**REVIEW OF DENTISTRY IN WEST AFRICA- CHALLENGES AND PROSPECTS**

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**ABSTRACT**

Oral health as an integral component of overall health is provided by dental professionals (Dental surgeons/stomatologists, hygienists, dental nurses, technicians, community extension workers). Oral diseases in West Africa are dominated by gum/periodontal diseases, dental caries, orofacial trauma, cancrum oris/noma and oral cancer. Human resources and infrastructure for oral health services in West Africa are skewed towards the urban areas where the rich live, while the rural poor have relatively little or no human resources and infrastructure. The development of human resources for oral health started much later than for other health services in West Africa. In all countries, the training of dentists at undergraduate level started after independence. In Nigeria, postgraduate training in dental surgery took off more than 10 years after the graduation of the first set of undergraduate dental surgeons. To meet contemporary realities for improved dental services with a substantial reduction of all oral health diseases in the region, there is need to review the 1998 WHO health strategies.

**Key words:** Oral health, West Africa, Manpower, Training, Challenges, Prospects

**Introduction:**

Oral health is an integral part of overall human health. Furthermore, oral diseases compromise the quality of life of affected individuals through their impacts on the well-being and the ability to sustain desired socio-economic activities.1 Dentistry or Dental Surgery is a division of Surgery that deals with the diagnosis, surgical and adjunctive treatment of the diseases, injuries and malformations of the maxillofacial structures including the teeth and other associated structures.2,3 As adopted by the 1997 American Dental Association House of Delegates, it is defined as the evaluation, diagnosis, prevention and/or treatment (nonsurgical, surgical or related procedures) of diseases, disorders and/or conditions of the oral cavity, maxillofacial area and/or the adjacent and associated structures and their impact on the human body; provided by a dentist, within the scope of his/her education, training and experience, in accordance with the ethics of the profession and applicable law. As a profession, it is made up of about fourteen specialties.2 The provision of oral health is largely the role of dental professionals.

West Africa has its fair burden of oral diseases such as dental caries, gum/periodontal diseases, facial trauma, cancrum oris (noma), oral manifestations of HIV/AIDS and orofacial cancers. However, there are inadequate dental professionals (dental surgeons, stomatologists, dental hygienists, therapists, dental technologists, dental nurses, dental surgery technicians/assistants and community health extension workers) for the population. The majority of the available professionals are unevenly distributed in favour of urban cities and towns where they serve the affluent population. There is also poor integration of oral care into primary health care delivery system which has resulted in the larger rural population being left out of oral care services. Dental education is further hampered by the relatively fewer training institutions for the dental professionals in Sub Saharan Africa.4

Despite its scope, practice and relevance to overall health service delivery, there exists considerable ignorance and even apathy by some non-dental health practitioners to the provision of dental services in West Africa. There are also reports of medical dominance, described as super-ego or overwhelming influence of medicine over other healthcare professions including dentistry.5,6,7 In addition, the antecedent of the dental profession in West Africa is yet to be adequately documented. The aim of this work is to review the challenges and prospects of dentistry in West Africa. This review will trace the evolution of dental care services, discuss the current dental disease burden of the population, present the state of human resources for dental care, evaluate the training facilities and discuss the prospects for improved dental services in West Africa.

**Brief background to the evolution of dentistry in West Africa**

In human remains from the lower Tilemsi Valley of eastern Mali, West Africa, archeological evidence from the Late Stone Age period (Ca. 4500-4200 BP) showed various intentional dental modifications such as removal of medial and mental angles of incisor teeth, as well as medial angles of the canines.8 Anecdotal evidence also exists of other oro-facial mutilations practiced before the introduction of allopathic dentistry such as filing teeth to create midline diastema (called open teeth in some societies) and the application of herbal mixtures to painful teeth and swollen jaws to relieve pain. However, there remains scarce literature on the early practice of dentistry in most West African communities.

Modern dentistry in English-speaking West Africa started in 1903, with a private practice clinic in Lagos Nigeria run by Dr Edward Gladstone, a foreign dentist. This premier dental clinic was later taken over by the Baptist Mission.7 The first Nigerian dental practice was opened in Lagos by Dr. Sidney Obafemi Philips in 1926. The first government- owned dental clinic in Nigeria was set up in 1938 in Lagos in the old Medical Head Quarters. At Nigeria’s independence in 1960, there were 49 dental surgeons in Nigeria among whom 16 were Nigerians.9 In Ghana, modern dentistry started in the 1930’s with 2 expatriate dentists, one with the private sector and the other with the colonial government. The first indigenous Ghanaian dentist started practicing in 1944 and by 1949, three others had joined the services of the nation.10

The first dental clinic in Cote d’Ivoire was a government owned clinic which was established in 1951 in Central Hospital. In the same year, the first private dental clinic belonging to Mme Romain was established. Professor Jacob Vilasco was the first stomatologist from Cote d’Ivoire and the father of modern dentistry in that country.11

**The dental disease burden of West Africa**

Today’s profile of oral health is different from that of the past; also, it is non-homogenous across West Africa.4 The major oral health problems in West Africa, in order of severity, are oral cancer, cancrum oris (noma), acute necrotizing ulcerative gingivitis (ANUG), oral manifestations of HIV/AIDS, Burkitt’s Lymphoma, facial trauma, periodontal diseases and dental caries.1 Others are harmful traditional health practices and congenital anomalies like cleft lip and or palate.12 Risk factors for dental diseases have been identified as malnutrition, excessive tobacco and alcohol use, consumption of refined sugary foods compounded by widespread poverty, illiteracy and poor health seeking behavior.12

Cancrum oris (noma), a debilitating gangrenous disease of the orofacial region has been largely eradicated in economically advanced countries but it still remains a scourge in West Africa. Of the 6 countries with the highest burden of noma (Burkina Faso, Ethiopia, Mali, Niger, Nigeria and Senegal) that form the ‘world’s noma belt’, only Ethiopia is not in West Africa.4 It could affect individuals of any age group but infants and children with poor oral hygiene associated with malnutrition, depressed immunity and susceptibility to oral commensal bacteria are mostly affected.13,14,15,16 Noma has an estimated prevalence in Sub-Sahara Africa of between 750,000 to 1 million cases, with about 90% of cases dying when treatment is inadequate. The disease usually occurs in poor, remote locations1. As stated earlier, noma remains a condition associated with poverty, malnutrition (especially the protein energy type and deficiency of Vitamin A) and poor oral hygiene. Poor oral hygiene leading to ANUG has been particularly implicated in noma.13,17,18 The economic crisis facing West African countries, the HIV/AIDS pandemic, widespread displacement due to sectarian, ethnic and religious armed conflicts can only compound existing vulnerabilities thereby increasing the prevalence of these preventable, orofacial diseases in the region.

Oral cancers have been on the increase and the prognosis has not dramatically changed worldwide. While the prevalence in West Africa has not been adequately reported, rates in sub-Saharan Africa are generally considered to be lower than those of South East Asian countries due to their widespread use of various forms of tobacco.19,20 The major aetiological factors are rapid urbanisation with tobacco smoking and heavy consumption of alcohol.1 While no age is exempted, 70-75% of oral cancers in West Africans occur in persons above 40 years of age.21,22 This contrasts with the age distribution in other parts of the world where 95% of oral cancers occur above the age of 40years.23 Reasons for this difference include the relatively lower life expectancy among West Africans and high mortality from other infective and non-infective causes as compared to more economically developed countries. The relatively younger population distribution and other socio-economic factors in West Africa are associated with high prevalence of both communicable and non communicable diseases.4 Common sites are the lips, tongue, floor of the mouth, palate, alveolar ridge and other unspecified parts of the oral mucosa.22,24 Many patients with oral cancer present with advanced lesions which limit treatment options. Furthermore, there are inadequate specialists to manage the patients coupled with poorly equipped treatment centres. Hence, mortality rates from oral cancer in West Africa are among the highest in the world.25

Human immunodeficiency virus (HIV), is a virus that affects the immune system causing the acquired immunodeficiency syndrome (AIDS) which is a complex of symptoms and infections26 and diagnosed by a positive HIV antibody test or evidence of HIV infection and the presence of some highly specific conditions/diseases.27 The syndrome remains without a cure and is responsible for premature death and suffering in many parts of the world including West Africa. Unlike other parts of sub-Saharan Africa, West Africa has been less affected by the HIV/AIDS pandemic with prevalence rates between 1.2% in Mali to 7% in Cote d’Ivoire.28,29 However, Nigeria in West Africa has the second largest population of persons living with HIV/AIDS in the world. Oral manifestations of HIV/AIDS are important multiple, varied but occasionally early features of the infection30, contributing to patient’s ill-health, causing economic and psychological dysfunction of the individual and the community31. They cause discomfort, resulting in compromised nutrition and adherence to therapy.32,33

According to Agbelusi et al26, Nigerian reports showed a prevalence of oral lesions in HIV infection to be between 36.4%-84.0% with oral candidiasis, periodontal diseases, oral hairy leukoplakia, Kaposi’s sarcoma and Non-Hodgkin’s lymphoma as common manifestations. Oral candidiasis are observed in forms of pseudomembranous candidiasis, erythematous candidiasis and angular cheilitis. These are often diagnosed clinically based on their typical appearance, with the presumptive diagnosis strengthened when the patient responds to empiric anti-fungal therapy.

Treatment of HIV/AIDS with anti-retroviral therapy (ART) and now highly active-ART (HAART) has resulted in changes in the overall prevalence of oral lesions. Herpes labialis and periodontal lesions have reduced in prevalence by more than 30%, so also have the prevalence of other HIV-associated opportunistic infections.26,34,35 Oral lesions are seen in 31%-84% of patients with HIV/AIDS in West Africa.36,37 To prevent pain, discomfort, malnutrition and other aspects that reduce quality of life of HIV/AIDS patients, the provision of oral health services has to be integral to the care of these patients.37 Periodontal diseases in HIV infection such as linear gingival erythema, necrotising ulcerative gingivitis/periodontitis along with some other oral lesions have important diagnostic value in alerting the dentist as to the presence of HIV infection.38,39,40 The lesions also have prognostic significance in their ability to predict a deterioration in the immune status and progression from HIV infection to AIDS.41,42

Injuries to skeletal and soft tissues of the orofacial region constitute a significant health burden in West Africa. Prevailing social, economic, environmental and cultural factors determine the trends and aetiologies within and between countries.43,44 In developed Western economies, assaults/interpersonal violence are responsible for most cases of facial trauma while in West Africa, most cases are due to vehicular collisions.45,46 The prevailing socio-economic conditions in West Africa have resulted in greater use of motorbikes and tricycles as commercial means of transporting passengers. This mode of transport has resulted in an increase in facial trauma due to poor enforcement of traffic laws, non-use of protective gadgets like crash helmets, low quality of road infrastructure and substance abuse by vehicle operators.44,45,46 Apart from road traffic crashes, other causes of facial trauma in West Africa include assaults/interpersonal violence, falls, contact sports, industrial accidents and attack by animals.45,46 Facial trauma occurs more commonly among persons between 20-39years of age (32%-80%) and it is seen more in males than females.45 However, increasing urbanization has reduced the gender difference in many countries, most especially in North central Nigeria where the male to female ratio changed from 16.9:1 to 3.3:1 from 1973-1978 to 1991-2000 respectively.45,46,47 Facial bones involved in trauma are the mandible, the zygoma and the maxilla in that order. In more economically advanced countries, maxillofacial fractures are treated using open reduction and internal fixation. However, in West Africa, dearth of infrastructure, cost of treatment and inadequate skilled personnel have placed reliance on closed reduction and mandibulo-maxillary fixation techniques which have produced satisfactory results.44,45

Dental caries is the most prevalent chronic disease in the world. In West Africa, the burden of dental caries varies according to the level of urbanization and access to refined sugary foods. According to the World Health Organisation Regional Office for Africa, the prevalence of dental caries is rising in Africa due to increasing urbanisation and changes in dietary patterns.4 To prevent dental caries, it is advised that all age groups brush their teeth twice a day with fluoride toothpaste, reduce the amount and frequency of sugar and carbohydrates in the diet and consume water and foods that are fluoridated. When detected early, and in the presence of adequate trained personnel and infrastructure, involved teeth can be filled and saved. When not treated early, dental caries can result in loss of teeth, interfere with nutrition and dietary choices while affecting sleep, work and attendance at school.4

Gum/periodontal diseases affect the tissues that support the tooth, including the gums and the cementum. They could present as bleeding or swollen gums (gingivitis), or cause bad smelling breath (halitosis) and severe cases can result in loss of gum attachment to the tooth and supporting bone with loosening of teeth (periodontitis). While most children have signs of gingivitis, many adults have early stages of mild to moderate periodontitis, but 5-20% of adults have severe periodontitis which may result in tooth loss.4 While not all cases of gingivitis progress to periodontitis, all cases of periodontitis would have started as gingivitis. Measures for preventing dental caries are also effective for preventing gum/periodontal diseases. While gingivitis can be treated by self-care methods, periodontitis can be arrested by periodontal treatment of deep scaling procedures for plaque/tartar removal performed by an oral health professional.4

**State of human and infrastructural resources for dental services in West Africa**

There have been improvements in global oral health, but Africa especially West Africa appears to have been left behind with persistent oral health issues due to inadequate access to oral health.48 Most residents are poor and lack dental care services, with about 75% of the human resources for oral health working in the urban areas leaving the rural areas with little or no dental professionals.12,48, 49 In Ghana, 80% of the dental professionals are skewed to practicing in Accra and Kumasi with no dentist in the two upper regions.10 This is worsened by the capital intensive nature of setting up dental practice.4,10,49 Hence, the beneficiaries of the oral health services are the rich or privileged elites in the urban communities.12 Other infrastructural challenges to dental services in West Africa include deficiencies of equipment, spares, supplies and maintenance.50 These have resulted in the lopsided and non-equitable oral health care delivery in the region. By the year 2016, oral health in Africa still suffered because basic dental services were lacking in existing health systems on the continent. Many conditions are missed in their early stages due to overwork, ignorance or inadequate technical skills of health workers at the primary health centres. This results in failure to refer serious conditions early. Furthermore, resources allocated to preventive and restorative care are also inadequate.4

**State of training infrastructure in West Africa**

**Undergraduate dental training**

Dental education started in Nigeria in 196649 and Senegal in 1967. In Cote d’Ivoire, training of the first set of dental students commenced in 1973/1974.11 Earlier, in 1945, the Elliot Commission recommended that the University of Ibadan should establish a dental school, but this was not to be until 1976. Reasons for late development of dental education were lack of staff and difficulties in getting equipment. Most of the early Nigerian dental schools had to rely largely on the government workers on locum basis. After Lagos and Ibadan, other dental schools were established at Ile Ife, Benin, Enugu, Maiduguri, Port Harcourt and Kano.

Before independence, the training of dentists in Ghana occurred in Europe especially in the United Kingdom with government funding. After independence, the Ghanaian Government collaborated with the Commonwealth Organisation to obtain scholarships for her citizens. Other schemes for training included the Canada-Colombo plan, the Inter-African Universities Program and scholarships in some eastern European countries.10

Training of dental students in Ghana started in 1974 at the University of Ghana Medical School. Between 1974 and 1992 the dental students undertook basic science courses in anatomy, physiology and biochemistry in Ghana then proceeded to the Universities of Manchester in the United Kingdom, University of Lagos in Nigeria and later King’s College in London, UK for their clinical training. In September 1992, the entire training of dental students became localised in Ghana, with the first set graduating in April 1997.10 Presently, Ghana has two dental schools, one in Accra and the other in Kumasi. Dental schools usually start with at least 4 departments consisting of restorative, preventive, oral and maxillofacial surgery/pathology and child dental health.

Training of dentists in Senegal started in 1967 with basic and preclinical courses being done locally while the clinical courses were done in France until 1972 when all the training became localised in Senegal. Presently Senegal has five dental schools three of which are privately-owned. In Cote d’Ivoire, the first two sets of dental surgery students also had to spend the last two years in France (Marseille and Clermont-Ferrand). Presently the country has one dental school.

In the Republic of Guinea (Conakry), approval for training of stomatology students was given in 1991 but due to lack of manpower, it commenced in 1993/94 with the assistance of lecturers from Senegal. Burkina-Faso graduated the first set of stomatologists in 2018 while. The Faculty of Medicine and Dentistry, University of Bamako, Mali trains dental surgeons.51

There are considerable variations in the undergraduate dental curricula of West African countries largely due to their colonial past. For example, while Anglophone countries train students using a British model curriculum to produce dental surgeons, the Francophone train stomatologists after the French model. Harmonisation of these into one curriculum that is suitable and relevant to the West African population, while of international standard, could help in human resource development and deployment.

In West Africa, there are other dental professionals apart from dental surgeons/stomatologists. These include dental therapists, dental technologists, dental surgery assistants/technicians and dental assistants. These are trained in various schools of health technology in the sub-region. There are variations in the scope of professional practice of dental professionals depending on where these are found within the region. There is scarcity of further training opportunities for many dental professionals. This gap could be improved with the upgrade of the Federal School of Dental Technology and Therapy, Enugu in Nigeria to university status in 2018.

**Postgraduate training**

Several studies have suggested that most dental undergraduates intend to specialise after undergraduate training.52,53 In West Africa, specialist training is commonly acquired through the residency training programme. However, apart from residency specialist training, other forms of dental postgraduate diplomas, certificates and degrees are available. Postgraduate training provides specialised manpower for the provision of oral health care services, and equips the next generation of academics, researchers and administrators. By so doing, they also help the subregion to reduce the dependence on expatriates10 to provide specialised oral healthcare. In Ghana, Senegal, Cote d’Ivoire and Nigeria, there are postgraduate dental training programmes. Restorative dentistry training in Nigeria was pioneered by Prof. JW Johnston from New Zealand at the Lagos University Teaching Hospital (LUTH), Lagos, in 1965 while training in Oral and Maxillofacial Surgery was started in Northern Nigeria, at the Ahmadu Bello University Hospital, Kaduna by Dr Ibrahim Shamia in 1965. At the University of Lagos, ~~Lagos,~~ Nigeria, Paediatric Dentistry training started in 1974; Preventive (Community) dentistry was started in 1982 and oral pathology in 1985.

The National Postgraduate Medical College of Nigeria was established by law in 1979, to award all post graduate degrees and diplomas to medical doctors and dental surgeons. The first dental specialist (Dr. Jelili A. Akinwande) graduated from the college in 1984. The West African College of Surgeons was established to train postgraduate medical doctors and dental surgeons, mostly for English-speaking West Africa. Its first examination by the faculty of dental surgery was held in April 1988 and Dr Alhassan Emil Abdulai became the first fellow to graduate by examination.9,10

Post graduate training for Ghana-based dental surgeons was initially done either in Nigeria, Europe or the USA. In Ghana, the Ghana College of Physicians and Surgeons was established in 2003. By 2012, it had graduated about 26 specialist dental surgeons.10 Postgraduate training in Francophone West Africa started in 1976 in Senegal. Cote d’Ivoire and Senegal run the “*Diplome d’etude Superieur*” in restorative and prosthetic dentistry and oral surgery for dentists while maxillofacial surgery was for graduates of medicine. As observed by Thorpe1, dental human resources are not appropriately trained to provide services to the West African population as most dental schools in English-speaking West Africa model their dental curriculum after the British10 whose oral disease burden is different from that of the West African population. English-speaking West African dental school curricula need to be reviewed to produce dental professionals more relevant to the needs of the population. Just like the undergraduate dental training, post graduate training in West Africa continues to bear vestiges of the colonial past. Despite efforts by the West African College of Surgeons to harmonise postgraduate training in English and French-speaking countries, more remains to be done in the region to achieve easier deployment of specialized human resources for oral health~~.~~

**Prospects for improved dental services in West Africa**

To improve dental services in West Africa, the WHO African Regional Office adopted an oral health strategy in 1998 with the objectives of a significant reduction of all oral diseases in the region, equitable access to cost-effective quality oral healthcare and the adoption of healthy lifestyles. In view of the limited resources available in the region, the following approaches were recommended:

a. Advocacy and social mobilization: using social marketing and participatory methods to mobilise support for oral health.

b. Capacity building: developing human resources through appropriate training and retraining programmes.

c. Information, education and communication: providing appropriate information to individuals, families and communities for healthy oral health lifestyles.

d. Equitable access to quality oral health services: achieving greater equity in oral health services, particularly for rural, peri-urban and underserved communities.

e. Promotion of operational research: developing a research culture in order to encourage essential research on oral health problems and needs.50

To improve training, Adekeye54 advocates the overhauling of the training institutions in terms of equipment, availability of journals, attendance of overseas conferences, revival of quality and quantities of surgical services to meet up with the standards and overcome the challenges. The improvement in the availability, zeal, enthusiasm and commitment of the residents to training are of paramount importance to improved training. Since dental care professionals are scarce, there is need to equip other health workers with basic skills for preventive and promotive dental care services so that larger segments of the population are quickly reached and better served.50 To improve oral care skills available to rural communities, the W.H.O has proposed that basic primary oral care be integrated into primary health care by training workers at this level using a specially produced manual.4 Dental treatment is expensive and many West Africans are unable to afford basic treatments. To improve financial access, there should be universal health insurance for the population which will include provision of basic oral health services as part of the primary health care package. Financial institutions should finance the setting up of dental clinics in underserved areas while government should provide special incentives such as rural allowance and soft car loans for dental surgeons, and scholarships for undergraduate students10 with the caveat that they are bonded to serve some years in rural communities after graduation.

**Conclusion:**

There is scarcity of published records on the state of dental services in the West African subregion. Societies in present day West Africa practiced some form of dentistry before the advent of colonialism according to archeological records. Despite the heavy burden of oral health problems there are inadequate human and other resources to adequately serve the population. Training at both undergraduate and postgraduate levels is widely divergent among Anglophone and Francophone countries, though some attempts at harmonization have been made under the auspices of the West African Health Organisation. Available oral health resources are skewed towards the urban centres while the majority of citizens in rural areas lack adequate care. To reverse poor oral health status in West Africa, there is need to embrace the WHO Plan of Action for African Oral Health Care, improve the funding for dental services, introduce universal health insurance with inclusion of basic oral health care services as part of primary health care and incentivise oral care workers to practice in rural areas.

**Tribute**: Professor Emmanuel Oladepo Adekeye was born on 4th April, 1938. He trained at the University of Edinburgh, Edinburgh, Scotland and Faculty of Dental Surgery, Royal College of Surgeons, England. He joined Dr. Shamia at the Maxillofacial Unit, Ahmadu Bello University Hospital Kaduna in 1970 where he worked with the doctors from the Royal (British) Army Medical Corps to treat victims with facial injuries from the Nigerian Civil War (1967-1970). At the exit of Dr. Shamia, he took over running the Unit and made it the preferred choice for training of maxillofacial surgery residents both in West Africa and outside Africa. He was appointed professor in 1981. Prof Adekeye was the Head of the Maxillofacial Unit/ Department of Dental Surgery from 1977 to 2003. He was also examiner for the National Postgraduate Medical College and the West African College of Surgeons. He was an examiner to the University of Ghana Dental School in 1998 and visiting professor, School of Dentistry, University of Benin, Benin City from 1993 to 2000.

He worked extensively to promote care of patients with oral/maxillofacial diseases in Nigeria, and participated in training of several generations of medical students at the Faculty of Medicine, Ahmadu Bello University, and trained more than 16 Nigerians and Ghanaians as resident doctors in oral and maxillofacial surgery up to consultant status. He supervised 14 senior surgeons from Britain on further training in Nigeria. He received a life-time achievement award at the 7th biennial World Cleft Lip and Palate Conference in May 2012 in the Seychelles. He passed on on 13th March 2015. He would be remembered for his deep passion for skilled training, his commitment to patient care, deep wit and uncommon kindness.

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