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TRADITIONAL MEDICINE DEVELOPMENT FOR MEDICAL AND DENTAL PRIMARY HEALTH CARE DELIVERY SYSTEM IN AFRICA.

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Abstract

Traditional African Medicine (TAM) is our socio-economic and socio-cultural heritage, servicing over 80% of the populations in Africa. Although, it has come a long way from the times of our ancestors, not much significant progress on its development and utilization had taken place due to colonial suppression on one hand, foreign religions in particular, absolute lack of patriotism and political will of our Governments, and then on the other hand, the carefree attitudes of most African medical scientists of all categories. It is incontrovertible that TAM exhibits far more merits than demerits and its values can be exploited provided the Africans themselves can approach it with an open mind and scientific mentality. The degree of sensitization and mobilization by the World Health Organization (WHO) has encouraged some African countries to commence serious development on TAM. The African Regional Director of the WHO has outlined a few guidelines on the responsibilities of all African nations for the realistic development of TAM, in order to sustain our health agenda and perpetuate our culture. The gradual extinction of the forests and the inevitable disappearance of the aged Traditional Medical Practitioner should pose an impending deadline for us to learn, acquire and document our medical cultural endowment for the benefit of all Africans and indeed the entire mankind.

Keywords: Traditional African Medicine practice, TAM and PHC, WHO and TAM, herbal production, herbal dentistry

Introduction

Traditional Medicine, as a major African socio-cultural heritage, obviously in existence for several hundreds of years, was once believed to be primitive and wrongly challenged with animosity, especially by foreign religions, dating back to the colonial days in Africa and subsequently by the conventional or orthodox medical practitioners. However today, Traditional Medicine has been brought into focus for meeting the goals

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of a wider coverage of primary health care delivery, not only in Africa but also, to various extents, in all countries of the world. Traditional Medicine is the first-choice healthcare treatment for at least 80% of Africans who suffer from high fever and other common ailments.

Primary Health Care (PHC) is the key to the development of a national health policy and as defined by the Alma-Ata Declaration of 1978, it is an essential health care, based on practical, scientifically sound and socially acceptable methods and technology made universally acceptable to individuals and families in the community and through their full participation and at a cost that the community and the country can afford, in oder to maintain, at every stage of their development, in the spirit of self-reliance and self determination. It is the first level of contact for the individual, family and the community within the national health care system, bringing health care as close as possible to where people live and work and thus constitutes the first element of a continuing health care process (WHO, 1978a). A health system, based on primary health care was adopted as the means of achieving the goal of health for all by the year 2000. Most developing countries of the world, for which the scheme was designed, have failed to seriously implement it up till this moment (in the year 2004). Hence the goal of "health for all" remains unattained in all such countries.

Examining the philosophy from the critical view point of the definition of Primary Health Care, it is easy to assess the orthodox practice alongside the traditional type of health care in the African context. Specifically in the areas of social acceptability, cost affordability, self-reliance, cultural compatibility, relevance and community participation, the orthodox or the modern/western-based medicine and dentistry have not been adequate for the majority of African populations and that if we must make progress, there is an inevitable need for the official integration of traditional medicine and the utilization of traditional medical practitioners into the PHC system in Africa. The only health care providers close to them are the traditional medical practitioners, living with them and providing healthcare services in the same communities. The western type of health institutions are out of the reach of most people in terms of distance and costs, especially at the village setting. On the other hand, the orthodox medicine, as currently made available today in Nigeria (as in most African countries), so long as every nook and corner of our rural populations in Africa cannot yet be provided with basic health care needs including full-time resident medical personnel and readily available and affordable drugs, the practice of conventional medicine has failed us woefully. Although wherever, modern health facilities exist, traditional medicine is incomparable. Therefore, the most workable health agenda for Africa is the institutionalization of traditional medicine in parallel (not in complete fusion) with orthodox medicine, within the national health care scheme in order to move the health agenda forward. Effective health agenda for the African continent can never be achieved by orthodox medicine alone unless it is complemented by traditional medicine practice.

Traditional Medicine is defined by the World Health Organisation (WHO, 1978a) as the sum total of knowledge or practices whether explicable or inexplicable, used in diagnosing, preventing or eliminating a physical, mental or social disease

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which may rely exclusively on past experience or observations handed down from generation to generation, verbally or in writing. It also comprises therapeutic practices that have been in existence often for hundreds of years before the development of modern scientific medicine and are still in use today without any documented evidence of adverse effects.

The explicable form of Traditional Medicine can be described as the simplified, scientific and the direct application of plant, animal or mineral materials for healing purposes and which can be investigated, rationalized and explained scientifically. The use of *Salix alba*, the willow plant (containing the salicylates) for fever and pains which led to the discovery of aspirin, would belong to this form of Traditional Medicine. Herbal medicines, which squarely belong to this form, are regarded by the World Health Organisation, as finished and labeled medicinal products that contain, as active ingredients, aerial or underground parts of identified and proven plant materials, or combination thereof, whether in crude form or as plant preparations. They also include plant juices, gums, fatty oils, essential oils etc (WHO, 1978a). There are several other official modern drugs today, which were originally developed like aspirin through traditional medicine e.g. morphine, digoxin, quinine, ergometrine, reserpine, atropine, etc and all of which are currently being used by orthodox medicine in modern hospitals all over the world. The inexplicable form of Traditional Medicine on the other hand, is the spiritual, supernatural, magical, occultic, mystical, or metaphysical form that cannot be easily investigated, rationalized or explained scientifically e.g. the use of incantations for healing purposes or oracular consultation in diagnosis and treatment of diseases. The explanation is beyond the ordinary scientific human intelligence or intellectual comprehension.

The traditional medical practitioner (TMP) or Traditional Healer (TH) is described as a person who is recognized by the community in which he lives as competent to provide health care by using vegetable, animal and mineral substances and certain other methods (WHO, 1978b); serving as the nurse, pharmacist, physician, dentist, mid-wife, dispenser etc. The specialists include herbalists, bone setters, traditional psychiatrists, traditional pediatricians, traditional birth attendants (TBA), occult practitioners, herb sellers, general practitioners, etc; they are certainly more readily available, accessible and approachable than the orthodox physicians while their services are much more affordable than modern medical facilities. No doubt, the traditional healers, diagnosing and managing various common diseases at PHC level, with various herbal dosage forms namely, concoctions, decoctions, infusions, dried powders, ointments, tinctures and macerates, are much closer to the community than the orthodox doctors who are mainly found in urban healthcare locations. The TMPs administer these medications through various routes such as oral, rectal, intra-uterine, sub-cutaneous, external or topical applications. Although most Governments in Africa are yet to pass into law, the official recognition of their practices (like in China, Japan, India, Thailand and Korea), the practitioners have been generally acknowledged excellent at PHC level in the areas of bone setting, psychotherapy in psychiatry, hydrotherapy as well as obstetrics and gynaecology (by the TBA). Whether approved or not by the Governments, Traditional Medicine continues to play a very significant role in the medical and dental primary health care implementation in Africa and other developing countries of the world, most especially in the rural areas which cover almost 80% of the entire population.

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The World Health Organisation has since urged developing countries of the world to utilize the resources of Traditional Medicine for achieving the goals of Primary Health Care. This injunction stems round the various advantages of Traditional Medicine namely, low-cost, affordability, ready availability, accessibility and acceptability and perhaps low toxicity. The practitioners are ready sources of medical and dental manpower. It is also expected that in recognizing them and hence utilizing the advantages, the various disadvantages of the practice can also be resolved. These include lack of adequate scientific proof, imprecise diagnosis and dosage, unstandardized medicines and occultic practices.

Trends in drug discovery from indigenous medicine

Plants, which have formed the basis of sophisticated traditional medicine systems for thousands of years, were originally instrumental to early pharmaceutical drug discovery and industry. Hence, the history of drug discovery and even drug chemistry is inexorably bound to the plant kingdom and the process of deriving drugs from plant sources is certainly not new (Parfitt, 1978).

(a) Evidence outside Africa

In 1785, the English Physician, discovered the medicinal uses of Foxglove (*Digitalis purpurea*) which gave rise to digoxin, an indispensable cardiac drug; while Ergot of Rye (*Claviceps purpurea*) was discovered as the foremost natural uterine stimulant while the analgesic morphine was produced from opium poppy flower *(Papaver somniferum*) by a French scientist; strychnine from *Strychnox nuxvomica* was isolated as a CNS stimulant in the 19th century; quinine for malaria fever from *Cinchona officinalis* was reported during the same century. Ephedrine (from *Ephedra sinica*) was discovered for asthma from the Traditional Chinese Medicine in the 20th century. The first British Pharmacopoeia of 1863 contained descriptions of 187 crude drugs including *Digitalis, Datura, Belladona and Hyoscyamus*. There is therefore little or no doubt that ethnographic (ethnopharmacognosy) research can provide important clues leading to new drugs for the modern Pharmacies. It is the herbal medicine (among other alternative therapies available in the U.K.) that has seen the biggest interest in recent years. About 85% of Japanese doctors prescribe herbal medicines (KAMPO) and two-thirds of the Indian populations use Ayurvedic medicines. There has been about 26-fold increase in the budgetary allocation (USD 52 million) for Complimentary and Alternative Therapies by the US Congress within 1992 to 1998 and this was doubled (USD 104 million) in 2002 (Enwonwu, 2003). Curricula of some 80 US medical schools had included some topics in Complimentary and Alternative Medicine. Over 75% population in France had used complimentary and Alternative Medicine at least once, while about 77% of the pain clinics in Germany provide acupuncture as official therapy. In the USA, over 1,500 herbal drugs (approximately worth of billion US dollars) were sold annually and in the United Kingdom, the annual expenditure on Complimentary and Alternative Medicine was 2.3 billion US dollars. Over USD 2.4 billion Traditional Chinese Medicines (TCM) were sold and USD 400 million worth of

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Table 1: Some potential drug plant candidates from African Forests

Plant species	Part used	Indications	Constituents
Phytolacca dodecandra	Leaf	Schistosomiasis	Triterpenoid saponins
Tetrapleura tetraptera	Fruit	Schistosomiasis	Aridanin
Azadiracta indica	Leaf/bark	Fever/Malaria	Gedunin
Cryptolepis sanguinolenta	Root	Hypertension	Cryptolepine
Zanthoxylum zanthoxyloides	Root	Sickle cell anaemia	Phenolic acids
Bridelia ferruginea	Bark	Diabetes	-
Cajanus cajan	Seed	Sickle cell anaemia	Phenylalanine
Senna podocarpa	Leaf/pod	Constipation	Anthraquinones
Senna alata	Leaf/Pod	Constipation/Eczema	Anthraquinones
Datura metel	Aerial part	Ulcer and dysmenorrhea	Hyocyamine
Momordica charantia	Leaf/fruit	Diabetes	Charantin
Euphorbia hirta	Aerial part	Asthma and dysentery	-
Aloe schweinfurthii	Leaf	Skin infections, burns	Anthraquinones/Enzymes

TCM were exported out of China in 1993; about USD 60 million was realized from herbs in 1996 in Malaysia and in Europe, North America and Africa, about 75% of people living with HIV/AIDS patronize Complimentary and Alternative Medicine. As a whole, the annual market value of herbal drug products is close to USD 43 billion which is more than the total annual budget of many Africa countries (Enwonwu, 2003).

(b) Evidence within Africa

(I) Current Supports from Some Relevant Organizations

On the other hand, the orthodox medicine, as currently made available today in Nigeria (as in most African countries), so long as every nook and corner of our rural populations in Africa cannot yet be provided with basic health care needs including full-time resident medical personnel, the practice of conventional medicine has failed woefully. Although wherever, modern health facilities exist, traditional medicine is incomparable. Therefore, the most workable health agenda for Nigeria is the institutionalization of traditional medicine in parallel (not in complete fusion) with orthodox medicine, within the national health scheme in order to move the health agenda forward. Effective health agenda for Nigeria can

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never be achieved by orthodox medicine alone unless it is complemented by traditional medicine practice.

Table 2: African Medicinal Plants with Oral Health Implications

ORAL HYGIENE	TOOTHACHE	SORE THROAT	CARIOUS TOOTH
Antidesma venosum Tul.	*Alchornea cordifolia* Muell. Arg.	*Acacia farnesiana* (Linn.) Wild	*Acacia sieberiana* D.C.
Casearia barteri Mast	*Anacardium occidentale* Linn.	*Amaranthus spinosus* Linn.	*Alchornea cordifolia* Muell. Arg.
Citrus aurantifolia Swing	*Chlorophora tinctora*	*Anacardium occidentale* Linn.	*Capsicum annum* Linn.
Diospyros ellioti F. Whit	*Capsicum annum* L.	*Casearia barteri* Mast.	*Curcuma domestica L.*
Garcinia kola Heckel	*Curcuma domestica* Linn.	*Citrus aurantium* Linn.	*Dichrostachys cinerea* Wigh & Arm.
Jatropha curcas Linn.	*Piper guineense* Linn.	*Cocos nucifera* Linn.	*Diospyros ellioti* F. Whit
Lecaniodiscus cupaniodes	*Daniella oliveri* Hut.	*Diospyros ellioti* F. Whit.	*Zanthoxylum rubescens* Eng.
Ocimum gratissimum Linn.	*Zingiber officinale* Rosco	*Gongronema latifolium* Benth.	*Zanthoxylum zanthoxyloides* Waterm.
Vernonia amygdalina Del.	*Erythrina mildbaedi* Har.	*Jatropha curcas* Linn.	*Indigofera hirsute* L.
Zanthoxylum. zanthoxyloides Waterm	*Zanthoxylum rubescens* Eng.	*Magifera indica* Linn.	*Piper guineense* Linn.
Masularia acuminate (G. Don.) Bull. Ex Hoyle	*Zanthoxylum. zanthoxyloides* Waterm	*Ocimum gratissimum* Linn.	*Syzigium aromaticum*
Terminalia glaucescens Planch.	*Garcinia kola* Heckel	*Piper guineense* Linn.	*Zingiber officinale* Rosco
	Syzigium aromaticum	*Zingiber officinale* Rosco	

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Table 3: Some African Medicinal Plants in the World Markets (Sofowora, 1993b)

Plant Species	Major Indications	Source(s)
Ancistrocladus abbreviatus	Anti-HIV	Cameroon & Ghana
Corynanthe pachycerus	Male stimulant	Ghana
Physostigma venenosum	Ophthalmia	Nigeria, Ghana
Prunus africana	Prostrate gland hypertrophy	Cameroon, Kenya, Madagascar
Rauwolfia vomitoria	Psychiatry/Hypertension	Nigeria, Zaire, Rwanda, Mozambique
Strophanthus gratus.	Cardiotonic	West African Countries
Voacanga africana	Antimicrobial	Cote d'Ivoire, Ghana, Cameroon, Nigeria
Albizzia adianthifolia	Gum	South Africa

The Relevance of the World Health Organisation (W. H.O)

The World Health Organization, has for several decades, supported, promoted and assisted the development of traditional medicine in the bid to move the African health agenda forward, particularly for the less-developed countries of the world. This philosophy was reinforced at the Alma Ata declaration of 1978 when it became obvious

that the large majority of the developing countries of the world were unable to provide health care to the populations using the imported orthodox health facilities. Since then, the W.H.O, utilizing several expert committees' policy decisions and resolutions, etc. had provided adequate guidelines that countries could use to develop and utilize their indigenous systems of medicine, for their individual national health agenda.

The Regional Office in Brazzaville, responsible for the specific needs of the African Region in this regard has since carried out several activities toward the promotion of traditional medicine. The current trend in the recognition and development of Herbal Medicine in Africa by various international organizations calls for positive response from all the medical and pharmaceutical research scientists of African origin. Firstly, the African Heads of States have since declared the next ten (10) years (2001-2010) as a period for Traditional Medicine development in Africa and this has been tagged as the "**Decade of Traditional Medicine in Africa**". Hence the 31st of August every year is to be observed and celebrated as the African Traditional Medicine Day in all the countries of the Continent. The maiden celebration of African

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Traditional Medicine Day was marked in August 2003 with the theme: "**Traditional Medicine – Our Culture and Our Future**".

The second African Traditional Medicine Day came up on 31st August 2004 and with the new theme: **"Moving African Health Agenda Forward with Traditional Medicine"** and with the following messages from Dr. Ebrahim Maluc Samba, the WHO African Regional Director, on the occasion of the second African Traditional Medicine Day, celebrated on 31st August 2004:

"Today 31 August 2004, Africa commemorates the Second African Traditional Medicine Day. The theme for this year's commemoration is "Moving African Health Agenda Forward with Traditional Medicine". This is a very important event which should be accorded due recognition, support and commemoration by all the stakeholders engaged in the development of African Traditional Medicine.

"The main message in the theme"

What does the theme, "Moving African Health Agenda Forward with Traditional Medicine" mean? The theme befits the occasion because Africa has, over the centuries, moved the health agenda forward with traditional medicine in that it has been with us before the advent of conventional medicine. African people have used traditional medicine to combat disease affecting the health of their families since time immemorial. It was the only form of medicine used for the prevention, diagnosis and treatment of social, mental and physical illnesses. It is acceptable, accessible and affordable by the majority of African people. Today, more than 80% of the population living in Africa use traditional medicine. For most, it is the only source of hope for the management or treatment of some priority diseases such as HIV/AIDS and sickle cell anaemia. Even though traditional medicine was often denigrated as backward practice during the colonial era, it has continued to thrive because it is culturally accepted by the African population. For some communities, it is the only system available because western medicine is too costly and sometimes unavailable. While the World Health Organization recognizes and respects traditional medicine, it also has a responsibility to ensure that quality, safe, effective and affordable traditional medicines are produced in Africa for Africans and the world. Because of this, WHO has developed various guidelines for the development and delivery of quality traditional medicine services.

"Contributions of traditional medicine to health in Africa"

Traditional Medicine has demonstrated its contribution to the reduction of excessive mortality, morbidity and disability due to diseases such as HIV/AIDS, malaria, tuberculosis, sickle-cell anaemia, diabetes and mental disorders. Traditional Medicine reduces poverty by increasing the economic well-being of communities and developes health systems by increasing the health coverage to the people.

"What is required by African countries under the theme"?

The major challenge is that scientifically-based evidence on Traditional Medicine, quality standards and regulations are not being developed at the same pace

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as the demands for the medicines. Therefore, Member States of the WHO African Region need to scale up institutionalization of African Traditional Medicine in their health systems. Institutionalizing African Traditional Medicine in health systems is a key pillar in the promotion and development of Traditional Medicine in this 21st century.

"Steps to be taken by individual countries in compliance"

W.H.O has developed model tools for institutionalizing African Traditional Medicine in health systems. The models are available to those who need them and may be adopted or adapted for local situations. Government can undertake the following actions in order to move the health agenda forward with Traditional Medicine, namely:

a. Develop policy, legal and regulatory frameworks for the practice of traditional medicine within the framework of national health policies and health legislation;
b. Promote and conduct relevant scientific research on medicinal plants in collaboration with traditional health practitioners to validate claims made on safety, efficacy and quality of traditional medicines.
c. Ensure that intellectual property rights are priority items on the agenda of Member States to protect indigenous knowledge about Traditional Medicine;
d. Establish an enabling economic, regulatory and political environments for local production of traditional medicines as well as develop industries that can produce standardized remedies to increase access;
e. Register traditional medicines, if need be, by using the W.H.O Guidelines on Registration and regulation of Traditional Medicines in the W.H.O African Region;
f. Disseminate appropriate information to the general public to empower them with knowledge and skills for the proper use of traditional medicines;
g. Build human and material resource capacity in order to carry out and accomplish institutionalization strategies."

Secondly, the African Regional Director of the World Health Organization (WHO) has placed a big challenge before the Regional Expert Committee on African Traditional Medicine as well as the several WHO Collaborating Centers for Traditional Medicine in Africa, that within the next few years, at least a drug each must have reached the market in the following priority diseases in Africa: Malaria, HIV/AIDS, Sickle Cell Anaemia, Diabetes and Hypertension.

What is the current status of the integration of traditional medicine in national health systems of countries in the African Region?

Countries in the WHO African region are at different stages of integration of TM in health systems. Some of the key actions that are

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recommended to Member States for integration of TM in health systems and services include the following:

i. Political recognition: This is already there as the African Summit of Heads of States and Governments have made various declarations including research on traditional medicines used for the treatment of priority diseases to be made a priority and the period 2001-2010 as the Decade of African Traditional Medicine.

ii. Formulation of policy, regulatory and legal frameworks: Some countries have formulated national policies, legal frameworks and regulations including mechanisms for registration of traditional medicinal products, established national expert committees, national programmes and national offices and developed training programmes for various cadres of health workers. WHO is supporting this process in Member States through the provision of guidance in these policy issues.

iii. Conducting research on traditional medicines: Countries are conducting research in order to validate claims made on quality, safety and efficacy of traditional medicine used for the management of priority diseases such as HIV/AIDS, malaria, sickle cell anaemia, diabetes and hypertension. WHO has developed guidelines on research methodologies and is supporting countries in this process.

iv. Collaboration and partnership arrangements: Countries such as Burkina Faso, Madagascar, Mali and Tanzania have made partnership arrangements with traditional health practitioners and the private sector as equal partners because trust among collaborators is crucial, and this holds the key to the success of integrating TM, WHO has developed memorandum of understanding between biomedical researchers and traditional health practitioners which countries can adapt to their local situations.

How should this integration be carried out?

Integration or harmonization of African Traditional Medicine does not have to be in the fashion of the Chinese, Koreans or Vietnamese.

Member States need to find and develop systems of harmony between traditional and modern systems of health care in the African context, with the minimum threat to each other. Member States working jointly with all stakeholders have to develop systems that will ensure economic survival and social acceptance of both systems of health care coverage to the majority of the population. By doing so we will have Moved African Health Agenda forward with Traditional Medicine.

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(II) Research focus on African Plants

Basic information as a lead to scientific probing of medicinal plants in Africa has been obtained from herbalists or traditional medical practitioners, native herb sellers and the local, indigenous people (Baba, *et al*., 1992). By the early nineties, screening work on African medicinal plants has advanced with publications arising from the following research areas: antimicrobial (16%), molluscicidal (11%), antimalarial (7%), plant toxicology (7%), antitumour-related studies (4%) and others (54%) (Sofowora, 1993a). For molluscicidal activity: P*hytolacca dodecandra*, *Tetrapleura tetraptera* (Table 1) and *Swartzia madagascariensis* had become an international research interest for the control of schistosomiasis (Adewunmi, 1991). Gedunin and nimbolide, two of the several limonoids in *Azadirachta indica* were pruned down as the antimalarial constituents (Khalid and Deddeck, 1989). The root of *Cryptolepis sanguinolenta*, used for treating urinary infections in Traditional Medicine is strongly antimicrobial with cryptolepine as the active principle. Its extract has been formulated by the Center for Research into Plant Medicine in Ghana. The common chewing sticks used by the Africans in various communities for traditional dental care have been reported to possess actions against oral microbial flora and to contain various minerals which can hinder plaque formation in Dentistry (Sofowora, 1993b). The most outstanding of the chewing sticks, *Zanthoxylum zanthoxyloides* (Lam.) Waterm. (Rutaceae), also an antisickling and anticancer plant, was found to contain alkaloids: berberine, fagaronine, chelerythrine, canthin-6-one and benzoic acid derivatives as the main active ingredients. *Ancistrocladus abbreviatus* (Ancistrocladaceae), a Cameroon plant species, showed a strong anti-HIV activity in the laboratory of the National Cancer Institute in the U.S.A. The antiviral component has been pinned down to Michelamine B., which was being developed for people living with HIV/AIDS.

(III) Local Drug Formulation and Production From African Plants

The need has since been expressed for industrial drug production from medicinal and aromatic plants in Africa in order to increase the economic and health potentials as well as the social benefits from our natural resources. To date, over 30% of the pharmaceutical products manufactured in Egypt are plant-derived e.g. *Ammi visnaga*, *Glycyrrhiza glabra*, *Aloe vera* etc. Rwanda and Zimbabwe also produce pharmaceuticals from plants' essential oils. Dr. Fumba's Center in Burundi provides and makes available both orthodox and traditional drugs for the hospital dispensaries.

In the Centre for Scientific Research into Plant Medicine established in Ghana since 1973, pilot drug production is carried out to provide well-formulated, stable, standardized and safe preparations from plants for clinical evaluation, utilization and monitoring in a clinical setting. Similarly, in the Centre for Research on Pharmacopoeia and Traditional Medicine in Rwanda, *Datura stramonium*; *Eucalyptus globules*, *Capsicum frutescens* and *Plantago lanceolata* are prepared in the Dispensary of Traditional Medicine where they are administered for antispasmodic, pulmonary disinfectant, counter-irritant and anti-tussive activities, respectively. And also in Mali, several herbal products have been formulated as tea bags for use as follows: Dysenteral (*Euphorbia hirta* for dysentery), Laxa cassia (*Cassia italica* for constipation) and Hepatisane (*Combretum micranthum* for constipation). These drugs are now produced

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by private herbal industries in Mali for clinical application. The **"Village Chemist"** outfit in the Department of Pharmacognosy of Obafemi Awolowo University, Ile-Ife, in Nigeria has embarked on herbal drug manufacture of many standardized and efficacious herbal preparations, basically for use in the management of different opportunistic infections in people living with HIV/AIDS (PLWHA) namely antithrush, (HAT DECOCTION), antifever (MAMA DECOCTION), antidiarrhoea and antidysentery (DIAFFIN JUICE/XYLOGIN POWDER), anticough (COFER INFUSION) and anti-infective against various skin pathogens (PAMET/PAMETONE/CAGELO SOAPS & ABAFICIN DECOCTION).

(IV) Plants as dental drugs

About 10 different oral/dental conditions treatable with plants are common in traditional health practice namely: toothache/decay, gingivitis, ulcerative gingivitis, angular stomatitis, mouth ulcers, swollen tonsil, oral thrush, tonsillitis and black tongue (Hollist, 2004). Most common plants in the field include *Piper guineense*, *Xylopia aethiopica*, *Citrus aurantifolia* and *Aframomum melegueta*. For ordinary oral hygiene and in many African homes, teeth are cleaned in the morning by chewing the roots or thin stems of certain plants until they acquire brush-like ends (El-Said *et al*, 1971). The fibrous end is used to brush and clean the teeth thoroughly every morning. In certain parts of West Africa e.g. Senegal, chewing sticks are used frequently during the day as well. *Zanthoxylum zanthoxyloides* (Lam.) Waterm. root imparts tingling and peppery taste sensations and numbness in the mouth; *Masularia acuminata* (G. Don) Bullock ex Hoyle stem, produces a strong bitter taste and frothing; an initial bitterness and later sweet taste by *Vernonia amygdalina* Del. root (Tella, 1976) while *Terminalia glaucescens* Planch. root gives a discolouration of the mouth after use (Sofowora, 1993b). The antimicrobial activities of the individual chewing sticks have been investigated, showing that all of them were active against the oral microbial flora in varying degrees. The antimicrobial action of *Zanthoxylun zanthoxyloides* is attributed to the presence of benzoic acid derivatives (Odebiyi and Sofowora, 1979). The phenolic acids were active at a pH of about 5 and the alkaloids (Canthin – 6 – one, berberine and chelerythrine) were active at a pH of 7.5, meaning that the root contained antimicrobial compounds, active at both alkaline pH (during heavy tooth decay) as well as acid pH (after a drink of lime or grape juice). Odusanya, with others (1979) reported that some African chewing sticks possessed fluoride ions but at insufficient concentrations and also silicon, tannic acid, sodium bicarbonate as well as other natural plaque-inhibiting substances that could reduce bacterial colonization and plaque formation in the mouth (Akpata *et al* 1977). Tella (1976) reported antimicrobial properties of the crude root of *Vernonia amygdalina* in gingivitis and toothache. Bruneton (1995) and Kocry (1983) have elaborated on the use of chewing sticks in preventive oral hygiene while Ogunbodede (1991) documented the role of traditional healers in dental care.

(V) Toothache and Tooth Extraction Techniques with Medicinal Plants

The immature pericarp of *Ganipa americana* (Family Rubiaceae) is used for tooth extraction by placing the pulp onto the aching tooth, left in place for several weeks for

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the disintegration of the tooth which is then removed in pieces, with little or no trauma (Lewis and Lewis, 1977). The stem-sap of *Stigmaphyllon* species (Family Malpighiaceae) is placed on the carious tooth for about 4 hours followed by other repeated applications throughout the day. After one week, the tooth can be removed without bleeding or pain. The aggressive stinging ants, found inside the stems of *Triplans* species (Family Polygonaceae) are crushed and placed on the aching tooth for one week. The tooth is then pulled out with the fingers. It is believed that the formic acid (among other substances) in the stinging ants is responsible for the activity. One application, followed by repeated contact, using cotton swab of the latex of *Chlorophora tinctora* (Family Moraceae), is also used for tooth extraction. No pain, trauma or bleeding is involved (Garcia, 1974; Maxwell, 1962). Careless applications resulting in spillage or damage to other teeth, adjacent to carious teeth, may lead to unintended extraction of unaffected teeth. The use of the juice of *Ficus* species (Moraceae) for toothache has revealed analgesic and anti-irritant properties. Other plant species recorded for tooth extraction include *Conssapoa glaberima* (Moraceae) and *Asclepia curassavica* (Asclepidaceae) and for toothache include *Alchornia cordifolia*, *Curcuma domestica*, *Piper guineense* and *Syzigium aromaticum* (Table 2).

(VI) Teeth Colouring

Teeth blackening with plants, sometimes up to one year, is done for the purpose of preserving the teeth, controlling dental caries and keeping the teeth strong and healthy. Some of the blackening plant species include: *Neea parviflora* (Family Nyctaginaceae), *Manettia divaricata, Manetta glandulosa,* and *Duroia hirsute*.

(VII) Clove bud in Dentistry

Eugenol, the main chemical constitutent of the volatile oil from Clove (*Syzigium aromaticum*) is eugenol, and has been used for a long time by Dentists through intracanal route; as a dressing in Dentistry, for treating minor oral wounds; as an analgesic in painful and infective diseases of the oral cavity and oropharynx as well as for general oral hygiene. In general medicine, clove is used as an agent against flatulence, stomach distension and gastro-intestinal spasm. Rapidly metabolized and excreted in conjugated forms, eugenol is not a carcinogen. Official formulation includes: *Zinc Oxide and Eugenol (ZOE) paste*, in form of lozenges, mouthwashes and neat clove oil. It is recognized as safe and may be added to foodstuffs in concentrations of up to 1,500ppm (i.e. 0.15%). The Indonesian cigarettes called “kretek” contains 40% clove. Side effects of eugenol include irritation of oral tissues and CNS depression (when used in systemic administration) which do not constitute serious health hazards to suggest withdrawal. The use of clove is unfortunately no longer favoured by dental practitioners in Africa.

Some other common traditional oral health practices in Africa include extraction of primary canine, removal of lower central incisors in adults, brushing of children gingival with fresh herbs and cosmetic hole-drilling of upper lip of girls for cosmetic dressing (Ogunbodede, 1991).

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(c) African Medicinal Plants in the World Market

Many plant drugs even in the crude form are well known in the international markets today and African countries are among the top world producers of such plants (Table 3). Examples are *Rauwolfia vomitoria* Afz., (Family Apocynaceae) which is a major source of reserpine, a major tranquilizer and an antihypertensive; ginger (*Zingiber officinale*) Roscoe (Family Zingiberaceae) which contains gingerol used as spice, carminative and important medicinal product. Ginger is also produced in Nigeria. *Capsicum annum* Linn. (Family Solanaceae) produces capsain and capsacin, used as spice and medicine; P*hysostigma venenosum* Balf. (Family Leguminoceae) which is the Calabar bean, produces physostigmine or eserine used in ophthalmia; *Syzigium aromaticum* Linn. (Family Myrtaceae) is a dental remedy and also *Chrysanthemum cinerariifolium* Vis (Family Asteraceae), called pyrethrum flower, produces the natural pyrethrins, a class of insecticides (Wallis, 1967). Others include *Catharanthus roseus* (Linn.) G. Don (Family Apocynaceae), also called the Vinca or Madagascar Rose periwinkle, used in the management of leukaemia and Hodgkin's disease; *Agave sisalana* Perrine (Family Agavaceae), exported by Tanzania and is rich in hecogenin, employed for the partial synthesis of steroidal drugs such as corticosteroids and oral contraceptives; also *Cinchona succirubra* Pav. (Family Rubiaceae) which yields quinine, a key antimalarial drug of long history (Reiz and Lipp, 1982). In addition, there are several other medicinal plants of research interest in several parts of Africa strongly qualified for drug development. A few examples are presented in Tables 2 and 3.

(d) The Challenges of Plant drug Utilization in Africa

Obviously, drug development from natural sources is not all a bed of roses. Infact, it can be much more Herculean than synthetic drug development. Formulation of herbal medicines, particularly in crude-drug form, represents a specialized expert area that requires training and experience. The heavy microbial load resulting from the field plant contamination as well as stability and shelf life determination in terms of stabilization and preservation, particularly in liquid dosage forms, would pose important fundamental challenges. Packaging materials must be carefully selected to withstand all possible natural colour deterioration as well as chemical, microbial and environmental contamination. The heavy demands of large-scale manufacture, which may rely on wild source collection, would pose the challenge of large-scale cultivation and conservation of different plant species. The problems of scientific evidence for the proofs of efficacy and the possibility of chronic toxicity for herbal medicines give reasonable and logical basis for reservation. Proven protocols for clinical monitoring (e.g. *Plasmodium* count in malaria, fasting and random blood sugar determination, etc.) as well as organized and affordable clinical trials, must be addressed objectively in herbal drug development. However, with serious attention, energy, resource mobilization, commitment and the required political will, the various challenges can be successfully addressed. Such ideals have since been achieved in India and China, as well as in other developing countries of the world. For several centuries now and up till today, *Cassia acutifolia* (Senna) leaves known as Herb Tea of Commerce, remains a product of large-scale cultivation and collection, in Egypt and Sudan, although they are packaged in London and sold back to Africa; sourcing of quinine from *Cinchona* bark

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or diosgenin from *Discore*a tubers continues in India as two separate large-scale cultivation and collection ventures. Hundreds of Chinese herbal preparations have already been developed with established standard methods of formulation for quality, stability and adequate shelf-life while many of them, including injections, have been subjected to high-level, sophisticated clinical testing for toxicity and efficacy. China and India started several decades ago from somewhere. It is high time, African countries where similar natural resources abound followed their footsteps using the natural forest endowment for self-reliance, international recognition, and economic liberation in health care financing.

The current interest surge in herbal medicines all over the world (both developed and developing countries), leading to the unregulated cropping of the Africa's bioresources, will pose stress and threat of extinction on the plant species while the traditional healers themselves are hopelessly being observed to advance in age and gradually disappearing from the surface of the earth. Therefore, the situation of both plant and human resource extinction must set a natural deadline for all of us the African pharmacognosists, pharmacologists, dentists, pharmacists and physicians to learn, acquire, document and use traditional medicine knowledge for the benefits of Africa and its people, and indeed the entire mankind (Elujoba, 2003). Since no single system of health can solve all the problems, there is need for African biomedical Scientists to adopt an open mind with due respect, towards our traditional health beliefs and practices. An official respect, by the orthodox practitioners, duly accorded to the spiritual, nutritional and socio-cultural components of physical healing, with the body's potentials to heal and maintain itself is highly essential at this stage in Africa.

There is also the need for orthodox doctors in Africa to be knowledgeable about the positive aspects of Traditional Medicine in order to appreciate the vast areas of research open to them for self-development and for service in the health care delivery system of our people. The oral health and dental scientists must equally be challenged not to shy away from Traditional Oral Health Practices but rather, to examine critically, the advantages and disadvantages, in order to come up, through studies and research, with some balanced and fair conclusion for the overall benefits of the African people. This, as a vital component of societal expectation, ought to be the collective responsibility of all the African medical scientists.

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