

Emergence of Colorectal Cancer in West Africa: Accepting the Inevitable

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Abstract

It seems not too long ago that colon and rectal cancer is a “rare” disease in rural Africa; however, over the last 30 years in West Africa, published evidence has shown decade by decade increases in the incidence of colorectal cancer (CRC). Therefore, CRC should now be accepted as a recognized disease in native Africans; nevertheless, we must acknowledge that the incidence is a fraction of what obtains in the developed countries of Europe and America. This presentation will attempt to examine the emergence of CRC within the West African axis over the last four decades.

Keywords: Colorectal cancer, increased incidence, West Africa

INTRODUCTION

It seems not too long ago that colon and rectal cancer is a “rare” disease in rural Africa; however, over the last 30 years in West Africa, published evidence has shown decade by decade increases in the incidence of colorectal cancer (CRC).^{1,2} Therefore, CRC should now be accepted as a recognized disease in native Africans; nevertheless, we must acknowledge that the incidence is a fraction of what obtains in the developed countries of Europe and America. This presentation will attempt to examine the emergence of CRC within the West African axis over the last four decades.

The crude incidence of CRC in Sub-Saharan Africa (SSA) is estimated at 4.04/100,000 population (4.38 men and 3.69 women).³

Most of the studies available showed an average age of between 43 and 46 years (peak age 50–60 years), except Ghana where the average age is 58 years (peak age 70–80 years).⁴⁻¹⁰

HOW WAS IT BEFORE?

West African populations are of similar genetic origin; thus, much of the subtle or overt differences in cancer incidence are presumably due to different environmental circumstances. The diverse ethnicity of the West African peoples translated into different dietary patterns which more or less reflected the

geographical peculiarities of the regions. Diet, as has been extensively researched, is known to be a major determining factor in the development of CRC, which is why the changing dietary patterns along the West African subregion should be subjected to closer scrutiny.

“The different climates in West Africa, with regard to agro-ecological systems, can be described as semi-arid, subhumid, and humid. Thus, food grown and consumed is influenced by these climatic conditions. In this respect, two large groups of countries can be identified on the basis of food consumption:

1. Predominantly, cereals consumers. These include Burkina Faso, Chad, The Gambia, Guinea-Bissau, Mali, Mauritania, Niger, Senegal, and Sierra Leone. They can be further divided into those relying mostly on sorghum and millet (Burkina Faso, Chad, The Gambia, Mali, and Niger), wheat (Mauritania), and rice (Guinea-Bissau, Senegal, and Sierra Leone). These countries lean more into the Sahel region
2. Countries from coastal West Africa relying equally on roots, tubers, and cereals. These include Benin,

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Cameroun, Cote d'Ivoire, Ghana, Guinea, Liberia, Nigeria, and Togo. Cassava, yams, and plantains are consumed in these countries. Rice and maize are also consumed heartily.

Protein sources are said to be insufficient in the West African subregion despite the huge livestock sector, especially cattle. Consumption statistics of animal protein are scanty, and no reliable analyses quantifying household meat and protein consumption have been made."¹¹

Over 40–50 years ago, the age-adjusted incidence rates of CRC in the West African subregion were <3 per 100,000 population. Nigeria in the 1960s had about 3.2/100,000,¹² while the lowest was from the Gambia where 1.5/100,000 was recorded from 1986 to 1988.⁵ Liver cancer is the most frequent cancer in Gambia (58%).⁶ Senegal showed 2.1/100,000 from 1969 to 1974 while Mali was 2.3/100,000 between 1987 and 1988 [Table 1].⁵ Mali also has a significant incidence of liver cancer; indeed, it is of the same magnitude as Senegal and Gambia.⁵ The West African population has a mix of Anglophone and Francophone colonial legacies, and cursory observation shows that the Francophone countries (grain consumers) seem to have a lower incidence of CRC than the Anglophone countries (roots and tubers consumers) but a higher rate of hepatocellular carcinoma.

How is it Now?

Studies that occurred more than 10 years after those earlier reported showed marginal increases in the CRC incidence in most of the countries. Mali significantly showed a big jump from the previous 2.3 in 1987/88 to 6/100,000 in 1988–1992.⁶ Recent studies from Mali show an incidence averaging 16 patients per annum from 2001 to 2005.¹³ Ghana also showed its earliest calculated age-adjusted incidence to be 11.8/100,000 [Table 2].²

Table 1: Earlier incidence of colorectal cancer in Sub-Saharan Africa

Country	Male/100,000	Female/100,000	Period of study
Nigeria	2.5	3.2	1960-1969
Senegal	2.1	1.7	1969-1974
Gambia	1.5	0.5	1986-1988
Mali	2.3		1987-1988

Table 2: Later incidence of colorectal cancer in Sub-Saharan Africa

Country	Cases/100,000	Period of study
Gambia	1.6	1988-1997
Mali	6.0	1988-1992
Guinea	6.1	1992-1995
Cote d'Ivoire	2.4	1995-1997
Ghana	11.8	1997-2007
Nigeria	3.4	2000 till date

Indeed, time trends in both Nigeria and Ghana, respectively, showed significant increases from 21 patients per year (1954–1967) to 70 patients per year (2000–2006)^{1,14,20} and 4.1 patients per year (1954) to 32.6 per year (1997–2007) [Tables 3 and 4].^{2,9,21,22}

In the Cameroun, CRC was 2.9% of all recorded cancers in both sexes, the most common being prostate cancer in men. Even with the low rate of CRC, it is on record that it (CRC) has increased in frequency over the last two decades in Cameroun.⁷

THE CONCEPT OF NUTRITION TRANSITION

Noncommunicable, nutrition-related diseases have emerged in SSA at a faster rate and a lower economic level than in industrialized countries before the battle against undernutrition has been won. The nutrition transition defined as the changes in dietary patterns and nutrient intakes when populations adopt modern lifestyles during economic and social development, urbanization, and acculturation is associated with the documented increases in noncommunicable diseases (NCDs). Most of the broad adverse changes in dietary patterns during the nutrition transition include decreases in staple foods rich in starch and dietary fiber, increases in foods from animal origin rich in total fat and saturated fatty acids, decreases in plant protein sources such as legumes, and increases in energy-dense snack foods, carbonated sweetened beverages, commercially available alcoholic beverages, as well as added sugar, fats, and oils in preparation of food. There is no doubt that the nutrition transition, accompanied by decreased physical activity, leads to increases in overweight and obesity.²³ Over the past 30 years, mean body mass index has been steadily increasing even in low- and middle-income countries, including those in West Africa. The steady increase in urbanization has resulted in the emergence and popularization of soft drinks and fast foods and many Western brand names on the continent. In many urban areas, such Western food items are regarded as desirable status symbols, rapidly inculcated by local inhabitants, and widely consumed.²⁴

Unhealthy diets, physical inactivity, and obesity have been linked with increased risk of several cancers such as endometrial, colon, breast, renal cell, pancreatic, and esophageal (adenocarcinoma). Despite this increasing cancer burden, cancer continues to receive a relatively low public health priority in Africa. This may be explained by limited resources and probably other more immediate problems such as HIV/AIDS, malaria, and tuberculosis.²⁵

WHAT WAS IT LIKE BEFORE?

There was in Africa generally, among native Africans, a rarity of premalignant colonic lesions such as colonic polyps, ulcerative colitis, and Crohn's disease.²⁶⁻²⁸ The native diet in the Sub-Saharan region was rich in resistant starch, fiber, fruits and nuts, and pepper, which were naturally occurring antioxidants and chemopreventives against CRC.^{27,29-31}

Table 3: Time trends of colorectal cancer in Ibadan, Nigeria

	1954-1967	1971-1979	1980-2000	2000-2006
Cases per year in Ibadan, Nigeria	21 (Williams and Edington 1967)	12-14 (Grillo <i>et al.</i> 1971, Ajao 1979)	18-26 (Adekunle and Abioye 1980, Ilyasu <i>et al.</i> 1996, Akute 2000)	70 (Ibadan cancer registry data)

Table 4: Time trends of colorectal cancer in Ghana (Adapted from Dokubo *et al.*, West Afr J Med 2010)

	1956-1965	1970-1975	1987-1991	1997-2007
Cases per year in Accra, Ghana	4.1	10	26.8	32.6

WHY IS IT LIKE IT IS NOW?

Increased longevity, intake of red and processed meat, cigarette smoking, alcohol ingestion, environmental pollution, westernization of diet, and obesity are the contributory factors toward the emergence and entrenchment of CRC in West Africa in contemporary times. The burden of all forms of cancer is increasing in Africa because the population is now aging and increasing bringing with it an increased prevalence of risk factors associated with economic transition which includes smoking, obesity, physical inactivity, and reproductive behaviors. In most urban African populations, there have been changes in diet toward high-saturated fat intake.^{25,32,33} At present, Nigerians consume the most alcohol in West Africa, and Sierra Leone and the Gambia are the top cigarette-smoking nations in West Africa.^{34,35}

EMERGENCE OF POLYPS IN WEST AFRICA: FROM VERY RARE TO QUITE A FEW TO MAYBE MORE THAN WE THOUGHT

From rarity of polyps...

In a study on resected colon specimens at the University College Hospital, Ibadan, Nigeria, between 1960 and 1969, only forty histologically confirmed cases of colonic polyps were encountered over that 10-year period. Analysis of these cases revealed a preponderance (60%) of the nonneoplastic juvenile type of polyp. Neoplastic polyps, which accounted for <10% of all the specimens, were not encountered in any female patient. All but one of the polyps were reported as solitary on clinical and radiological examination.³⁶ Experiences like this led many researchers at the time to believe that familial or multiple polyposis of the colon is distinctly rare in the African.^{14,28,37}

To quite a few...

The status quo was maintained with respect to colonic polyps in Nigeria until the early 1990s when reports were emanating from parts of the country of patients with colonic polyps that had neoplastic potential. From 1992 to 2010, at least five reports were published in some peer-reviewed journals of patients who had features of multiple adenomatous polyposis.³⁸⁻⁴²

To more than we thought...

With the improvement in hospital infrastructure, diagnostic imaging, health workforce, and training of relevant personnel across West Africa, diagnoses of hitherto rare lesions are being seen. Even though there still seems to be no government-powered CRC screening programs in SSA, many tertiary health centers now have access to flexible fiberoptic endoscopes. The results of some colonoscopy studies show that colonic polyps are not as rare in Africans in the present day; however, those with malignant potential still have a low incidence with the percentage of histopathologically confirmed adenomatous polyps at 6.75% in Ile-Ife, Nigeria, and 2.85% in Accra, Ghana [Table 5].⁴³⁻⁴⁷

PECULIARITIES OF WEST AFRICAN COLORECTAL CANCER

West African patients usually have a higher percentage of rectal than colon cancer,^{10,48-50} except a paper from Mali that showed 56% colon to 44% rectum proportion.¹³ No definite explanation has been put forward for this topographical peculiarity, and this has led some authors to consider the possibility of the etiopathogenesis of rectal cancer as being separate from colon cancer.^{51,52} It is well-known that many patients with CRC in SSA present with advanced diseases;⁵³ however, late presentation, which is a significant problem,^{54,55} cannot be the sole reason for this because it has been shown that West African CRC shows evidence of unfavorable and/or aggressive tumor biology by the presence of increased mucinous and signet ring types and also the significant affectation of younger patients under 40 years.^{1,13,48,49}

CHALLENGES IN WEST AFRICA

- Lack of government support and framework. It is known that most Sub-Saharan governments have no structured cancer-prevention programs and this makes it difficult to promote cancer awareness and institute advocacy.⁵⁶ The reliance on outside funding for control of communicable diseases, for example, malaria, HIV/AIDS, and tuberculosis, has made many governments complacent and unwilling to rise to the challenges which NCDs such as cancer present with respect to funding for adequate control²⁵
- Prevailing nutrition transition with strong attraction to western diet and lifestyle. It seems like there is no way back from this. The pull of fast foods, highly-sugared carbonated drinks, cigarette smoking, and alcohol ingestion is too strong that it is unlikely that this development can be halted or moderated.²³⁻²⁵ The effect

Table 5: Results of some colonoscopy studies in Sub-Saharan Africa

Study	Patient population	Polyps found	Polyp detection rate (%)	Colorectal cancer found	Polyposis coli	Histopathology showing adenomatous polyps
Alatise <i>et al.</i> (Ile-Ife), 2014	415	67	16.1	Not stated	4	28
Ajayi <i>et al.</i> (Ado-Ekiti), 2014	68	10	14.7	11 (16.2)	-	-
Andulo <i>et al.</i> (Cameroon), 2013	297	28	9.4	32 (10.8)	-	-
Olokoba <i>et al.</i> (Ilorin), 2013	103	16	15.5	133 (12.6)	-	-
Dakubo <i>et al.</i> (Ghana), 2008	596	19	3.2	39 (6.5)	-	17

of this nutrition transition superimposed on the burden of malnutrition may actually directly contribute to the increasing incidence of CRC in SSA because it appears that stunted children showed a greater susceptibility to a high fat diet, lower fat oxidation, and higher fat gain.²⁴ Obesity is a risk factor for the development of CRC^{25,33}

- High cost of treatment: Screening, surgery, chemotherapy, and radiotherapy. In the low-economic countries of SSA, the complete treatment for CRC will still be in bits and pieces, stops and starts, with financial challenges of individual patients determining which of the modalities for adequate cancer treatment they can afford at any given time⁴⁸
- Dearth of radiotherapy centers. Basically, in Africa, there is a shortfall of radiotherapy centers even for basic radiation services. West Africa is the worst hit, where out of 16 countries only 4 countries (Ghana, Mauritania, Nigeria, and Togo) have existing radiotherapy machines.⁵⁷ Whether they are functioning optimally is another matter entirely which is beyond the scope of this paper
- Scarcity of literature on molecular biology of West African CRC. In a pilot study in Ibadan, five randomly picked CRC tumors were subjected to microsatellite analysis; two were found to be microsatellite unstable.⁵⁸ Another study aimed to determine KRAS and BRAF mutations of Nigerian CRC using CRC tissue from Lagos patients. They showed that 21% of Nigerian CRC patients carry a KRAS mutation (half the rate in Caucasians) and 4.5% BRAF V600E mutation.⁵⁹ Other authors tried to determine the MSI status using IHC to detect defects in MMR gene among CRC cases in Ibadan. There was a loss of MMR gene protein (MLH1 and MSH2), indicating MSI in 23% of the cases.⁶⁰ A study from Accra, Ghana, analyzed MMR by IHC and sequenced exons 2 and 3 of KRAS and exon 15 of BRAF from ninety paraffin blocks of CRC. The study found 41% of MSI-H, 32% of KRAS, and no BRAF mutations.⁴⁹

CONCLUSION

The world is now referred to as a global village given the rapid technological advances in communication, travel, and medical care. Western culture has pervaded the whole of Africa; western modes of dressing, music, electronic devices, and diet are seen as most desirable. Native Africans are turning their backs on native diets because one is seen as more “developed”

or “civilized” if a taste for western diet has been acquired. Can we hope for a turn-around to the wholesome, healthy, antioxidant, and chemopreventive property that native African diet offers?^{31,33} This will probably be difficult and too late now.

We must then gear up for the next round of battles against disease in West Africa; the fight against communicable diseases has not been totally won, and now, we are exposing ourselves to factors that will increase cancer. A change in mindset will be the means to winning this battle.

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Conflicts of interest

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