



Import substitution within the framework of global trade in Medicinal Plants: A potential consideration for homologated phytomedicines in Cameroon

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ABSTRACT

This initiative is an advocacy drive to industrialize the herbal product industry through import substitution. Cameroon has to conform and align with the common policy widely used by resource limited countries to minimize dependence on Western nations and increase self-sufficiency in home-made products. The aim of this pilot study was to evaluate the impact of import substitution on the Phytomedicine industry in Cameroon

We carried out a pilot survey study in August 2024 during the traditional medicine (TM) day, that involved an inventory of actors in medicinal plant products. Data was collected through a structured design questionnaire from tradi-practitioners on improved traditional medicines. The Survey of MTA approved for use in Cameroon were also investigated from the database of the Division of Pharmacy, Medicine and Laboratories (DPM) and state research institutions in TM Preliminary results from pulled data identified 100 tradipractioners that had products on display during the trade fare, with socio-demographic informations. We obtained at least 14 approved MTA products from the DPML data base. We observed challenging cases of products already commercialized without homologated authorization. The tradi-practitioners recommended that for a sustainable import substitution drive for phytomedicine in Cameroon, the government first of all needs to enact into law the activities and regulation of herbal medicine activities in the primary health care sector in Cameroon.

Keywords: *Import substitution, Traditional herbal product, homologation, traditional practitioners, MINSANTE, DPML, Phytomedicines.*

INTRODUCTION

Import substitution is a well-intended economic concept geared towards meeting the needs of a wider sector of a nation's general demand for goods (production and imports), by her self-domestic production [1, 2]. Import substitution within the framework of the medicinal plants sector has generated more interest in Cameroon as the country reflects on her vision 2035 economic plan. Efforts towards the improvement of the quality of life has led to increasing the use of herbal natural product medicine, along with the complementary and alternative medicine worldwide in the past five decades. For millions of years, men have turned to plants not only for the treatment and prevention of various diseases but as a renewed interest in traditional and non-conventional medicine [2].

About 80% of resource limited nations particularly in African and Asias use herbal products to meet address their health care needs [3].

In sub-Saharan Africa countries, the use of herbal products is very popular and majority of the people in the communities rely on these natural products due to lack of access to health care facilities. The use of TM is gaining popularity in some countries like Cameroon due to economic crisis and devaluation of the nation's currencies in the late 80's. This has caused a growing interest in the sector due to low cost, readily available and environmentally friendly natural products when compared to the conventional more expensive medicines [4]. Most convention medicine are derived from plant base materials found in the African traditional pharmacopoeia. Thousands of natural herbal plant products have been identified from 95 different plant families mostly used as traditional pharmacopoeia in Cameroon [5]. In sub-Saharan Africa, allopathic or conventional medicine coexists with African Traditional Medicine, which provides healthcare to more than 80% of the population.

The production procedures for traditional African medicines have not been streamlined in the same way as those for conventional medicines. However, the WHO and the Malian Ministry of Health have identified at least four categories of traditional African medicines derived from medicinal plants: Category 1: The African Traditional Pharmacopoeia prepared by tradi-practitioners according to original individual recipes. Category 2: Traditional medicines prepared from harvested fresh or dried plant materials according to a traditional community recipe. Category 3: Improved traditional medicines, manufactured under controlled conditions and validated by regulated body or research organizations [6]. Category 4: Purified and isolate fractions of the natural plant products with a known chemical structure, used alone or in combination. It is argued here that African Traditional medicines should be subject to the same safety and efficacy standards as conventional drugs, and that Category 4 African Traditional medicines should follow the conventional drug production process described above, while those in Categories 1 to 3 must meet the minimum safety standards recommended by the WHO. To achieve this, African countries need to mobilize more resources in research, document and validate the discovery and development efforts of African traditional pharmacopoeia [1, 6].

Definition of terms

Phytomedicine are drugs in which the active compounds are from plant origin or derivative from plants [6]

Traditional Medicines are the assembly of traditional knowledge and practices they may be widely understood or not usually used for diagnosis, prevention and treatment in order to eliminate a disease, physically, mentally or socially, based on experiences, or ancestral acquisition of experiences from generation to generation orally or written [3].

Phytotherapy is an assemblage of medicinal practices using traditional herbs for the purpose of treatment [7].

The classification of traditional medicine by African Organization for Intellectual Property known with the French acronym (OAPI), in collaboration with global health body, the World Health Organization, (WHO) that coordinate and collaborate with regulatory authorities in the approval process of medicines issued in the traditional pharmacopoeia within member states. It specifically defines the criteria for classifying medicines issued in the traditional pharmacopoeia through the establishment of a common procedure for the approval process of medicines issued in the traditional pharmacopoeia [5].

To understand the categorization of phytomedicine in the OAPI nations based on WHO guidelines is to guarantee Efficacy, Safety, and Quality (ESQ standards)

Traditional medicines incorporate the use of herbal plants, animal and mineral based medicines, spiritual treatments, physical or manual methods and exercises, use alone or in combination forms, with the objective to treat, diagnose and prevent illnesses or maintain well-being. Traditional medicine at the traditional and ancestral level is based on anecdotal evidence and not clinical evidence-based and with challenges of safety and efficacy guarantee.

CLASSIFICATION OF TRADITIONAL MEDICINE

OAPI's Approach to Traditional Medicine

While OAPI uses these international systems for formal intellectual property (IP) protection (patents, trademarks), the organization and its member states have also focused on

suitable generis systems to protect traditional knowledge (TK) and the expressions of folk medicine from misuse (biopiracy) [5]. The regional protocols have been developed by OAPI members through participation in discussions and initiatives related to TK protection, aligning with broader African Union recommendations.

Base of a regulatory point of view, the regulation and classification of traditional medicines for public health use (safety, quality, efficacy) within OAPI member states often follow guidelines from the global health sector like the World Health Organization (WHO) Regional Office for Africa. The WHO play an active role in the integration of Traditional Medicine in the International Classification of Diseases (ICD) [11], for standardized data collection [6].

General Categories of Traditional Medicine

While OAPI's primary role is in the legal/IP domain, the general classification of traditional medicines themselves, often following WHO guidelines, involves categories such as:

Codified Systems: These are well-documented systems of medicine, often found in ancient scriptures and official pharmacopoeias (e.g., Ayurveda, Unani, Traditional Chinese Medicine).

Non-Codified Practices: This refers to the vast amount of knowledge and practices held by local communities and traditional healers that are often passed down orally and are not systematically written down. OAPI's initiatives aim to create a system that can take these various forms of knowledge into account within an intellectual property framework. For further information on OAPI's legal framework for traditional knowledge, refer to their official documents. The category of traditional medicine is based on OAPI/WHO strategic plan for the national promotion and integration of traditional medicine into the primary healthcare systems of member states [7].

Category 1

Involves *in situ* or extemporaneous preparation applying the traditional practice methods of herbal preparation. Safety/Quality and Efficacy are put into consideration or guaranteed by tradi-practitioner's long use and practice experience over many generations of use within the framework of ethnobotanic and ethnopharmacology ancestral history of long usage in the folk community [5]. The herbal raw materials are well recognized and authenticated locally by the traditional doctor (fresh/dry) and usage is for a short duration with short storage and shelf life. No data is required for evidence of efficacy and safety use, and therefore claim of potential use is based on anecdotal evidence.

Category 2

Applicable in the traditional pharmacopoeia and is in current use in the community. It is an improved traditional medicine supported by the following characteristics; Prepared in advance, stored with a lot No. The herbal plant raw materials are identified and authenticated by the population and the preparation method should guarantee stability and standardization. Production is usually by a semi-industrial process with the quality, safety and efficacy assured by ethnopharmacology and ethnobotanic evidence and the long history of use and in some cases the conduction of clinical trials to support the clinical evidence if necessary. The active pharmaceutical ingredient is from extra-dry raw materials with a known chemical structure and functional groups of the plant

metabolites well established (OAPI, 2004). Stability studies are performed to inform shelf-life and storage and evidence-based results of safety and quality.

Category 3

Issued by research organization. The characteristics of this category is well elaborated. With the following characteristics; It is usually processed in advance, are stored according to batch number and the production scale up is by a semi-industrial process. The stability studies are performed to inform shelf-life/storage and the active ingredient is from a standardized extract. The following are taken into consideration for category 3 improved traditional medicine, the biological activities and pharmacological properties of the bioactive metabolites, new therapeutic indications, the new chemical entities formulation and information on the active pharmaceutical ingredients. The principles and regulation on Good Manufacturing Process (GMP), the efficacy and safety studies should be conducted at the preclinical and clinical studies using high throughput screening (HTS) assays, standard operation procedures, with regulatory compliance [6, 7].

Category 4

Issued by research organization and must have the following characteristics;

The herbal preparation is processed in advance, conserved in batch lot reference numbers. The production process is by a semi-industrial or industrial process. Stability studies are performed to inform shelf-life and storage. The active ingredient is purified molecules and takes into consideration the biological and pharmacological activities of the bioactive metabolites, and the new therapeutic indications, the pharmaceutical formulation with specific dosage form and understanding of the bioactive molecule. Scale-up production follows the norms of Good Manufacturing Practice (GMP). The efficacy of safety of the active pharmaceutical product needs to be evaluated at the preclinical and clinical studies conducted using high throughput assays. The categorization of Traditional medicine by the OAPI/WHO improved traditional medicine is illustrated according to the four categories in figure 1.

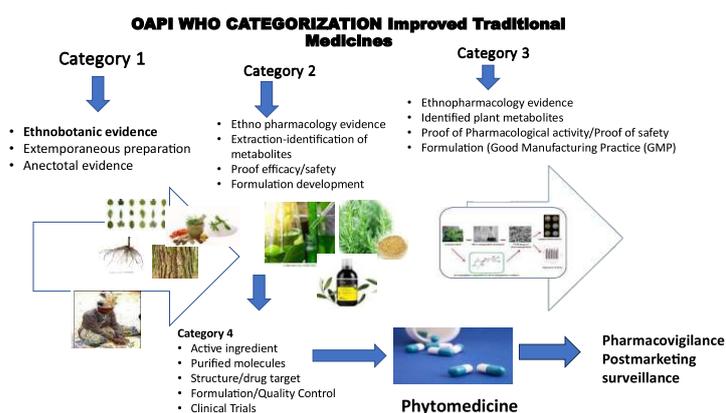


Fig 1. Categorization of Improved traditional medicine in OAPI Countries [7]

Marketing Authorization Application (MAA)

All medicines contained in the traditional pharmacopoeia must have proof of pharmaceutical quality, safety and efficacy. Medicines in category 1 a good regulation of traditional medicines/practitioners may be considered sufficient. Prolonged use of medication can be considered as a guarantee of safety and efficacy for those in categories 1 and 2. In contrast it is imperative for those in categories 3 & 4 to demonstrate scientific

evidence of safety and efficacy for the chosen indications. Abbreviated dossier is acceptable for categories 2 and 3 and full application is expected for category 4 medicines [8].

Discovery and Development of Phytomedicine

The drug discovery and development of phytomedicine involves identifying a medicinal plant, extracting and purifying bioactive compounds, and then using modern scientific methods to confirm efficacy and safety for clinical use. This process integrates traditional knowledge with modern techniques like computational modeling, advanced analytical methods, and rigorous testing to develop standardized, evidence-based herbal medicines. Key stages include: initial identification, extraction and isolation, biological activity testing, preclinical (toxicology) studies, and human clinical trials [9].

1. Identification and initial research

Ethnobotanical approach: Begin by identifying medicinal plants based on traditional uses.

Literature review: Conduct a thorough review of existing information on the plant's historical use and potential properties.

2. Extraction and isolation

Extraction: Process the plant material (e.g., leaves, roots, bark) to create extracts.

Purification: Use various techniques to isolate specific bioactive compounds from the complex plant extract.

3. Screening and testing

In vitro and in vivo assays: Test the extracts, fractions, or isolated compounds for specific biological properties, such as anti-neoplastic or anti-bacterial activities.

Computational modeling: Utilize tools like molecular docking and machine learning to predict potential drug targets and guide experimental validation.

Analytical techniques: Employ methods like LC-MS to speed up compound identification and characterization.

4. Preclinical development

Toxicology studies: Assess the safety and potential toxicity of the active compounds.

Standardization: Develop protocols to guarantee consistency in product quality, purity, and potency of the final molecule. This may involve defining a "phytopharmaceutical drug" as a standardized fraction with a minimum number of bioactive constituents.

5. Clinical development

Clinical trials: Conduct human studies to confirm the drug's efficacy and safety under specific conditions.

Formulation: Develop a suitable formulation for the final product.

Industrial production: Develop methods for large-scale production, which may involve synthetic routes if natural yields are too low.

The Demand and economics of Traditional Medicine in Cameroon

It is estimated that more than 80% of Cameroonians have had access to traditional medicine with a statistics of more than 20 million consumers. These consumers are identified from a different classes and strata of life, education levels, religion and professions. The national trade in TM in Cameroon is still at its infancy due to gaps in information on annual sales. The sector is very informal and therefore for any future import substitution initiative by the government, the trade sector needs to be formalized as the case in other African countries, like South Africa, where the sector is evaluated to the turn of R3.5 billion per annum, which is about 5.6% of the National Health budget as indicated in figure 2, [10].

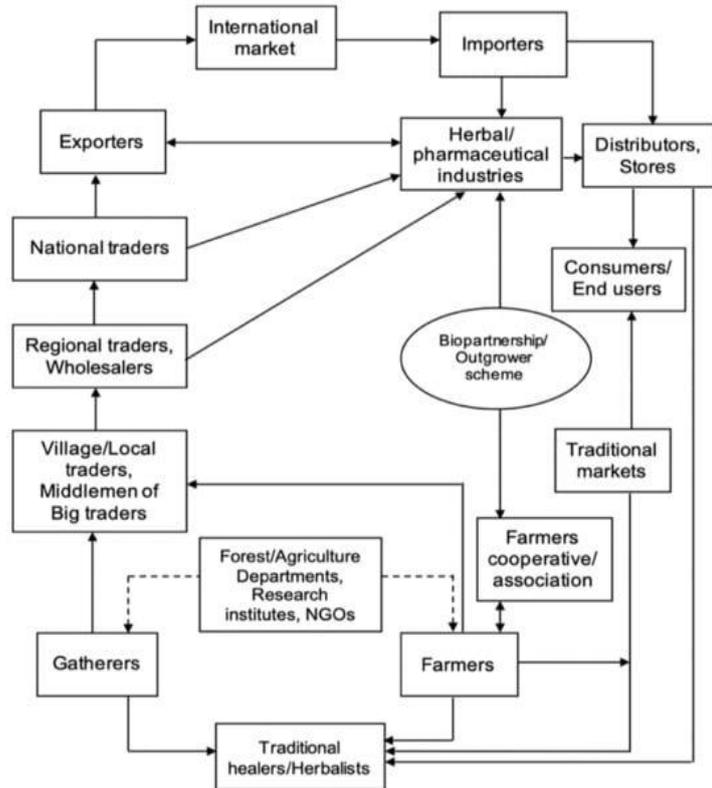


Figure 2. The general market structure of medicinal plants [10].

Records on the economics of trade in medicinal plant materials in Cameroon is still undocumented and even the cost of consultation and prescription by tradi-practitioners. In total the traditional medicinal plants and product trade in Cameroon is not well documented and this constitute an informal commercial sector where most of the sales are not recorded into the formal trade and therefore does not constitute much addition in the gross domestic products (GDP) [8, 11].

An economic flow chart for Traditional medicine trade for Cameroon has been conceptualized as shown in figure 3. Conceptual framework for the commercialization of Medicinal Plants in Cameroon can be defined into three clusters (Healthcare, production and industry. These cluster will help evaluate potential for commercialization, product benefit, transaction cost and the perception and motivation of actors Figure 3.

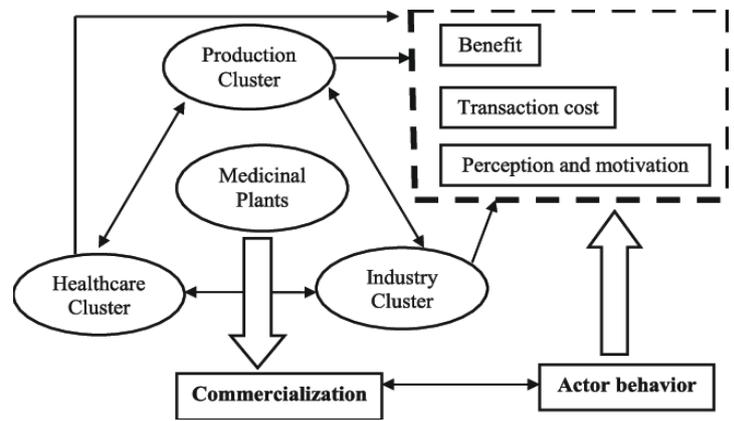


Figure 3. Conceptual framework for the commercialization of Medicinal Plants in Cameroon [10]

International trade of Natural products

Although the TM sector has a growing popularity, there is a gap of information on the area of regulation, legislation, and homologation in Cameroon [5]. The challenges of safety and efficacy of TM, has generated an increasing concern for consumers in the community and the call for public health sensitization [26]. The World Health Organization (WHO), survey showed that only 32% of responding member states reported having an effective policy or regulation of TM/CAM. For members states with no policies, 56% reported that they policies were in progress. 28% of the member states indicated they had national programs on TM/CAM, and only 58-member states indicated that they had at least one national institute on TM [5]. The potential role of global international trade of herbal medicine and parts of species trade distribution have been illustrated in Figures 4 and 5 respectively.

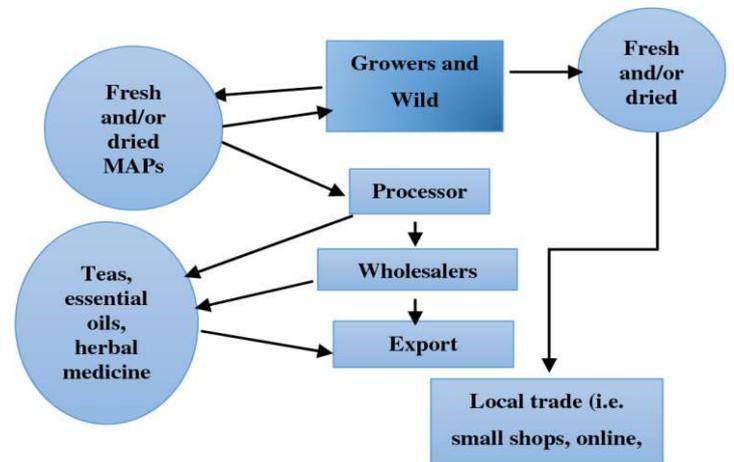


Figure 4. Important parts of herbal plants contributing in the international trade of medicinal and aromatic plants in the World [8]

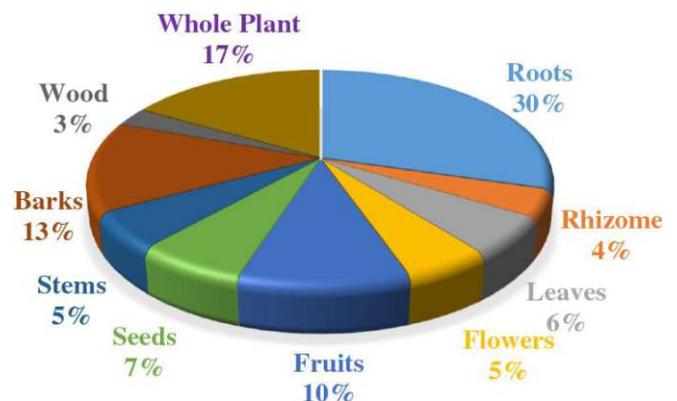


Figure 5. Global medicinal trade sales distribution of plants parts [5]

National policy on the efficacy, safety and homologation of TM.

The National policies on the efficacy, safety, homologation, and regulation of TM are the pivotal point for defining the role of TM/CAM in national health care programs, that ensures that the necessary regulatory and legal framework and mechanisms for advancing and creating good herbal practice are made available, and thus providing equitable access to health care services [12]. Homologation is a process put in place nationally as a requirement for the marketing of a pharmaceutical product. It can also be defined as the process of acquisition, renewal, extension, or modification by a pharmaceutical regulatory authority, of the marketing authorization of a medicinal product [21]. This process includes the submission of application for homologation request, the study of the file (evaluation), including laboratory control and GMP (Good Manufacturing Practice), and the final decision by the competent regulatory authority [12, 15]. It is known that the use of TM is more and more popular globally and many traditional health practitioners lack a better understanding on the homologation or regulation practices. In resource limited countries, the clinicians in health practice are in short supply to meet the health needs of the population, and therefore, TM and its practitioners are considered as an important part of the health care system, even though most the Tradi-practitioners have little understanding of legislation and homologation procedures. Some of the major challenges for import substitution of herbal plant products in Cameroon concerns safety data evaluation studies. This has been illustrated in figure 5, the toxicities regarding herbal products from the pharmacoeconomic point of view. The flow chart in figure 6 is showing aspects of toxicity due to herbal products [12]

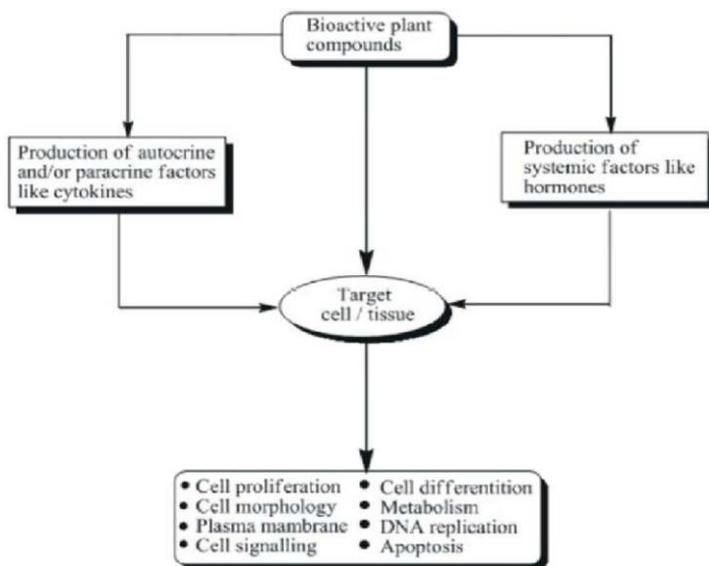


Figure.6 Flow chart showing toxicity due to herbal products [12]

Cameroon in the Era of Import substitution for traditional medicinal products homologation

A few years ago, the President of Cameroon in conjunction with other stakeholders, launched a nationwide effort to boost the local industries in Cameroon for local product transformation, sales and consumption (*Consume Cameroon*). This government initiative is an advocacy drive to industrialize the industrial sectors through substituting imports.

This is to align with the common policy widely used by resource limited nations to avoid the constant support and reliance on industrialize nations and increase self-sufficiency.

In the case of the Cameroon Pharmacopoeia/pharmaceutical industry, an influx of cheaper imported products is viewed as the pharmaceutical industry compromising survival of local manufacturers [13].

The sustainability of socio-cultural wellbeing and preference to treat culturally bound diseases with traditional herbal products are encouraging for the local population in Cameroon. Generally, due to importation tax incentives it is easier for commercial importation of exotic food with respect to traditional natural herbal product. Cameroonians have developed more interest for natural products of food and therapeutic potential (nutraceuticals) [[17]. To make of with this shift of preference in the herbal medicine sector, the introduction of drive for the integration of traditional herbal medicine into the primary health care system has become a major challenge to restrict importation of essential drug products according to Department of Pharmacy, drugs and laboratories (DPML/Ministry of Health) commission on the homologation of pharmaceutical natural products, that were deemed to be manufactured locally by local manufacturers [14, 21].

The rationale behind the SI is that the local medicinal plant sector has been flooded by imported medicines and hence failing to survive. SI will attempt to create opportunities for local companies to have certain product markets ring fenced for themselves. This would allow them to grow and then manage to compete against global pharmaceutical giants [13]. The SI would also increase production volumes so that companies benefit from economies of scale which will ultimately make the products cheaper. For import substitution to be sustainable, Cameroon needs to innovate the processing of herbal products. It is encouraging to note that many herbal products have gone through the drug discovery process to find a place in the global market [7].

In consideration of the implementation of import substitution strategy and policies in Cameroon, there is a need to demonstrate that science, technology and innovation (STI) can significantly play a role in bridging the gap and guarantee effective and efficient policy implementation [9].

To date has there been an approved MTA in Cameroon for success stories? What effects will import substitution have in the long run to the pharmaceutical industry in Cameroon? There is the need therefore for Cameroonian researchers to conduct desk research by analyzing existing literature, reports and case studies on import substitution strategies and their outcomes globally in the domain of phytomedicines. To engage in stakeholder relevant ministries, national parastatal corporations and institutions to extract information on challenges, opportunities and best practices, at the same time formulating recommendations to stakeholders [5]. What are the species of African herbal medicinal plants identified for commercialization in Cameroon? . Can their source and origin be identified and any evidence of safety and efficacy known? [9] For researchers and stake holder in herbal medicines to compete in the economic world trade it is important to understand the time lines in phytomedicine discovery and development as illustrated in figure 7.

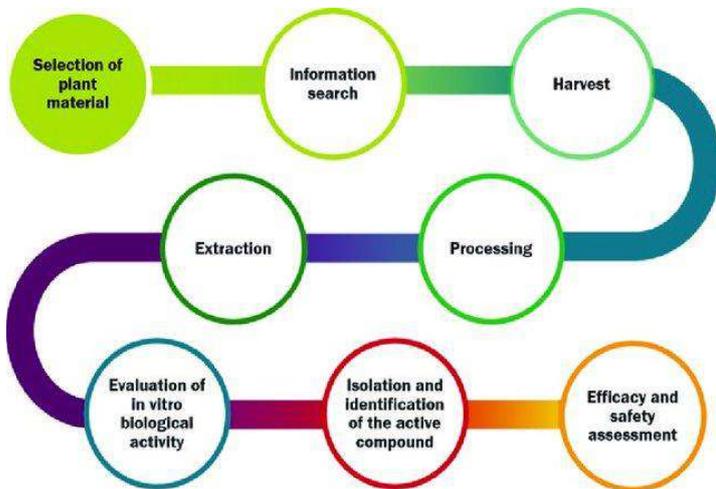


Figure 7. Validation process stages of products based on medicinal plants [13]

The supply challenges of traditional medicines for economic trade in Cameroon within the import substitution policy.

The main source of herbal medicinal product used by tradi-practitioners in Cameroon are indigenous plants with at least 771 taxonomically identified plant species documented in the herbal trade sector [10]. In some countries like South Africa, an estimated 20.000 tons of indigenous plants are harvested in the grasslands, forest and woodlands every year, with only a few tens of tons per annum cultivated to replace harvest products. It is important to note that 80% of the plant parts harvested pose a potential danger of extinction and the death of the entire plant, due to poor harvesting techniques as shown in figure 8, the danger of poor harvesting method and overexploitation of the flora biodiversity in Cameroon. This has a significant implication for sustainable supply of raw materials for the herbal commercial products.



Figure 8. showing poor harvesting of medicinal plants parts for commercialization [5]

Stakeholder of research and development of medicinal plant sector in Cameroon

The R&D in the medicinal plant sector in Cameroon involves integration of actors and traditional healers' people's participation as indicated in figure. Input from institutional experts will integrate scientist, government, NGOs to achieve a sustainable utilization and economic upliftment [15].

Traditional medicine patent security towards the import substitution policy drive

Base on the records of the World Intellectual Property Organization (WIPO), a patent is an exclusive intellectual property right of monopoly accredited to an invention, provided that the invention is new, novel with the ability and capability of sustainable industrial application [13]. The patent is globally recognized and the main intellectual property title recognized in the pharmaceutical companies and regulatory authorities with a life span of about 20 years from the date of filing [11]. Patents validate and promote clinical research, as they encourage researchers to exploit their research findings within a recognized professional framework, and attracts companies and investors, stakeholders to invest in long-term research programs for the development of innovative pharmaceutical products to address health needs. According to the World Health Organization (WHO), the global trade for herbal medicinal plant products so far is estimated at a total cost of \$60 billion per annum [21]. With the increase in trade in this sector, there is the for African countries in particular members of the African Organization for Intellectual property (OAPI nations) to develop protection policies of their indigenous knowledge (IK) to fully integrate in the big herbal medicine market. The need for patenting of traditional herbal natural products is increasingly becoming a state regulatory policy agenda in most African countries [24]. The objective of this project was to establish an overview of the importance of import substitution and relevance in economic trade in TM, and to give the national perspective of IS and challenges. To conduct a pilot survey to illustrate some success story of homologated products in Cameroon as a potential IS trade products [16, 17].

MATERIALS AND METHODS

We conducted a pilot survey study in August 2024, on actors of traditional medicine. Due to the pilot nature of this preliminary study, consent was verbal. This study was to provide us with information to build a basic data base on an inventory of actors in medicinal plant products. This was carried out during the traditional medicine trade fare. An interviewed was conducted with 20 local traders with products, voucher collection and data gathering on potential medicinal products on exposition, to the population during the trade fare. We collected data through a structured design questionnaire in both English and French from traditional practitioners on improved traditional medicines and determined their homologation and commercial status. The Survey of MTA approved for use in Cameroon were also investigated using the database of the Directorate of the Ministry of Health, (DPM), respecting the Prime Ministerial decree No 98-405/PM of 22 October 1998, fixing modalities for the homologation and marketing of pharmaceutical products of natural products in Cameroon. Information on traditional actors perspective on the way forward for import substitution in the TM sector in Cameroon was obtained

RESULTS

Preliminary results from pulled data identified 100 traditional practitioners with their organizations, for those that had products on display during the fare, and they gave their impression on the way forward for government drive towards import substitution of their herbal products. We obtained at least 14 approved MTA products from the DPML data base. The tradi-practitioners were unanimous that for a sustainable import substitution drive for herbal product to be achieved in

Cameroon, the government first of all needs to enact into law the activities and integration of traditional medicine into the public health care system in Cameroon.

Socio-demographic status

Our study captured out of the 102-survey questionnaires made on the participants 61.0% were male and 39.0% female.

Qualification and experience of actors in TM

Study showed 23.1% naturopaths, followed by ancestral tradipractioners 15.4%. This distribution is illustrated in table 2

Table 2: Repartition of actors of traditional medicines by profession

Professions	Effectifs	Pourcentage (%)
Biologist	1	1.9
Researchers	3	5.8
Medical Doctors	2	3.8
Éducators	1	1.9
Teachers	1	1.9
Clergy	1	1.9
Herbalist	1	1.9
Agronomist/Naturopathist reseachers	1	1.9
Traditional healers	4	7.7
Naturopath	12	23.1
Nutritheapeutics/Nutritionists	2	3.8
Pastors	1	1.9
Pharmacist researchers	1	1.9
Phytotherapist dieticians, chiropractors	1	1.9
Producers phytomedicines	1	1.9
Practitioners tradimedcines	8	15.4
Spiritual healers exorcist	11	21.1
Total	52	100.0

Repartition of actors by training

The actors by training showed that there was a range from university education to primary education as illustrated in figure 9. 67.3% had below university education against 32.7% who had up to post secondary education.

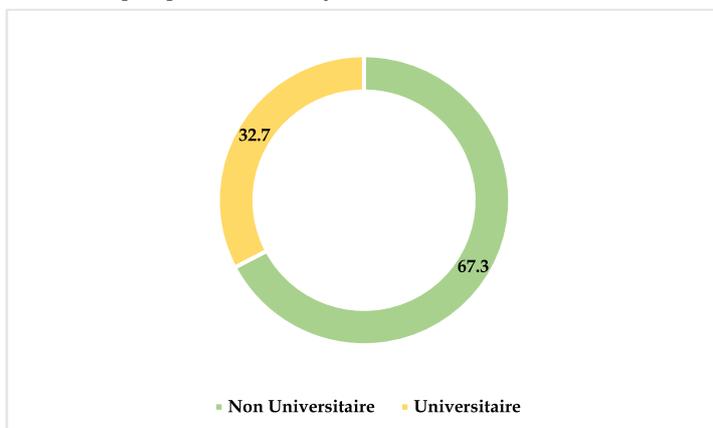


Figure 9. repartition of traditional medicine actors by training

Distribution of actors by experience in practice

In the practicing of TM, the average age was 16 years, with the oldest experience of 42 years and the youngest was 2 years in the trade as shown in Figure 10.

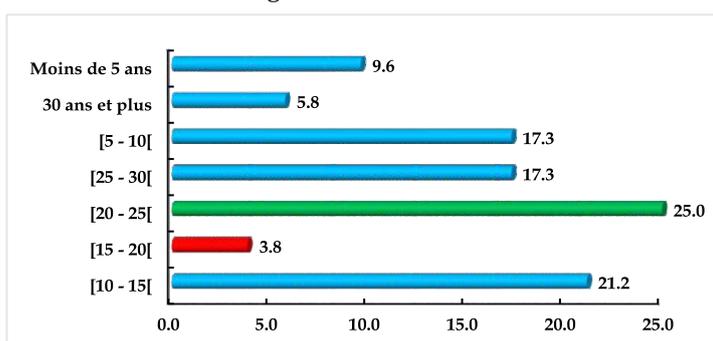


Figure 10. Repartition of actors by experience

Non-homologated Phytomedicines

It was observed that the products on display and commercialized very few were homologated by the regulatory authority of Cameroon. The identified products are listed in table 3

Table 3: Non homologated herbal product on exhibition

➤ BIO-DEFENSE
➤ CODJOLI
➤ NDALE HI ;
➤ ANDAH KE HI ;
➤ GILBON COLLYRE ;
➤ HUILE D'ACAJOU ;
➤ JAPHACINE 60 & 120 GÉLULES ;
➤ KITS JAFOSURE EN COURS DE BREVET ;
➤ VENINSERIN.

Homologated herbal products

We established 14 homologated improved traditional medicine from the DPML data base as illustrated in table 4. These products have patent for commercialization in Cameroon

Table 4: List of homologated improved traditional herbal products in Cameroon from the Directorate of Pharmacy, Medicines and Laboratories, Ministry of Public Health

HEPASOR
Polar gastral
COROCUR ;
NGUL BE TARA ;
SOU DICOV-Plus;
VIRO GREEN FORCE 4 ;
VENINSERIN ;
PALUBEK'S ;
ELIXIR-COVID & AKSAD-COVID ;
VIROLEX ;
SPIRULINE BIODETOX ;
SELENIUM BIODETOX ;
BITTER GOURD
PROSTATE SUPPORT.

Other improved traditional medicine was available with undefined homologation status. We obtained products from IMPM institute. However, despite the fact that these products were available as shown in table 5, we were not able to confirm their homologation status.

Table 5: Improved traditional Medicine with un confirmed homologation status

No	Product Name	Therapeutic/Medicinal Use	Homologation status
1	CASMYC	Skin disease	NA
2	TABERCINE	Malaria	NA
3	VENINSERIN	Snake vernom	NA
4	DIAMIB	NA	NA
5	DIAMORIN	NA	NA
6	RAJEUNIL	NA	NA
7	SIROP HIBISSA	NA	NA
8	POLATAUX SYRUP	Cough syrup	NA
9	AVOCATYL	Aromatherapy	NA
10	CAROTTYL	Cosmetic Aromatherapy	NA
11	VERGETYL	Aromatherapy	NA
12	COCOTYL	Cosmetics	NA
13	HUILE ESSENTILE DE GIROFLIER	Cosmetics	NA
14	HUILE ESSENTIEL DE CANANGA COOR	Aromatherapy	NA
15	HUILE ESSENTIEL DE NOIX DE COCO	Aromatherapy	NA

NB= Not available information at the time of study

Perception of the valorization of traditional medicine actors in promoting import substitution.

Focus group discussions and interviews permitted us to get the views of participants on their perception of the valorization of traditional medicine to promote import substitution in Cameroon. The table 6 gives a summary of participants response to perception of valorization of traditional medicine.

Table 6: Perception of the valorization of traditional medicine by actors in traditional medicine to promote import substitution

To promote traditional medicine in Cameroon, the actors proposed the following:

1. Register a large number of medicinal plant-based drugs in the Cameroonian pharmacopoeia to meet the objective of import substitution ;
2. Creation of an independent body specializing in traditional medicine for the homologation of products from traditional Cameroonian medicine;
3. The Cameroon government recognizes traditional medicine and gives authorization to practice legally within the national territory;
4. Development of the law relating to the profession and conduct studies on the situation in Cameroon of chronic pathologies treated by traditional medicine, study by category
6. Identification of actors, organization, legalization and mechanization of production ;
7. Raise awareness about good practices in traditional medicine, consultation and monitoring of patients ;
8. It is necessary, as a first step, to bring together naturopaths and traditional practitioners through meetings ; Working in synergy, jointly to promote Traditional African medicine;

DISCUSSION

Traditional medicine occupies an important place in our country, and several efforts are being made at the institutional level to promote research through collaboration platforms. The development of the law regulating the traditional medicine practice, which is still in progress to be enacted, is promising hope for the sector. The national directory of traditional health therapists was a recommendation of the last traditional medicine forum held in 2020. From our survey the actors in the TM trade were mainly aged over 40 years. They are present in several cities in several regions, divisions and districts in the country. Less than half of them had a university education with oldest having 42 years of experience. The tradi-practitioners treats several diseases with their herbal products whether homologated or not.

The challenges in the field showed that there were many improved traditional products marketed and promoted without any patent. To promote traditional medicine in Cameroon, several proposals were made by the actors. However, to have the most exhaustive data possible, it would be appropriate to review the collection method and set up a survey with field visits, respecting all statistical standards to have reliable data and a directory of actors in traditional medicine. provided and covering all regions, departments and districts. Most of the tradi-practionals were not aware of the decree fixing the homologation process of medicinal products in Cameroon [4].

The supply of wild medicinal plant products is on a decline and rare species are increasingly inaccessible due to expansion of urban settlement, over exploitation leading to fast increase in market price created by the scarcity of raw materials [10, 26]. Current levels of production of herbal medicinal plants by the commercial farming activities are reduced with respect to the quantity of plant products demands in the trade market [11]. In recognition of the great encouragement and initiative in promotion of African Traditional Medicine and the contribution in the improvement of the health and well-being across the African continent, for the past two decades, each year on the 31st of August nations celebration the African Traditional Medicine Day declared by the WHO in the African Regions [24].

So far OAPI member states have experienced and expansion interest in the African Traditional Medicine Day (ATMD) as a potential avenue for advocacy, dialogue, and knowledge exchange [16, 18]. The ATMD has brought together health policy stakeholder from traditional medicine practitioners, policy makers, researchers and international partners to unite and enhance and explore ways to establish best practices, groundbreaking innovations, and finding solutions the challenges in this sector. There is a great potential for traditional medicine to promote the holistic health and well-being for all as an alternative and complimentary tools in primary health care practice for most resource limited nations. The traditional medicine day celebration theme for 2025 in Cameroon was captioned "The Contribution of Traditional Medicine to Holistic Health and Well-being for All," This theme was in alliance with

the inaugural WHO Traditional Medicine Global Summit held in Gandhinagar, Gujarat, India, on the 17-18 August 2023. The global summit showcased the need for political commitment and encouragement of evidence-based action on traditional medicine, as the first port of call for the global communities as a force to address their health needs [19, 20].

So far, about 25 countries in the WHO Africa sub-Region have already integrated traditional medicine practices into their health care system and sciences curricula. At the same time, more countries have developed established training programs for training traditional health practitioners and health sciences students to strengthen human resources in both traditional medicine and primary health care. Thirty-nine countries have developed legal frameworks for traditional health practitioners [17, 21].

The informal and formal traditional herbal medicine commercial actors.

The main trade in traditional herbal product is carried out within informal sector in the urban cities in Cameroon. Records indicate that about 70% herbal plant materials accessible to the plant harvesters, herbal street vendors and tradi-practitioners in Cameroon are supplied by men rather than women as indicated in other countries like South Africa. More than 80% of the raw material suppliers are from rural hinterlands and only 20% subcontractors of urban settlers. The raw materials are mostly sold as plant parts partially processed into chopped or ground products by commercial vendors and traditional healers or are prepared in the form of complex polyherbal mixtures. Most of the packaging is in the form of recycled non degradable plastic papers or reused bottles in most cases of poor quality control. The herbal plant product can be sold in dry powder form or in a wet mixture, mostly prepared with water of unknown quality source used as the liquid component or in some cases liquor are used as solvent in some few cases. The safety, efficacy, stability and quality hygiene of these herbal products is unknwon, although the quality may vary from traders and traditional healers. However the non stringent regulation of the commercial products is a great challenge to guarantee protection of consumers of the product [20, 22].

Formal sector herbal traditional product suppliers

Formal herbal traditioanl product suppliers and potential for import substitution. The formal herbal product suppliers comprise of retail shops, tradi-pratitioner herbal clinics, pharmaceutical manufacturers and *laissez faire* manufacturers. Currently, there has been a significant popularity and expansion in the *laissez faire* manufacturers of herbal product with consumer pressure propaganda in many claims and performance in the efficacy of their commercial products [[18]. Many of these commercial manufacturers do not comply to or confirm to industry Good manufacturing practice (GMP) standards.

There are relatively an indication of few certified pharmaceutical manufacturers producing formalized traditional medicines in Cameroon due to possible factors such as lack of investment opportunities, lack of state subvention to industries, research and development. High investment requirements for the development of clinically tested and certified medicines using traditional medicinal plants has encourage more informal sector trade and illegal trade operations [21].

Intellectual property rights issues regarding medicinal plants and products, and the high cost of resolving these issues prior to investing in product development and risk associated with volume and sustainability of raw plant material supplies, given that the majority of indigenous medicinal plants are not cultivated. The investment required by any single pharmaceutical company to develop formalized and certified traditional medicinal plant products, and a secure raw material supply chain for those products, has thus been largely prohibited to the development of this sector of the industry [22].

Research and development of herbal traditional products.

There has been an increasing interest with the decentralization of state universities in Cameroon involved in traditional medicine research and to discover and develop phytomedicines with new chemical entities (NCE) for potential products for new markets [ref]. However, research and development are at its infancy to support the current trade in herbal natural products trade. Many bioprospecting companies and consortia have been established in the country that are actively involved in phytomedicine research. Interestingly, any discoveries made by these researchers have the potential to benefit few people in the community within the herbal plant trade [ref]. Although it is not surprising that private sector research investment in medicinal plant is focused on bioprospecting, it is more of a concern that there is very limited public sector investment into addressing the sustainability of the TM trade, considering the socio-cultural and economic importance of this trade [23]. There is the need to prioritize in Cameroon the development of new technologies for medicinal plant harvesting, farming, processing, stabilization, packaging, dispensing and treatment and also the need to assist, provide support and build capacity for the current actor in the traditional medicine industry in view of addressing the challenges and opportunities involving the TM trade sector [9].

The consumption of herbal products in Cameroon.

Natural herbal products consumption is a growing and popular product in Cameroon and the consumer demand for better quality medicinal plant products is increasing. However, the supply of better-quality improved traditional medicines can be supported only on a small scale of commercial traders through improved product packaging with the quality of the medicine contained therein of uncertified and probably variable quality and in most case the product is not homologated [9, 11].

The trade in herbal medicinal product constitutes an important source of income for the rural communities, and for those commercial actors involved TM trade is a major contributor to rural household incomes. There is a gap of information however in Cameroon on the TM commercial household statistics that are dependent on the trade information in medicinal plants [18]. The use of herbal natural product is a positive choice made by consumers supported by long history of ancestral use, and who are often prepared to pay at very low cost for these products and services, even when the cost sometimes exceeds the cost of

imported medicinal products [26].

Apart from TM regulation, there is little record of public or private sector investment to promote and support the development of the TM industry and the principal actors (Promoters and researchers) [ref]. With the indication from a number of universities and bioprospecting advocacy groups, few large pharmaceutical manufacturers are interested to invest in the TM industry and are face with challenges of collaborative partnership, data sharing and material transfer agreement as the consequences of emerging intellectual property rights legislation. With limited TM investment into the development of homologated certified TM, there is a rapid increase of commercial manufacturers of *laissez-faire* TM that make propaganda of having products that can cure multiple diseases and most of these companies buy their primary raw materials from non-censured and uncredible plant supply sources [9, 22, 24].

The Future of TM industry for Cameroon Traditional herbal product consumers

Millions of Cameroonian consuming TM have reduced access to highly valued plants and traditional treatments. The local population in need of better-quality products with low income, have limited access to medications with an option to rely on purchasing packaged herbal product non homologated over the counter traditional medicines, which in most cases are of questionable efficacy and safety [7, 9, 25].

Traditional Medicine Traders

There is an increasing reduction in the trade in high value plants with a declining market share, leading to more traders dealing with trading lower value plants. Increase in lower value plants has been caused by high exploitation of the already threat of extinction of the herbal plants. With the overexploitation of the rich diversity for Cameroon medicinal plants, there is more international imports of highly valued plants from neighboring countries such as Gabon, Tchad, and the Centra Africa Republic [[26, 27].

Phytomedicine Pharmaceutical Manufacturers

Large manufacturers are unlikely to engage in research discovery and development of natural herbal products, leading to increase in the trade of traditional and complementary medicine in Cameroon. However, the informal trade sector is still popular although with anecdotal evidence of the potential to treat diseases of the commercial products. The researchers are faced with very little effort made for the security of the intellectual property of their research findings which hinders their potential to develop products and markets for TM for fear of litigation around unsafe products. [28].

CONCLUSION

Traditional medicine occupies an important place in our country, and several efforts are being made at the institutional level. The development of the national directory of traditional health therapists is a recommendation of the last traditional medicine forum held in 2020. Many phytomedicines are to be promoted, some are patented and others approved, despite the low number, which could also be justified by the low number of respondents. To promote traditional medicine in Cameroon, several proposals are made by the actors. However, to have the most exhaustive data possible, it would be appropriate to review the collection method and set up a survey with field

visits, respecting all statistical standards to have reliable data and a directory of actors in traditional medicine. provided and covering all regions, departments and districts.

RECOMMENDATION

- **Enact a law for the traditional medicine practice and regulation in Cameroon**
- Create a national dialogue forum between all the actors of traditional medicine.
- The informal traditional medicine sector does not comply and implement current regulation and therefore regulation alone is not a strong motivating force unlikely to improve the traditional medicine sector and the associated health care for the millions of consumers in Cameroon.
- Provision of subvention to promote the development of state-of-the-art technology in herbal plant harvesting, improved good farming practice, conservation/storage, packaging, dosing and treatment will motivate the current commercial actors to participate in the development of their own industry. These incentives should be integrated and established by the various stakeholders and the government by way of bursaries, research funds, safe and hygienic market infrastructure development, developing processing facilities and easy access to clean packaging.
- Local and foreign pharmaceutical manufacturers need to be given tax incentives to invest in Cameroon traditional medicine sector to enable investors secure the ownership rights of their technologies and intellectual properties.
- There is the need to restructure the TM sector and identify charlatans or laissez-faire actors in the trade to to assure safety and better standard of care of consumers of herbal products.
- A sustainable TM industry needs to develop platform for partnership corporation between all current or potential actors regulating the sector like the Ministry of Health, Ministry of scientific research and innovation, Ministry of Higher education, the commercial trade promotion agents, development corporation institutions (Universities, manufacturers, regulatory agencies, and plant conservation agencies).

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions

FCN, TVP, TEA are the main conceptor of this article and searched for funding, conceived and supervised the activities and wrote the entire article, in collaboration with TVPM BHN, KHC and TE, ECO, did data mining and search for regulation documents. TVP, TEA were involved in protocol development and made a major contribution to the drafting of the manuscript. TE, TVP participated in data collection and laboratory experiments. TVKP, TE, ECO read and corrected the manuscript. All the authors read and approved the final manuscript.

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