

# Translational Herbal Medicines Availability: A Necessity to Ensure Medicine Security in Nigeria.

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## ABSTRACT

**Background:** Over 80% of people in Africa receive care from Traditional African Medicine (TAM), which is part of our socioeconomic and cultural legacy. Nigerian traditional herbal medicine has made significant contribution to the primary health care needs of Nigerians from time immemorial. However, there is significant room for improvement in its development and utilization. In most communities, they have served as the primary and, in some cases, the only source of healthcare for many millions of people. This is because they are accessible and reasonably priced. They are trusted by a vast majority of the populace, having been embraced culturally. Due to the current economic set back in Nigeria and other developing countries, the affordability of these herbal medicines have made them to be in high demand as alternatives for primary health needs of majority of the populace. A significant amount of efforts have been made to translate herbs used locally into standardised dosage forms, however there is still a lot to be done in this regard. Herbal medicines, whose potency, efficacy and safety have been scientifically validated can help to achieve the goal of ensuring that everyone has access to healthcare.

**Methods:** A review of translational herbal medicines available in Nigeria was centered on emphasizing the necessity of translational herbal medicine. This will ensure availability and affordability of drugs, which will in turn lead to medicine security in Nigeria.

**Results:** Recommendations were made to encourage the use of translational herbal medicine to ensure medicine security in Nigeria.

**Conclusion:** For the benefits of herbal medicine to be maximized, individuals must be informed about the likely benefits and risks of supplementing their use of conventional medicine with Herbal Medicine. In addition, herbal medicinal products must be standardized to render them more acceptable such that they can be integrated into the national health care delivery system.

## 1. Introduction

Nigeria is a country blessed with abundant natural resources, some of which can be used as medicinal plants to treat various ailments and diseases. Some of these herbs have already been utilized by the public, however their full potential hasn't been harnessed. This is due to lack of awareness by the public on their safety, efficacy, quality, and lack of adherence to regulatory and quality assurance standards to ensure its safety and quality. Translational traditional medicine is one of the latest areas of traditional

medicine<sup>1</sup>. It is the link between 'bench and bedside' which is a term used to describe the process by which the results of research done in the laboratory are directly used to develop new ways to treat patients<sup>1,2</sup>. For so long, Herbal medicine safety, efficacy, quality, availability, sustainability, and continued development have been questioned due to its supposedly underdeveloped scientific understanding. In order to bridge this gap, it is necessary to conduct translational research that will enhance the empirical basis of traditional herbal medicine<sup>3</sup>.

### 1.1 Traditional medicines vs orthodox medicines

According to WHO, Traditional medicine is the sum total of the knowledge, skill, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness<sup>4</sup>. Orthodox medicine is a medical system that assumes that the mind and the body are separate. Hence patients are not treated wholly but based on the symptoms they exhibit, and the diseased organs<sup>5</sup>. The widespread use of traditional medicine in Nigeria and Africa is due to its availability, cultural acceptability, affordability, low cost and toxicity<sup>6</sup>. For instance, the ratio of traditional healers to the population in Africa is 1:500 compared to 1:40 000 medical doctors to population<sup>7</sup>.

In Nigeria, most rural communities lack access to orthodox medical facilities, even though there has been an expansion of these facilities and an increase in the number of orthodox health care providers. Majority of its citizens especially those living in the rural areas would rather depend on Traditional medicine than Orthodox medicine. In recent times, more countries, including Nigeria, have come to understand the potential benefits of traditional medicine on public health and wellness as well as the quality of their health-care delivery systems. Governments and the public are beginning to consider how indigenous medical practices might be incorporated into the provision of healthcare<sup>7</sup>.

According to the WHO Traditional Medicine Strategy (2014-2023), to harness the full potential of traditional medicine, its contribution to health systems and promote its safety and efficiency. The following strategic objectives have to be implemented: 1) building the knowledge base and formulating national policies; 2) strengthening safety, quality and effectiveness through regulation; and 3) promoting universal health coverage by integrating Traditional and complementary medicine services and self-health care into national health systems<sup>7</sup>.

## 2. Challenges of Traditional Herbal Medicines

To completely realize the goal of regulating, standardizing, and integrating Traditional Medicine in Africa, several issues and obstacles must be overcome. One major challenge will be the dominant mentality of most stakeholders in modern medicine over traditional medicine<sup>8</sup>. In the medical community, there is a widespread perception that Traditional medicine violates the principles

of objectivity, measurement, coding, and classification. Another major challenge of TM is the widespread reports of fake healers and healing caused by poor quality controls, inaccurate labeling, and a lack of relevant patient information<sup>8</sup>.

Other challenges include ambiguous clinical indications, outdated production processes, unknown material bases and mechanisms of action, low-level quality control, inadequate intellectual property protection, lack of toxicological evaluation, lack of standardization, safety regulations and lack of regulation on manufacturing practices<sup>9,10</sup>.

Unclear

clinical indication, obsolete manufacturing process, unclear material basis and action mechanism, low-level quality control and poor intellectual property protection are the problems more or less existed in the Chinese medical preparations. Using modern technology to solve these problems can achieve the seamless transformation of research results. There are several typical successful Unclear clinical indication, obsolete manufacturing process, unclear material basis and action mechanism, low-level quality control and poor intellectual property protection are the problems more or less existed in the Chinese medical preparations. Using modern technology to solve these problems can achieve the seamless transformation of research results. There are several typical successful

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### 2.1 Drugs developed from Traditional Herbal Medicine

In Africa, Traditional medicine, play a vital role in the treatment of various ailments and diseases especially the top killer diseases such as HIV/AIDS, malaria, diabetes, tuberculosis, hypertension<sup>11</sup>. It has also been perceived to be safer than modern medicine because the adverse effects of phototherapeutic agents are less frequent compared with synthetic drugs<sup>11</sup>. These claims can't be fully backed up due to insufficient clinical/experimental data to support claim of safety, efficacy and quality, Traditional medicine still plays a huge role in the health system in most developing

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countries.

In Nigeria, effective medicinal plants in management of various diseases have been documented. For example, *Rauwolfia vomitoria* Afzel (Apocynaceae) is a plant species containing reserpine, yohimbine which are used as a tranquilizer and an antihypertensive. *Cinchona succiruba* L. (Rubiaceae) is a plant species containing Quinine that has Anti-malarial activity. *Physostigma venenosum* Balf. (Fabaceae) is a plant species containing physostigmine that is used as an ophthalmia for eye problems. *Zingiber officinale* Roscoe (Zingiberaceae) (ginger) - another medicinal plant containing gingerol is used in the management of hypertension and hypercholesterolemia. This indicates that there are potentials in our resources, in our medicinal plants/ herbs. With proper study, research, standardization, information and regulation on these medicines, they can be integrated into modern medicine, and this can cause a significant advancement in the current health systems in Nigeria<sup>12</sup>.

## 2.2 Suggestions on the Development of Translational Herbal Medicine in Nigeria

### i. Establishment of more Research

**Institutes/Centers** – Standardized medications that are both safe and effective are made possible by the results of placing more attention on improving randomized, well-controlled clinical trials. Government support for research facilities will promote the creation of novel cures that will improve the health of its citizens. For instance, in Nigeria, the 'village chemist' in development of Pharmacognosy, Obafemi Awolowo University, Ile-Ife, manufactures standardized and efficacious phytomedicine for managing various (opportunistic) infections in people living with HIV/AIDS, such as: anti-thrush, antifever, antidiarrhea, anticough, antidysentery, anti-infectives against skin infections<sup>12</sup>. The Institute for Drug, Herbal Medicine and Excipient Research and Development, university of Nigeria, Nsukka established in 2017, serves as a pilot unit for translation of pharmaceutical research results from laboratory to medicinal products that can be beneficial to patients in treating various diseases<sup>13</sup>. With proper funding by the government in centers such as these, more research works can be done leading to more utilization and production of effective cures

from our traditional herbs.

### ii. Integration of Herbal into the Health System-

harmonizing our traditional medicine into the health care system will lead to a reduction of the tension, bias, and threats of orthodox medicine against Traditional medicine. The absence of formal integration of traditional medicines into the current system of conventional healthcare is largely due to the fact that there aren't many traditional medicine curricula that focus on developing skilled human resources to provide quality services and provide the Materia medica needed for treatments of various ailments. This training program will give Traditional Health Practitioners the knowledge and assurance they need to collaborate with contemporary physicians inside the current official healthcare system<sup>14</sup>. In addition, traditional medicine practitioners can give appropriate information on the prescriptions and indications of these herbal medicines to orthodox practitioners and consumers that will enable proper application of these products in the health care delivery system.

Under the present health care reform of the Federal Government of Nigeria, traditional medicine is allegedly recognized as an important component of the healthcare delivery system especially at the primary care level<sup>12</sup>. The Federal Government of Nigeria has also established the Nigeria Natural Medicine Development Agency (NNMDA) to study, collate, document, develop, preserve, and promote Nigerian TM products and practices and to also fast track the integration of the TM into the mainstream of modern health care system in line with happenings in China and India<sup>12</sup>.

### iii. Policy and Regulations-

With the growing need for medicinal plants and a large increase in population in the country and the world at large, there is a need for national policies and regulations to promote the safety, efficacy, quality, availability, accessibility, and rational use of herbal medicine. In Nigeria, there are established national and state traditional medicine boards for regulation of herbal medicine practice and to also promote cooperation and research<sup>15</sup>. In 2017, a center for research in traditional complementary and alternative medicine was established in

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Nigeria to support the work of the WHO Traditional Medicine Strategy 2014–2023, by assisting the Federal, state, and local governments in Nigeria develop policies and implement plans that strengthen the role traditional medicine (TM) plays in keeping populations healthy. The center works in collaboration with the Nigerian Council of Physician of Natural Medicine (NCPNM) and other traditional medical practitioners to incorporate traditional medical practice into public healthcare in Nigeria<sup>16</sup>.

**iv. Proper Education of the Public** – Despite the growing knowledge and development of TM in some parts of the world, it has been observed that little is being done in our medical schools to support its teaching, as there is still some bias amongst Nigerian medical students about the inclusion of TM in the country's system of primary healthcare<sup>12</sup>. Hence, Public enlightenment Program, in the form of health education cannot be over-emphasized. According to the Nigerian traditional medicine policy, to fully integrate TM into the health care delivery system, Traditional Medicine Practitioners shall be identified, screened, and appropriately trained through training programs that shall be established at all levels of the national health system<sup>15</sup>. Notably, universities in Nigeria especially the Faculty of Pharmacy run courses in Pharmacognosy that enlighten the students on some of our natural herbs and their use in the medical field<sup>17</sup>. The Federal Government has also set up and financed the Federal College of Complementary and Alternative Medicine, Lagos under the Federal Ministry of Health to train herbalist on its use and practices<sup>11</sup>. Furthermore, Orthodox Medicine Practitioners and consumers should be educated about the efficacy of herbal medicine especially for those that have some sort of prejudice and bias over Traditional Medicine. Several state governments in Nigeria have encouraged this through their traditional medicine boards by organizing tradomedicine fairs and exhibition in a bid to educate the consumers on the possible cures from traditional medicine.

**v. The Need for Standardization of Herbal Medications.**

Standardization of herbal drugs refers to all the measures that must be taken right from the

identification of a plant to its manufacturing stage to ensure its safety, quality, efficacy and authenticity<sup>18</sup>. This is very crucial, as most herbal medicines may contain numerous chemical components and this may be difficult in indicating which constituents may be responsible for a therapeutic effect or adverse effects. According to WHO, the first stage in assuring the quality, safety and efficacy of herbal medicines is identification of the plant species, followed by assessment of its safety and/or efficacy by the evaluation of well-documented literature reports, documentation of its safety and risk based on experience, providing consumers with product information, and also promoting product<sup>19</sup>. An herbal product that has not been authenticated and characterized in order to ensure reproducibility in the manufacturing of the product, cannot be regarded as scientifically genuine<sup>19</sup>. A lot of herbal medicines in the market today, have not gone through a drug approval process to prove their safety and effectiveness. Some of them may contain mercury, lead, arsenic and toxic organic substances in harmful amounts<sup>18</sup>. Hence it is important for standardization to be well incorporated into the traditional medicine system to prevent events such as toxicity, adulteration, fake drugs, injury or death to the public. In Nigeria, The National Agency for Food and Drug Administration and Control (NAFDAC) serve as an agency where herbalists can register their proven and efficacious standardized herbal preparations<sup>11</sup>.

The government should increase funding to these regulatory agencies in order to make them function better. One of the ways is to ensure they are provided with adequate instruments and machinery needed in the quality control of herbal medicines. Some of these instruments include High performance liquid chromatography machine (HPLC), Gas Chromatography-Mass spectrometry (GC-MS), Nuclear magnetic resonance (NMR) amongst others. These instruments are useful in the determination of toxic substances, plant authentication and very importantly quantification of active ingredients in plant materials<sup>20</sup>. The latter is one of the major problems of the standardization of herbal medicine. The amount of active ingredients in

plant materials varies depending on a number of factors e.g., time of collection, season of collection, geographical location etc. which will in turn affect the quality of herbal medicine products<sup>21</sup>. Hence the need for adequate

instrumentation in the quality control of herbal medicine cannot be overemphasized. In addition to providing these instruments, provision should be made for their long-term maintenance.

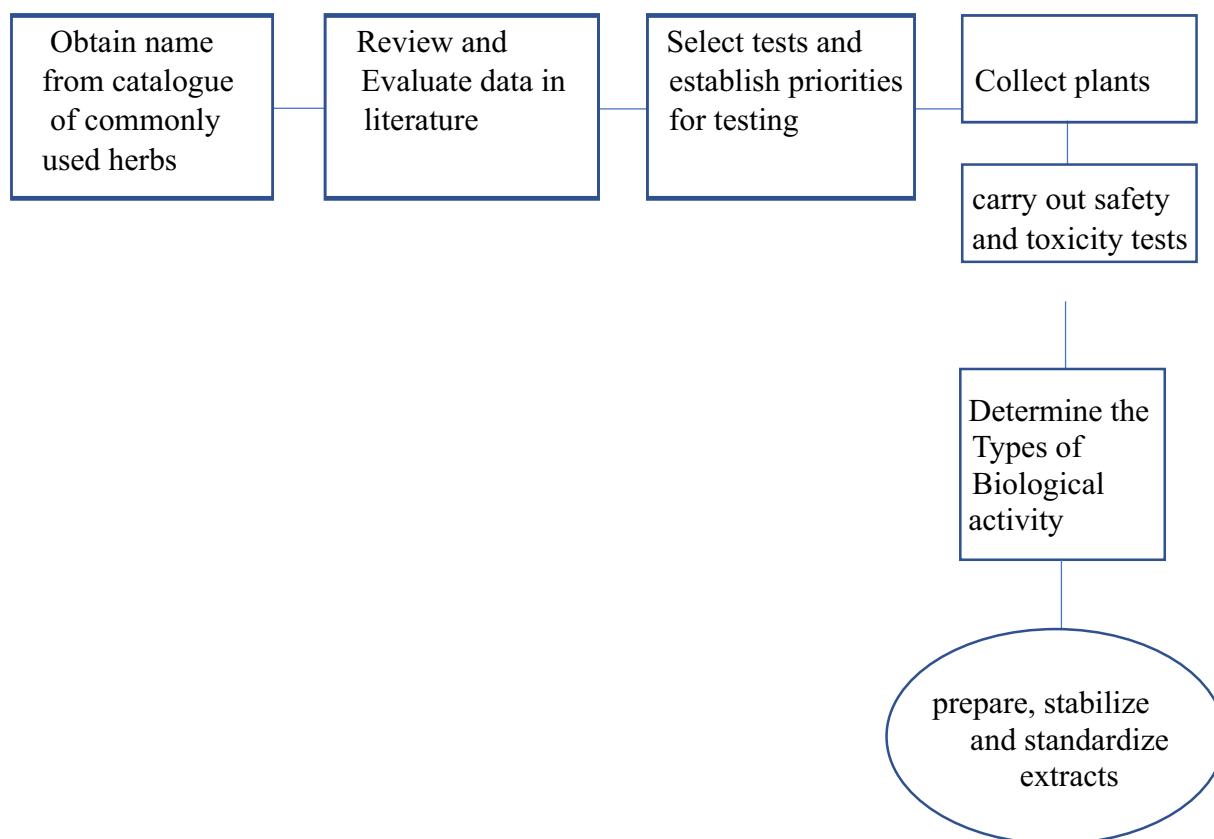


Figure 1 A Diagram Showing the Process of Standardization of plant extracts

**vi. Ensure Sustainability of Medicinal Plants-** Most medicinal plants in the wild are either extinct, endangered, rare, over exploited or may vary in their pharmacological constituents. Therefore, there is a need for the government to create policies that would protect and ensure continuous availability of these plants. One way to ensure that these medicinal plants are always in supply, is to encourage continuous cultivation of these medicinal plants. Farmers as well as collectors must be enlightened and encouraged to continue the cultivation of these plants. The government can achieve this by providing incentives to them especially in some areas in the tropics where they are slow-growing trees. Also, there should be an effort to educate the

masses about sustainability of this important resource. The government should also regulate the collection of medicinal plants from the wild and should prohibit the collection from the wild of threatened medicinal plants except for propagation purposes<sup>12</sup>.

**vii. Encourage Local Production-** According to WHO, to enhance access, the government should create enterprises that can produce standardized medications and make sure that a favorable economic, political, and regulatory environment is maintained for local production by traditional herbal practitioners<sup>7</sup>. Such medicines after following through with the internationally accepted standard and quality should also be included in the national

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list of essential medicines to encourage manufacturers on its continuous production<sup>15</sup>. To achieve this, sufficient funding from the government as well as non-governmental organization to local industries must be encouraged.

### **3. Effects of Translational Herbal Medicine on the Medicine Security in Nigeria**

**3.1 Universal Health Coverage-** According to WHO (2014), the main aim of UHC is to ensure that all people have access to promotive, preventive, curative and rehabilitative health services, that they have access to not only quality medicines but affordable ones too<sup>7</sup>. Although there are many pitfalls to achieving this feat in Nigeria and Africa as a whole, such as bad governance, poor financing, poor availability and distribution of essential medicines, poor availability of health workers, accessibility, geographical barrier, cultural barrier, poor medicine quality/ health services<sup>7</sup>. With the integration of traditional medicine into the health sector, the gap could be bridged and this could contribute greatly to accomplishing universal health coverage. Most traditional medicines are affordable, culturally acceptable, accessible by the local community members and when fully utilized would ensure sustainability and availability of essential medicines. For example- Agbo Jedi- Jedi, Agbo Iba, yoyo bitters, Alamo bitters, are all examples of common local medicines used in treating malaria which is a common public health issue in Nigeria<sup>22</sup>.

**3.2 Increased Research and Development** – The Nigeria Natural Medicine Development Agency (NNMDA) has recorded so many research and remarkable developments on some local herbs in Nigeria that can be used for the prevention and management of numerous diseases. These products are easy-to-use, high-quality and reasonably priced. Some of which include: Amarus Herbal Tea for prevention and management of malaria, herbal mosquito repellent, Ocimum Herbal Tea for management of diabetes and so many others<sup>23</sup>. However the challenges the agency faces, prevents them from enjoying the level of public recognition they deserve (Table 1). Some of these challenges include: the lack of proper documentation on bio-resources and practice outcomes on patients, lack of benefit-sharing in terms of profits and collaboration with other local/international scientists. In addition, the

requirement for clinical research data to validate traditional medicine knowledge products, and the requirement for technology to convert these resources into novel and marketable goods that are well-accepted by clinicians and the general public also poses as a major challenge<sup>23</sup>.

Proper funding and involvement of the federal government and stakeholders in this sector can bring about a notable change in the health and economic status of the nation. At the moment, the federal government has demonstrated its commitment to the development of the sector by adding in the assent to the Bill creating the agency that the Board will vigorously pursue a government development plan for the sector to help raise the standard of living of our people. The agency NNMDA has been working with the National Board for Technical Education for accreditation of the College of Natural Medicine and Technology as National Innovation Diploma (NID) in Natural Medicine Technology (NMT) in Nigeria<sup>23</sup>. This is to create more credibility and encourage more innovation in the traditional medicine sector.

Table 1 Selected Nigerian Medicinal Plants, their uses and Marketed Formulations derived from them.

Botanical Name of the plant	Local Name	Common name	Plant Part Used	Medicinal Use	Marketed Dosage Form	Reference
<i>Allium sativum</i> L. (Amaryllidaceae)	Tafanuwa (H) Ayu (Y)	Garlic	Bulb	Antimicrobial Blood purifier To improve heart health.	Capsules Tablets	8,9, 24
<i>Vernonia amygdalina</i> Delile (Asteraceae)	Ewuro (Y) Shuwaka(H) Olugbin(I)	Bitter Leaf	Leaves	Anti-diabetic Stimulates digestion Detoxifies the liver	Capsules, Liquid	18,19,21
<i>Ocimum gratissimum</i> L. (Lamiaceae)	Dodoya (H) Effirin(Y) Nchanwu (I)	Scent leaf	Leaf	Antispasmodics Anti-flatulence	Tea bags	24
<i>Moringa oleifera</i> Lam. (Moringaceae)	Iye (Y) Odudu oyibo (I) Bagaruwar Makka (H)	Miracle tree, Moringa Horseradish tree,	Leaves Seeds Flowers Roots bark	Immune booster Antibacterial	Capsules Powder Tea bags	24
<i>Capsicum frutescens</i> L. (Solanaceae)	Borkono (H) Ose (I) Ata-jiye (Y)	Chilli pepper Red Pepper Cayenne	Ripe fruits Seeds	Arthritis and Rheumatism Blood thinner Appetite stimulant	Capsules Lotion Cream	12
<i>Daucus carota</i> L. (Apiaceae)	Carrot	Carrot	Root	Liver detoxifier Excellent for the eyes and gastro-intestinal tract Protects the skin and evens the skin tone	Oil Oral liquids	18
<i>Senna tora</i> (L.) Roxb (Fabaceae)	Tafasa (H), Asunwon (Y)	Sickle senna, tora, coffee pod Tovara	Seed Leaves Roots	Laxatives Liver tonic Haemorrhoid Hepatic disorders Improves vision	Seeds powder Leaf juice	24
<i>Phoenix dactylifera</i> L. (Arecaceae)	Dabino (H)	Date Palm Fruits	Date palm kernels	Energy booster Strengthens the heart Bronchitis Lowers cholesterol	syrup	24

				Useful in constipation		
<i>Cyperus esculentus</i> L. (Cyperaceae)	Ofo (H), imumu (Y)	Tiger nuts	Nuts	Beverage Aids digestion Aphrodisiac dyspepsia	Nuts Powder Milk	24,31
<i>Balanite aegyptiaca</i> Del. (Zygophyllaceae)	Adua (H) Adowa (Y) Beto (F)	Soapberry tree Desert date	Roots Seeds Bark Pulp fruits	Purgative Colic Gargle for mouth ulcers and gingivitis Rheumatic pain	Seed powder Seed oil Fruit pulp Bark decoction	2,24
<i>Azadirachta indica</i> A.Juss. (Meliaceae)	Dogonyaro (H) Eke-oyinbo (Y) Ogwuiba (I)	Neem Holy tree Indian lily	Leaves Seeds Roots Stem bark	Treatment of malaria fever Skin diseases Anti-inflammatory Anti-septic dressing Jaundice	Seed oil	8, 12
<i>Ricinus communis</i> L. (Euphorbiaceae)	Dan kwalere (H) Lapa lapa ade (Y)	Castor Bean	Leaves Oil	Constipation Colic in infants For inflamed or reddened eyes	oil	26
<i>Cucurbita maxima</i> Duchesne (cucurbitaceae)	Kabewa (H) Elegede (Y) Okoro (I)	Pumpkin seed	Leaf Seed pulp	Lowers cholesterol level Dyspepsia Constipation Helps with bowel movement	Seed oil Tablets Tea	24, 26
<i>Curcuma longa</i> L. (Zingiberaceae)	Turi (N) Atale (Y) Ibule (u) Gangamo (H)	Turmeric	Rhizome Root	Used as a carminative Treatment of cough and catarrh	Capsules Powder	15



<i>Zingiber officinale</i> Roscoe (Zingiberaceae)	Atale (Y) Cittar (H) Jinja (I)	Ginger	root	Improves digestion and liver function. Controls nausea, vomiting, and coughing. Treatment of indigestion, colic.	Capsules Tea bags	14, 26
<i>Aloe vera</i> L. (Asphodelaceae)	Echi-dungi (N)	Aloe	leaves	As an Emmenagogue Antimicrobial Good for digestive health	Capsules	25
<i>Cocos nucifera</i> L.(Areceaceae)	Attaagaraa (H) Aki bekee (I) Agbon (Y)	Coconut	Oil Coconut-water Roots Fibre Leaves	Oil is used to prevent hair loss As a wound ointment As a skin ointment	Oil	14, 26
<i>Allium cepa</i> L. (Amaryllidaceae)	Albasa (H) Alubosa (Y)	Onion	Bulb Spring	Serves as a remedy in Cold, Cough, Catarrh and Bronchitis	Tincture Syrup	5
<i>Cymbopogon citratus</i> (DC.)Stapf (Poaceae)	Ciyawan lemu (H) Waapa (Y) Achaara Chi (I) Ikon (Ef) Isoko (Ed)	Fevergrass Oil grass Guatemala	leaves	Antibacterial Antifungal Tea used for liver cleansing, to treat headache, muscle cramping and flu.	Oil Tea bags	27, 24

I-Igbo Y-Yoruba H-Hausa N-Nupe F-Fulani U-Urhobo EF-Efik ED-Edo

**3.1 Generation of Revenue for the Nation-** With herbal medicine products gaining global acceptance and usage. It is necessary and important for the country- Nigeria to ensure its products are up to standard to be traded internationally in order to generate income for the nation. The National Agency for Food and Drugs Administration and Control (NAFDAC), believes that sensitizing herbal and traditional medicine practitioners on international best practices would make the trade earn foreign exchange for the country at large and boost its economy<sup>27</sup>. In view of that, the agency is collaborating with herbal and traditional medicine practitioners in Niger state to achieve the standardization of herbal medicine products through workshops. The workshops will give

the government suggestions for policies that will improve the adoption of our herbal and traditional medicine practices in global trade as a substitute source of foreign exchange for the country<sup>27</sup>.

**3.2 Reduction in Mortality and Morbidity Rate. -** Research has shown that diseases such as Malaria, Diabetes, Hypertension, HIV/AIDS which are the number one cause of mortality and morbidity rate in the nation have been treated significantly with traditional herbal remedies<sup>8</sup>. In Nigeria, effective medicinal plants have been documented in managing various diseases such as Malaria. Some of these plants include *Allium sativum*, *Mangifera indica*, *Vernonia amygdalina*<sup>28</sup>. Also, a research study identified at least 325 medicinal species used in the management of

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numerous ailments in Nigeria including those used for the treatment of opportunistic infections associated with HIV/AIDS<sup>29</sup>.

### 3.3 Reduction in Substandard and Fake Drugs-

One major challenge that Africa face is unavailability of adequate essential medicines and a major cause of that is our inability to produce our own drugs. As a result, we rely hugely on importation of medications (both finished products and starting materials). Some of these medications, without proper check on the part of our government officials, can be an avenue for illegal importation, manufacture, and sale of fake, adulterated and substandard expired goods by dishonest drug dealers and some corrupt government officials<sup>30</sup>. Another challenge we have are the numerous open drug markets where customers can freely purchase any medication. For instance, the popular Idumota market in Lagos state, The Head-Bridge Market in Onitsha, and Sabongari drug market in Kano state are open drug markets in the country that act as gateways for the entry of fake, inferior, and adulterated drugs<sup>31</sup>. Although there have been commendable efforts by the federal government to guarantee that the medicines that reach the consumers are efficient, of high quality, secure, and reasonably priced. Such as, the establishment of the New Drug Distribution Guidelines (NDDG) to stop quacks' operations, track down inferior and counterfeit pharmaceuticals, and improve monitoring and assessment practices, not much has changed as a result of a lack of implementation<sup>32</sup>. A focus on our TM can reduce our over-reliance on western medications and push us to produce our own medications, especially essential medications that are always available for her citizens. This can greatly minimize the advent of substandard and fake drugs in the country.

## 4. Documentation and its Implications to Traditional Herbal Medicines

It is important that traditional herbal medicine knowledge is preserved by developing a system which ensures that pertinent information on traditional medicine is recorded in journals, books, indexes and in multimedia devices. In today's world, information is stored in a database system. This process of information storage ensures safe-keeping and ease of retrieval for future reference<sup>33</sup>. Certain countries have adopted the method of documentation by using a digital database. In India, the country has developed a

digital database where the names of several traditional herbal plants and their functions in both the local and western languages are stored and is constantly updated by library medical scientists<sup>34</sup>. In a third world context like Nigeria, where most traditional knowledge is taught in unorthodox settings. There is the dire need to create a system of data collection and documentation to prevent a decline of valid traditional medicine knowledge. With collection of herbal information and creating a storage database, it is important that this information gathered is also shared at intellectual gatherings or formal forms of information dissemination.

### 4.1 Benefits of Documentation:

With gradual modernization of our environment, developing conservative measures in our locality will prevent the gradual extinction of our rich herbal culture. Preservation of authentic traditional medicine plants and their biodiversity will be made accessible for knowledge based education<sup>34</sup>.

Valid documentation provides evidence of community patent rights to herbal plants; this protects the community against bio-piracy and over exploitation by Pharma companies and ensures these communities enjoys financial benefits gained as well as validation of knowledge claimed on herbal plants<sup>34</sup>. With research, herbal medicines safety, quality, molecular effects and clinical efficacy reports will be documented<sup>35</sup>. These reports are essential for detection of bioactive agents which are important in drug development<sup>36</sup>. Increasing online accessibility of traditional knowledge creates a platform for more research and bridges the gap between modern medicine and traditional medicine<sup>37-38</sup>.

**4.2 Development of Digital Database:** There are various ways a digital documentation of traditional herbs can be compiled. In India Koraput district, scientists carried out three different methodologies to build up their documentation<sup>37</sup>. Having direct interactions with the local people or the traditional herbal practitioners, who gave them information of the different functions of herbal parts, methods as well as exact periods of cultivation and harvesting and preservative methods. Direct interview-based approach with community informant, who gives direct details on the purposes of the different parts of the herbs during visits to community forests or farms where these herbs can be found, and all information is recorded. Inventory based approach system, which is slightly like direct interview approach, but in this case the plants are first collected and then the community specialist is asked to identify and give purpose of each herbs<sup>37-38</sup>.

## 5. Conclusion

With the growing demand of Traditional herbal medicines, it has become necessary that the traditional medicine system be incorporated into the mainstream of health care services to increase accessibility and affordability to health care by its citizens in the country. For this to be attainable, the goal of regulating, standardizing, and integrating TM into the National health system in Nigeria must be taken seriously. With challenges such as widespread reports of fake traditional medications and healers, bias amongst orthodox practitioners to traditional medicine, low quality controls, poor research and documentation outcomes amongst others. It is pertinent that the Government create a very good policy, legal and regulatory framework that will favor the production and use of TM, encourage scientific research and development through adequate funding and creation of research institutes, disseminate proper information to the general public regarding the safe use of TM and also promote a good and favorable economic environment for local production.

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