphoma	Colorectum

obesity, physical inactivity, poor diet, and reproductive factors [6]. Despite the increasing rate of cancers in Africa, there is no enough public policy about the disease [7]. According to WHO, over 71,000 people died from cancer related causes, with about 102,000 new cases reported that year (Table 1) [8]. It was reported that in developed countries like United States of America and other western countries, incidence and mortality rates of most cancers are decreasing, but in developing countries like Nigeria the situation is on the contrary [9]. For instance, in Kano state of Nigeria, the pattern of cancer recorded in its cancer registry for a period of ten years noted a progressive increase in number of cancer cases [10]. This increase is in agreement with the prediction of WHO that there would be a major increase in cancer incidence and mortality in developing countries [11].

CANCER-CAUSING RISK FACTORS

There are some major categories of external factors or agents that lead to development of cancer (Figure 2). Long exposure to one or more of these factors may result in damage of deoxyribonucleic acid (DNA) causing mutation in the gene. Whenever gene controlling cell division is affected and the damage to the gene cannot be repaired, then unregulated cell division occurs which may leads to cancer.

These cancer-causing agents are:

1. Physical carcinogens, such as ultraviolet and ionizing radiation
2. Chemical carcinogens, such as asbestos, components of tobacco smoke, aflatoxin (a food contaminant), and arsenic (a drinking water contaminant) and
3. Biological carcinogens, such as infections from certain viruses, bacteria, or parasites.
4. Ageing is another fundamental factor for the development of cancer. The incidence of cancer rises dramatically with age, most likely due to a build-up of risks for specific cancers that increase with age. The overall risk accumulation is combined with the tendency for cellular repair mechanisms to be less effective as a person grows older.
5. Heredity: Though most cancers are sporadic (non-hereditary), A small number of cancers occur due to inherited genetic defects. Most of these cancers often occur in a syndromic manner (involves more than one form or cancers or conditions in more than one organs of the body). Examples include Li-Fraumeni syndrome associated with development of breast cancer, sarcoma, brain tumour and leukemia; and Lynch syndrome which is associated with increased risk of colon, ovarian and endometrial cancers.
6. Hormones: Some hormones have been implicated in the development of some malignancies such as the cancer of the breast, prostate and endometrium. For instance, increased incidence of prostate in black men compared to those of European descent is linked to significantly higher levels of testosterone in black men. High level of oestrogen in females is associated with increased risk of breast and endometrial cancers.
7. Immunological defects: immunological defects such as autoimmune diseases and immunosuppression are associated with increased risk for some cancers such as cancer of colon, stomach and liver etc.

WHO, in its 2006 report, listed high body mass index, low fruit

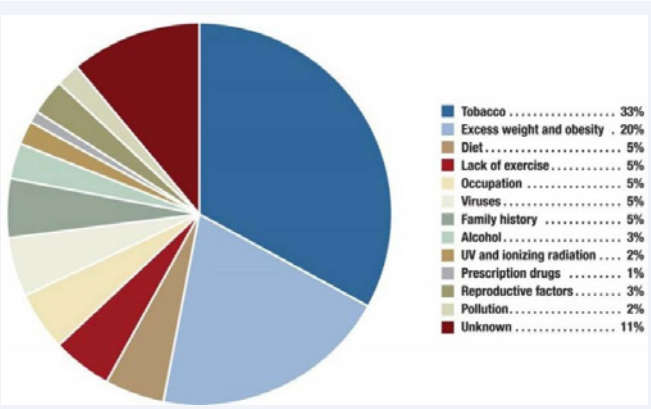

Figure 2 Estimated percentage of cancer cases caused by identified and /or potentially preventable factors (Harvard report on cancer prevention, 1996).

Table 2: Shows some of risk factors in Nigeria as reported by WHO, 2014.

Adult Risk Factors			
	Males	Females	Total
Current Tobacco Smoking	9.8%	2.3%	6.10%
Total Alcohol per Capita consumption, in liters of pure alcohol (2010)	14.9	5.1	10.1
Physical inactivity (2010)	17.7%	21.9%	19.8%
Obesity (2014)	5.3%	14.3%	9.7%
Household solid Fuel use (2012)			75.0%

Table 3: Shows cancer incidence for some states in Nigeria based on National system of cancer registries (2016).

States	Years	Cancer cases in males	Cancer Cases in Females	Total
Anambra	2009-2013	857(42.3%)	1167(57.7%)	2024
Bayelsa	2009-2013	53(37.9%)	87(62.1%)	140
Borno	2009-2010	251(45.6%)	299(54.4%)	550
Edo	2009-2010	923(41.4%)	1307(58.6%)	2230
Ekiti	2009-2010	126(33.1%)	225(66.9%)	381
Enugu	2009-2012	1323(40%)	1959(60%)	3282
Gombe	2009-2013	298(39.1%)	464(60.9%)	762
Kaduna	2009-2013	474(40.5%)	696(59.5%)	1170
Kogi	2009-2013	103(55.1%)	84(44.9%)	187
Kwara	2009-2013	612(41.5%)	864(58.5%)	1476
Lagos (LU)	2009-2013	596(26.5%)	1651(73.5%)	2247
Lagos (LA)	2009-2013	493(25.1%)	1469(74.9%)	1962
Nasarawa	2009-2013	109(32.4%)	227(67.6%)	336
Osun	2009-2010	262(44.7%)	325(55.3%)	587
Rivers	2009-2013	526(47.0%)	592(53.0%)	1118
Sokoto	2013	60(40.8%)	87(59.2%)	147

and vegetable intake, lack of physical activity, tobacco use, alcohol use and infections as the chief risk factor around the world [12]. In Nigeria, according to WHO cancer country profiles, household solid fuel caused 75% of cancer in 2012, tobacco smoking 6.1% in 2011 and physical inactivity 19.8% in 2010 as shown in the Table 2 below. In Nigeria, the estimated number of cancer cases of all ages is 12,079 showing the commonest with percentage (Figure 3). 4172 cases (ASR=4.2 per 100,000) and 3175 deaths (ASR= 3.3 per 100,000) were estimated in Nigeria in 2012 [8].

CANCER INCIDENCE IN NIGERIA

Nigeria recorded 102079 cases of cancer, out of which 27,304 (26.7%) cases were for breast cancer, 14089 (13.8%) for cervix uteri, 12,047 (11.8%) for liver and 11,944 (11.7%) for prostate cancer as incidence (Figure 4) (Globocan, 2012).

The age standardized incidence rates (ASR) for these common cancers; breast, cervix uteri, liver and prostate were 50.4, 29.0, 11.5, and 30.7 per 100,000 respectively.

A 5-year prevalence study in Nigeria also showed almost the same trend. Breast cancer being the leading cases with 87,579 (37.7%), followed by cervix uteri 35,644 (15.4%), prostate 31062 (13.4%) and then liver 8,447 (3.7%) (Figure 5).

The mortality as recorded by Globocan (2012) showed that breast cancer caused 13,960 (19.5%) deaths, cervix uteri 8,240 (11.5%) deaths, liver 11,663 (16.3%) deaths and prostate 9628 (13.5%) deaths in Nigeria. The ASR for mortality are; breast cancer 25.9 per 100,000, cervix uteri 17.5 per 100,000, liver 11.0 per 100,00 and prostate 25.3 per 100,000 (Figure 6). The cumulative risk for these common cancers in Nigeria are on the high side, breast cancer being the highest followed by cervix uteri, prostate and the liver cancer. Nigeria like many other African countries lacked accurate data on cancer incidence and mortality. Some of the estimates by WHO are gotten from extrapolating data of few populations- based cancer registries in Nigeria and therefore may not be accurate. The recent publication by Nigeria National System of Cancer Registries (2016) gave the cancer incidence and pattern in Nigeria for 5 years i.e. from 2009-2013.

BREAST CANCER

Breast cancer (BC) is a global disease of significant burden and its incidence continues to rise especially in the sub-Saharan Africa [13]. It was described as the most common cancer in women worldwide [14]. It accounted for 24.45% of all the cancer types (Figure 3). Huge differences have been observed in the behavior of the tumour, clinical manifestation, treatment response and prognosis across the various regions of the world especially between the developed and the developing world [15].

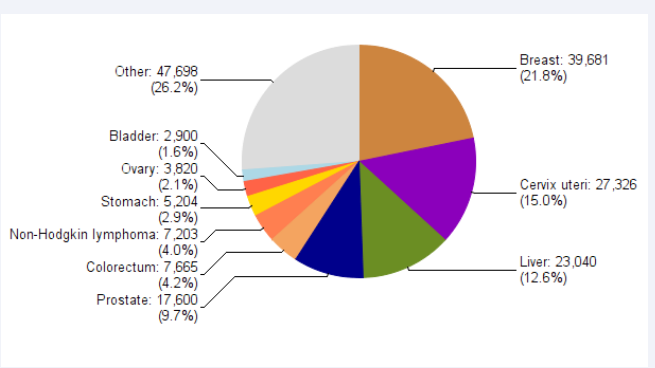

Figure 3 Estimated number of Nigerian most common cancer cases, all ages (total 102,079) Globocan [8] Major common cancers in Nigeria.

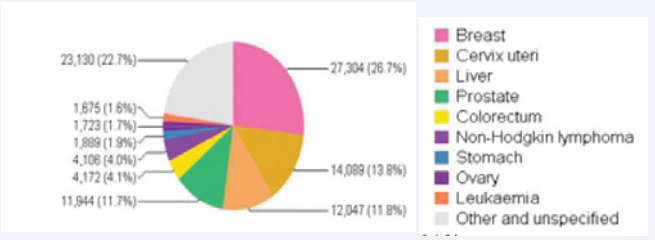

Figure 4 Cancer incidence in Nigeria (GLOBOCAN 2012).

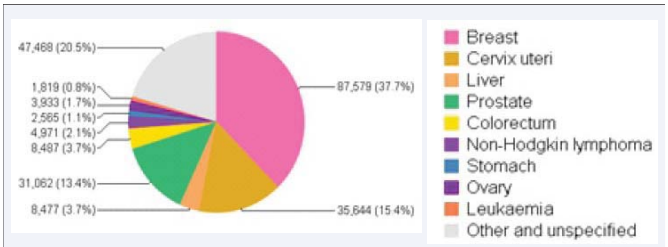

Figure 5 Cancer 5-year prevalence in Nigeria (GLOBOCAN 2012).

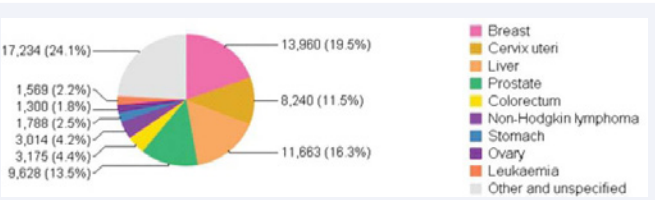

Figure 6 Cancer mortality in Nigeria (GLOBOCAN 2012).

About 92,600 cases of breast cancer and 50,000 breast cancer deaths were recorded in Africa in 2008, making it the most commonly diagnosed cancer and the second leading cause of cancer death among women [3]. Southern African women have the highest breast cancer incidence rates of all African regions, in part because of a higher prevalence of reproductive risk factors for breast cancer, including early menarche and late child bearing among the more affluent predominantly white [16]. In Nigeria, the prevalence of breast cancer is 116 per 100,000 and 27,840 new cases were expected to develop yearly [17]. Cancer incidence data from two population based cancer registries in Nigeria suggested substantial increase in incidence of breast cancer in recent times [18]. Recent observations also showed that the frequency of breast cancer had risen over that of cervical cancer in Nigeria [19]. In 2012, WHO also estimated 27,304 cases with age standardized incidence rates (ASR) of 50.4 per 100,000 and 13960 deaths with ASR 25.9 per 100,000. Nggada et al., in 2008 suggested public enlightenment, were screening all women at risk, early detection of the lesion, and proper management in our health institution as the ways to slow down the progressive increase in breast cancer cases and deaths in our environment, Nigeria [13].

CERVICAL CANCER

Cervical cancer is a cancer of the women. Its frequency in Africa is second to breast cancer and it is the leading cause of cancer death (50,300) in women with ASR of 25.2 cases per 100,000 [3]. North America on the other hand had 7.7 per 100,000 as its ASR [20]. This value is low when compared with that of Africa. In Nigeria, the incidence and the trend are not different. In 2012, WHO also named cervical cancer as the second common cancer in Nigerian women with estimated 14,080 cases and ASR of 29.0 per 100,000 and 8,240 deaths and ASR of 17.5 per 100,000 [21]. Cervical cancer is caused by Human papilloma virus infection which is transmitted during sexual intercourse. So, it is preventable and remains one of the most preventable cancers. Its slow development offers an opportunity for easy identification and treatment when detected early. Some of the risk factors in African women are early age of sexual initiation and multiple sex partners [22,23].

PROSTATE CANCER

Prostate cancer is the most common cancer among men in southern Africa and western Africa in which Nigeria and Cameroon are good examples [9,24]. A study showed that the ASR of 17.5 per 100,000 in Africa was lower than those of developed countries with 61.7 per 100,000 [3]. Ajape et al., 2010 reported low level of awareness of prostate cancer and prostate specific antigen (PSA) screening in Africa [25]. In Nigeria, prostate cancer is also the most common cancer among men. 11944 cases with ASR of 30.7 per 100,000 and 9628 deaths with ASR of 25.3 per 100,000 were estimated in 2012 [8].

LIVER CANCER

Liver cancer is common to both male and female. It is ranked as the second common cancer and the leading cause of death in men and the third common cancer and the third leading cause of cancer death women in Africa. The ASR of 11.6 per 100,000 in Africa was higher than that of the developed countries with 8.2 per 100,000 [3].

Middle Africa had the highest incidence and mortality rates while western African was next in rank [3]. Incidence rate was also common in western Africa countries like Gambia and Guinea [26]. In Nigeria, 12047 cases of liver cancer were estimated in 2012 (ASR=11.5 per 100,000), out of which 7,875 were males and 4,172 were females. Also a total of 11663 deaths with ASR of 11.0 per 100,000 were estimated for both sexes in the same year [8].

COLORECTAL CANCER

The rate of colorectal cancer in Africa was not as high as that of developed countries as recorded in 2008. The ASR for Africa was 6.9 per 100,000 compared to 37.7 per 100,000 for the developed countries [3]. In central Tunisia, colorectal cancer accounted for 8.4% of all the cancers with significant increase between 1993 and 2007 [27].

Some risk factors like smoking, alcohol consumption, and unhealthy diets that are high in excess calories such as meats, starches, fats, and sugars are associated with development of colorectal cancer [28].

NATIONAL CANCER INCIDENCE BASED ON POPULATION BASED REGISTRIES DATA (2012-2013)

National cancer incidence statistics were derived from the Abuja and Enugu population-based cancer registries and are reported below:

There were 3215 cases of cancer reported by the Abuja and Enugu population-based cancer registries in 2012-2013. Out of these 3215 cases, 1977 (61.5%) were in women and 1238 (38.5%) in men. The age standardized incidence rates (ASR) for all cancers in women was 160.2 per 100,000 and 94.2 per 100,000 in men.

The five most common cancers in Nigerian women were cancers of the Breast 871 cases, ASR= 65.8 per 100,000, Cervix 290 cases ASR= 31.2 per 100,000, Ovary 86 cases ASR=6.9 per 100,000, Colo-rectal67 cases ASR 6.8 per 100,000 and Connective/Soft Tissue 56 cases ASR 3.0 per 100,000. The five most common cancers in Nigerian men in 2012-2013 were cancers of the Prostate 412 cases ASR= 42.5 per 100,000, Colorectal 84 cases ASR= 5.9 per 100,000, Non-melanoma Skin 73 cases ASR= 4.0 per 100,000, Liver 63 cases ASR 3.9 per 100,000 and Connective/Soft Tissue 56 cases ASR 3.1 per 100,000 [29].

CANCER PATTERNS IN NIGERIA STATES

Cancer pattern in Nigeria as extracted from Nigeria National System of Cancer Registries (2016) is shown in Table 3 below.

There were 4209 cases of cancer recoded from two registration centers in Lagos State between 2009 and 2013 (Table 3). 25.9% of this figure is male while 74.1% is female. The next in rank after Lagos centers is Enugu center with total cancer cases of 3282 in which 40% is male and 60% is female. Edo and Anambra are the next with 2230 and 2024 cases of cancer respectively.

The least cases of cancer were recorded in Bayelsa and Kogi with 140 and 187 cancer cases respectively [29]. The common cancer recorded in LUTH (LU), one of Lagos cancer registries, for period of 2009 to 2013 for male were prostate (7.1%) and colorectal (3.4%) while that of female were breast (41.2%), cervix (14.5%) and colorectal (3.1%). In LASUTH (LA), the second center in Lagos, prostate (5.3%), connective, soft tissue (4.4%), and colorectal (3.3%) for male and breast (38.9%), cervix (9.2%) and uterus (6.6%) were recorded.

The record from Enugu cancer registry showed similar trend: prostate (33.9%) and colorectal (6.0%) and non-melanoma skin (4.1%) in male while that of female were breast (60.3%), cervix (22.2%), ovary (5.5%) and colorectal (5.3%).

The most common cancers in men in Anambra for all ages were of the prostate (15.1%), colorectal (3.4%) and liver (2.6%). For women of all ages in rank order were breast (20.1%), cervix (8.3%) and ovary (4.0%).

In Edo state where the lowest cancer cases were recorded within 2009-2013, the common cancers reported were prostate (13.4%), and colorectal (2.0%) for male and breast (19.6%), and cervix (3.9%) for female [29].

DIAGNOSIS AND TREATMENT OF CANCER IN NIGERIA

Early diagnosis is very important to the control of cancer. Standard screening methods are available for detecting different types of cancers. These methods include mammography for breast cancer, fecal occult blood testing and sigmoidoscopy/colonoscopy for colorectal cancer, and Pap smear for cervical cancer [30]. Whereas pap smear-based screening program was unsuccessful in Africa, other approaches like on visual inspection using Lugol's iodine or acetic acid, and low-cost DNA tests to detect HPV infections, have been shown to be feasible and effective in many parts of Africa, including Kenya and South Africa [31,32]. Screening one or two times in life time between the ages of 35-55 years would reduce cancer by about 30% [33]. Increasing public awareness of early signs and symptoms of cancers of the breast, cervix, oral cavity, urinary bladder, colorectal, and prostate should increase the detection of these diseases at earlier stages when there are more effective options for treatment leading to better prognosis [34].

Different treatment options are available. Four common types are:

1. Chemotherapy: The use of a combination of drugs to destroy cancer cells to cure or to control cancer.
2. Radiation therapy: The use of various forms of radiation to safely and effectively treat cancer and other diseases. Radiation therapy remains an important component of cancer treatment with approximately 50% of all cancer patients receiving radiation therapy during their course of illness; it contributes towards 40% of curative treatment for cancer [35]. The main goal of radiation therapy is to deprive cancer cells of their multiplication (cell division) potential.
3. Surgery: Removal of the tumor and the area surrounding the tumour.
4. Antologous/allogenic Bone Marrow Transplant: Used to treat diseases that damage or destroy the bone marrow. Also used to restore bone marrow that has been damaged during cancer treatment [36].

Cancer treatment is facing serious challenges in Nigeria. The treatment facilities are inadequate or unavailable, especially radiotherapy machines. Most of the few ones in Nigeria are in bad conditions without hope of repairing them. This has contributed to high cancer deaths recorded in Nigeria. Therefore, the

government of Nigeria need to show more commitment towards fighting this deadly disease called cancer. Cancer treatment needs urgent improved funding and research from government and other stakeholders.

CONCLUSION

The prevalence of symptoms of cancer and cancer treatment are highly significant issues in clinical oncology. Cancer data available in Nigeria are hospital based; it is obvious that cancer incidence and deaths in Nigeria are increasing from year to year. However, majority of the Common Cancers are preventable or curable if detected early. Despite these, Nigeria government is putting very little effort towards cancer diagnosis and management. This review was conducted in order to call the attention of the government and research based organizations to use the trend of cancer in Nigeria for setting priorities in cancer control programs. It is obvious that the implementation of the National Cancer Registry could facilitate the study of the evolution of the tendency of cancer by age group in the future, to achieve an appropriate screening system and provide training to people at risk. This will help health officials monitor the disease in the community. Also, as novel cytotoxic, radiation, immunotherapy, and combination therapies evolve, there is a continued need for research evaluating strategies for preventing or mitigating the symptoms related to cancer. The evidence of efficacy of current treatment regimens needs further validation in well-powered clinical trials, targeted to and specific to cancers and treatment regimens. Future studies using personalized medicine approaches for the treatment of cancer with the identification of specific gene clusters to discriminate these groups will be valuable.

RECOMMENDATIONS

Many suggestions and recommendations have been put forward by different authors on how to reduce the incidence and death rates. Some of these are below:

1. There is need to develop national screening program for major cancers [37].
2. There is need for regular nationwide surveys [37].
3. There is need to intensify effort on creating public awareness on the importance of lifestyle and dietary modification that will reduce cancer incidence [37].
4. Current cancer registries in Nigeria need to be re-structured in order to meet the challenges of burden posed by cancer in Nigeria [37].
5. Proper implementation of programs like tobacco control, vaccination of liver and cervical cancers and others will go a long way to reduce the incidence of cancer in Nigeria [6].
6. Early detection and treatment, as well as public health campaigns promoting physical activity and healthier dietary patterns should be intensified [6].

With the increasing incidence, the clinical management of cancer continues to be a challenge for the 21st century. Remarkable progress should be made towards the understanding of proposed hallmarks of cancer development and treatment in Nigeria.

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