

Pharmacy in Africa

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Introduction

After world war II, a wave of awakening touched many african colonies. The root of the second World War was founded on freedom, equality, and tolerance in regards to other ethnic groups. The involvement of african countries and soldiers during WWII led educated african elites to question colonialism and its legitimacy. Many looked at India, which became independent in 1947, as a model to follow. Movements of nationalism, congregated by educated african leaders, emerged in the colonies. They demanded equal rights. In the 1960s, most african nations were granted their independence. However, the post-colonial transition had negative impact on the development of african countries due to incessant political instability in those newly created nations.¹

The premises of western medicine in Africa goes back to the beginning of colonialism. Prior to the installation of western medicine, africans relied on indigenous practitioners- also known as witch-doctors- for healing. Science was inexistent and unknown. Therefore, diseases were attributed to spirits. As a results, treatments were associated with rituals, offerings, and knowledge of herbal therapies for certain diseases such as diarrhea or the parasitic worms. As colonists settled on the wild land, the stress of tropical diseases such as malaria and yellow fever, forced them to improve the healthcare system in their colonies. At first, the main health care providers were europeans who exclusively treated the european colonists, and some africans that were closely related to the settlers. However, the potential of using healthcare services as a mean to increase supremacy, imperialism, and control over the colonies quickly became a strategy. As colonies became important economic resources for Europeans, it was important that african workers were healthy in order to increase labor force, productivity, and favor towards the ruling force. Consequently, more africans were trained and taught medical skills. A medical school with a four years program opened in Dakar, Senegal in 1918 to educate africans as « auxiliary doctors, midwives and pharmacists» in order to provide primary and preventative care. There was an increasing burgeoning of small health centers, hospitals, and health program destined to educate on hygiene and adequate nutrition, improve maternal and child health to reduce mortality and stimulate a demographic growth, and finally, expand curative services. In reality, it was only affordable to a restricted number of people: the Europeans and african elites. In the era of national awakening, the health sector change from being public and european ruled to privately owned clinics by educated african practitioners. It is important to add that health services and access were unequally distributed. The regions with greater europeans influences concentrated most the the health services, ostracizing rural areas from access to healthcare; higher classes, including europeans and educated africans benefited the most from health care access. As nationalists gained in popularity, they advocated for equality and promised social advancement

to the locals. Therefore, after the independence of colonies, education and health were among the most dynamic areas of social change. However, the economic crisis of 1980s hindered further growth in the health sector. Even during the flourishing years of development, the health disparities based of social and geographical statuses were present. By the end of the 1970s, the continent experienced a decline and reversal from the gain of the colonial and first post-colonial decades. The currency devaluation, increasing unemployment rate, weakening financial power, heavy inflation, flight of educated labor, unstable political atmosphere, and the deterioration of infrastructure of public health buildings contributed to this decline. Furthermore, the emerging for-profit privately-owned health centers deepened the socio-economical gap, making health services only accessible to the richest, forgetting the poorer. As a results, self-medication, increasing circulation of counterfeit medicines, and consultation with traditional healers became an alternative for the majority of the locals.^{2,3,4}

Health Status

Africa accounts for approximately 14% of the world population, and remains the poorest region of the world. However, the level of development is not homogenous across the continent and major disparities exist in multiple aspects. The main gap is between Sub-Saharan Africa and the northern as well as southern part of Africa. The maghreb and South Africa followed the world's trend in fertility with 2.5 children per woman. In contrast, Sub-Saharan Africa, despite the general decline over the past years, remains one of the region of the world with the highest fertility rate averaging the 4.7, up to 7.4 with countries such as Niger. Indicators of health status such as neonatal mortality rate, infant mortality rate, child mortality rate, maternal mortality rate, and life expectancy remain the outliers compared to the rest of the world. Maternal mortality in developed countries is 16 per 100,000 live births compared to 230 in developing countries. Rwanda, saw its maternal mortality declined from 1400 deaths per 100,000 live births in 1990s to 320 in 2013.⁵ Despite the declining trends, the healths indicators in Africa remain above average compared to the rest of the world. The reported child mortality rate in Algeria, Burkina Faso and Angola were 20, 102, 164 per 1000 of live births, accentuating the disparities among african countries.⁵ The cause of death has been a combination of constant unstable wars shaking the continent and diseases. The attributable causes of diseases are both communicable and non-communicable diseases, even though infectious diseases have the strongest impact. HIV/AIDs, lower respiratory diseases, malaria, diarrheal diseases, tuberculosis, ischemic heart disease, cerebrovascular diseases, diabetes, and cancer continue to kill millions of people each year in low-income countries, with two-third of the burden of diseases being infectious diseases in Africa. Despite its prevalence, malaria has almost been eradicated even though it continues to kill 750,000 people each year; compared to HIV/AIDS which accounts for 1.3 million death annually with sixty percent occurring in southern Africa. The current health status in Africa translate to the fragile healthcare system.^{5,6,7}

The current health expenditure in Africa is divided in three categories: the government spending characterized by direct health care services and national insurance system; the private sector which includes out-of-pocket expenses and private insurance schemes; finally, the external source which is donation from foreign governments or non-governmental organization (NGOs). In 2001, at the African Union meeting in Abuja, Nigeria, most african countries agreed to allocate 15% of their annual budget to the health sector. To this date only five countries have complied including Botswana, Zambia, Togo, and Rwanda which has the highest health

expenditure of 21%; even South Africa, which is the most developed country of Africa, only uses 12% of its government annual budget for health. However, it is important to note that the total health expenditure per capita per annum in South Africa approximate \$700, which is far above the WHO recommended amount of \$34 per capita and most african countries. In Mozambique, Ethiopia, Rwanda, and Ghana, it averages \$20, \$16, \$56, \$67 respectively. On the other hand, in oil-rich Equatorial Guinea, the total health expenditure per capita per year is \$897, the highest of Africa. It is reported that 22 countries allocate less than 10% of their annual budget to the health sector limiting health care services access to their population. Also, very few countries- to the exception of South Africa, Ghana, and Rwanda- have a good national health coverage insurance system. In Rwanda, for instance, the government implemented a program allowing 91% of the population to belong to one of three health insurance schemes. Similarly, the Ghanian government launched at the end of 2004 the National Health Insurance Scheme (NHIS) requiring the residents to be member of a district health mutual, a private commercial insurance, or a private health mutual. As a consequence, 70% of the population is currently covered. On the other hand, when the health system as structured and the government does not create incentive to promote health access, people tend to have recourse to private fundings. After Burundi introduced the user fee for services in 2002, many went bankrupt or had to sell their assets to afford health care services. Private fundings, more specifically out-of-pocket, is the most common in most african countries due to lack of government involvement in health sector. Many african countries at the 2001 African Union meeting highly expected foreign donors to meet their 0.7% gross national product (GDP) reflecting the reliance of african countries on foreign investments and their financial shortage necessary for health development. the USA, and France are the biggest donors. Others involved NGOs are the Melinda and Bill Gates Foundation, and the Clinton Foundation. Issues have arisen due to heterogenous donation to countries. For instance, Namibia received \$34 health donation per capita, which is relatively high compared to other countries such as Democratic Republic of the Congo (DRC) which received \$4.40 and Guinea which got \$2.80. This illustrates the weakness of the health system in most african countries. There are several reasons explaining the current health status of the African continent.^{7,8}

Most health services accessed by the population are primary health care services which englobes health education, promotion of proper nutrition, safe water and basic sanitation, maternal and child health care (family planning), immunization programs, and provision of essential drugs. Secondary health care which is dominated by hospitals and major health systems is more scarce. South Africa, Nigeria, and Kenya are reported to be offer secondary health care services to their population. Specialists are even more infrequent.⁷

Africa holds 25% of the global burden of diseases but only 3% or less of the health care workers. The access to health care services are very limited due cost, scarcity and quality of health resources and services. As a matter of fact, 47% of the population has no access to health services, and 59% of women continue to deliver babe without the assistance of skilled nurses which emphasizes the inadequate service delivery system of the continent. In many african countries, pharmacists share the market of drugs supply with general stores and street drug sellers principally. Besides, the geographical disparity between urban and rural areas as well as the lack of law enforcement foster such phenomenon. Other determinants highly participate to the burden of diseases. As suspected, the colonial past of most african countries shaped their

current health system. Moreover, modernization, urbanization and industrialization of the continent has favored the spread of endemic diseases such as malaria and HIV/AIDs.⁹

The development of transport, the rural migration to overcrowded urban cities, the nascent industrial hazards were the premises of the current health challenges faced by most african countries. African urbanization is often characterized as “demographic urbanization” rather than « economic urbanization » because of the disparate trend compared to developed countries urbanization process. As a consequence, there has been the development of overcrowded urban areas with poor infrastructures such as the lack of access to safe and clean water, inadequate sanitation characterized by poorly designed sewage systems, and increasing air pollution due to emissions of modern means of transportations and nascent industrial hazards including lead, mercury and pesticides damaging soils and water sources. The statistic shows that there are 64% of the african population lack sustainable access to decent sanitation, and 42% to clean water source. Those environmental factors have played major roles in the persistence of diseases such as malaria with standing open waters.^{9,10,11}

Additionally, there is a significant lack of political leaderships depicted by challenged public health services and management, weak legislation and their enforcement, absent community participation in health services, disconnected inter-sectoral collaborations, and a dearth of information, research and innovation in the health sector. The inexistent system of surveillance of safety, efficacy, quality, and stock of medical supplies aggravate the situation with irrational use of medicine, circulating counterfeit drugs, and frequent drug shortages. Finally, cultural challenges, socio-economics realities indirectly shapes the african health system.⁹

Finally, the low educational level, gender inequality with poor access to health care services by women, the societal hierarchization of men at the top, folk medicine, beliefs, and traditions have major implications in disease and their poor management. The 2014 ebola’s pandemic has been interpreted as a government conspiracy by locals to control the population or obliterate the « unwanted ». Others, in Nigerian, believed that salt was a cure of ebola limiting certain affected people to seek adequate care. The most plausible etiology was direct contact with infected african fruit bat which are believed to be the natural reservoir of the virus since african fruit bats are a delicacy in certain ethnic groups of western Africa.^{9, 12, 13, 14, 15}

In 2000, the United Nations created the eight Millennium Developmental Goals (MDGs) to set the agenda for the twenty first century and a deadline to improve the world’s poorest region social and economic conditions. By 2015, the world should achieve eradication of poverty and hunger, universal education, gender equality, reduction in child mortality, improved women health, lower HIV/AIDs, malaria, and other disease, environmental sustainability, and finally global partnership and development. Each goals, define more precisely their targets such as reduce child mortality by 2/3 (67%), or halt and reverse the spread of HIV/AIDs. Only MDGs 4,5,6 directly relates to health. In the dawn of 2015, there is many unmet goals. Sub-Saharan Africa and southeast Asia are the main contributor to the unmet goals. Only 15% of african countries met the target of reducing child mortality by two third. Cultural barriers continue to threaten women’s health with poor adherence to condom use. Therefore, there is very much to achieve in order to improve the social and economic development of poor countries. Like developed nations, pharmacists are seen as an valuable but underutilized asset in the health professional team. In many of those african nations, leaders are fighting to advance the

profession and train new generation with the necessary skills to serve the community and patients population better.¹⁶

Pharmacy education

Pharmacy education varies across the continent. The colonial past and the level of development determine the educational system in pharmacy.

In Nigeria, a British colonized country, there are 13 accredited universities to train pharmacy students. The curriculum has evolved throughout the years to fit the need of the society with longer training, shift in core courses, and bigger classes. Currently, practice in pharmacy in Nigeria is possible after graduating with a Bachelor in Pharmacy (B.Pharm). This degree program is a four (through DE) to five years (through UTME/UME) curriculum focusing on clinical pharmacy and patient-care. Depending on the school attended, the core courses may vary. Certain schools focus more on pharmacy as an applied science therefore train students to become immersed in research. Other schools that perceived pharmacy as a profession direct education toward a more clinical training such as prescribing drugs, administering drugs, documenting professional services, communication, counseling, consulting, preventing medication errors, drug information, drug utilization, drug evaluation and selection, medication therapy management, formal education and training programs, disease state management, and application of electronic data processing (EDP). In the 1980s, harmonization in the pharmacy education across the country has been suggested by the Pharmacy Council of Nigeria (PCN), the national regulatory agency of pharmacy practice. Regardless the focus of each school, all curriculum must meet a minimum requirements which include patient-oriented training in order to receive accreditation, which is overlooked by the two independent agency: the NUC, a federal agency of the Ministry of Education and Health, and the PCN. There are two paths to be accepted to pharmacy school: The Direct Entry (DE) and the Unified Tertiary Matriculation Examination (UTME). The DE allows you to go directly to 2nd year if enough points has been obtained in physics, chemistry, biology and english after high school (could be compared to AP classes), hence the four years program. Education is both didactic and experiential. The main innovation in the Nigerian system is the increasing use of internet and telecommunication to deliver lectures. Students can use a web platform to get access to notes and recorded lectures. The experiential training is in industry, hospitals and community and it is supported by the Student Industrial Work Experience Scheme (SIWES), a federal program allowing undergraduate students to get hands-on experience. Students start during their 3rd year to explore the profession of pharmacy. One of the critique of the system is the lack of coordination and infrastructures. However, it is being improved with the recent building of private consultation rooms for pharmacy students to enhanced their patient-care approach. Further educational opportunities are offered to students who are willing to do research, work in academia or in health care delivery system through the post-graduate programs. Pharmacy in Nigeria seems to have a very strong foundation and the decision-making individuals as well as leaders are more than willing in improving, reshaping, and advance the profession by offering an excellent curriculum to their students. This is also observed in Malawi, another former British colony. However, change was much slower.^{17, 18}

The very first pharmacy school in Malawi opened in 2006 with 8 students enrolled to now 40 new students each academic year. Until present days, the country continues to rely on qualified pharmacists who obtained their degrees abroad since the only school cannot meet the

pharmacists need of the country. Students must enroll in pre-pharmacy classes for a year, then join the accredited pharmacy school for five years to obtain the B.Pharm: four years of didactic courses combined with experiential and research; and a year of practical experience. The main mission of the school is to equip pharmacists with the necessary knowledge, skills, values and attitudes toward pharmacy in order to help health institutions with the procurement and storage of drug in a cost-effective manner to reduce cost and waste. The program receives a great and single support from the government through the National AIDs commission. Indeed, the countries is facing a high demand of pharmacists as most of pharmacies are run by unqualified pharmacy assistants or health works. Students are assessed throughout the semester using laboratory work, presentation, projects and end-of-semesters examination, the latter being the most important. The curriculum provide basic courses such as pharmacology, therapeutics, pharmacy practices, pharmacy law, to trained skilled and additional unique courses such as pharmacognosy, drug and medical supplies management, toxicology, and research in practice. Experiential training is only acquired during the fifth required year of internship, after the B.Pharm has been grated to students. For this newly started program, the main challenge is the lack of professors and experts in the field pharmacy. As a result, many teachers are qualified expatriates.¹⁸

South Africa counts eight accredited pharmacy schools offering the bachelor in Pharmacy (B.Pharm) after four years of didactics. There is an additional required year of internship called the pre-registration practical training period, during which post-graduates gain experiential training in community pharmacy, hospitals, industries, or clinics. After completion of the experiential year, students can be registered as pharmacists. Accreditation is granted by the South African Pharmacy Council.¹⁹

The educational system is different for french speaking countries or with a french colonial past, as their education in pharmacy emulates the french pharmacy education. Tunisia opened its first and only pharmacy school, Faculté de Pharmacie Université de Monastir, in 1995. Admission to the pharmacy's program is based on an application after high school. The number of candidates accepted is limited and rely on the type of high school diploma (baccalaureate in mathematic, economy or letters) obtained by the students with greater seats numbers for sciences oriented baccalaureate diplomas, and their general performance in sciences classes (mathematics, physics, chemistry, and biology). Those with poor performance has to wait a year and pass the national admission exam for pharmacy schools. Since 2009, the curriculum extended to 6 years- prior, it was 5 years- and is divided in 2 « cycles ». the second year of this first cycle, experiential training start in community pharmacy. The second cycle is the four remaining years of pharmacy school. During this cycle both didactic and experiential training is offered to the students. The third year (or first year of the second cycle) of pharmacy school, experiential training in hospital pharmacy. The last year of pharmacy school which is the sixth year (or fourth year of the second cycle), is purely experiential, with the possibility to intern in various areas such as community pharmacy, hospital pharmacy, clinics, pharmaceutical industries, or research. The doctorate in pharmacy is granted after students pass during the presentation of their thesis. Further specialization, through a four-years residency, is possible. Students who already have their doctorate in pharmacy can pass the national exam for residency and specialized in industry, hospital, research, or academia. Due to lack of infrastructures, the residency can be done, depending on the specialization, in France or other accredited foreign institutions. However, students are required so spent at least three of the eight semesters in Tunisia.²⁰

In Kenya the 5-year B.Pharm is also the diploma awarded to pharmacists. University of Nairobi, Mount Kenya University, Kenyatta University, are three accredited by the Pharmacy and Poison Board (PPB), to award the B.Pharm. They also offer advanced training with the M.Pharm with specializations in pharmaceutical analysis, clinical pharmacy and pharmacognosy, or complementary medicine. A PhD in clinical pharmacy could also be pursued by graduate students. Other countries highlight would be Sudan since it graduates the highest number of 900 students each year from its 14 accredited schools. However, this leads to major pharmacists unemployment.²¹

The effort to elevate and recognize pharmacy as a profession has been a major focus across the world including Africa. The reshaping of pharmacy education characterized by long years of study, high competition, strict selectivity, and densely challenging curriculum have all contributed in valuing pharmacy. Moreover, the strict regulation of the profession adds to the value of pharmacy.

Pharmacy regulation

Pharmacy practice and medicine are regulated in most african countries. Regulations overlook ownership, staffing, quality of medicine, pricing, and standard of practices. Pharmacists holding a degree from an accredited pharmacy school are permitted to own a pharmacy. In other countries such as Ghana, pharmacies could be owned by individuals without a pharmacy diploma. In Nigeria, the patent However, there is no enforcement due to limited government capacity such as limited staff, budget, regulation inspection, and legal structures. Enforcement is more difficult because of the very fragmented medicine system characterized by multiple sources of medicine supply such as dispensing doctors, medicine sellers, drug sellers, general stores and legal pharmacies Consequently, counterfeits, illegal medicine and medicine without prescriptions are dispensed to patients.²²

Regulatory agencies are branches of the Ministry of Health with little autonomy and ability to manage their budget and staffs. Consequently, many agencies have poor sustainable funding for full operation. In some countries, regulatory agencies are inexistent or not fully established such as Kenya, Malawi, Mozambique, and Rwanda. On the other hand, In Ethiopia and Burundi, the agencies are functioning autonomously. In term of accessibility, many regulatory agency are relatively hard to reach. Few uses communication platform such as websites. For those that has a website, not all information is present.²²

Most african countries rely on foreign imports for their medicines. Most medicines imported are part of the essential medicine list developed by the WHO to guide countries. Moreover, the majority of pharmaceuticals are generics due to low cost. Safety and efficacy of those are assumed to be adequate; however, the quality of those generics is to be verified. Very few countries perform clinical trial to assess the bioequivalence of generics. Often, ethical trials, requirements for good manufacturing practices, import controls, as well as inspection of those clinical trial sites are absent or unclear due to lack of capacity, tight budgets, and unstructured bureaucracy. Also, the stringency on medicine registration is varying between countries. Legal system is existent but flaws arise in guidelines and procedural steps for applicants often defined as lengthy and unclear.²²

It is primordial that the regulatory systems must be well-structured and efficient to surveil the medicine market in order to provide sustainable availability to good quality medicine to their population. However, it has been reported that regulatory institutions in african countries are

disorganized. The legal framework tend to be very complex and unclear. Many african countries including Nigeria, South Africa, Burundi, and Chad overlook traditional, herbal, and veterinary medicines. Meanwhile, many of the regulatory agencies are also looking over cosmetics, foods, bottled water, pesticides, poisons, and animal supplements. 22

Licensing is a major task executed by regulatory agencies. In Sudan, Kenya pharmacists are required to participate in continuing education to renew their licenses. Manufacturing companies are also granted licensing by regulatory agencies. However, inspections are not always carried out and many of those manufacturing companies are not licensed. In Ethiopia, only one of the existing manufacturing companies is licensed. 21, 22

Due to the disparity in medicine registration, the absence of transparency in the confusing process of the application, the unclear guidelines, the lengthy process, and weak financial support, many potential applicants choose not to integrate the african drug's market. Therefore, in 2009, the New Partnership for Africa's Development (NEPAD) started a new program called the African Medicines Regulatory Harmonization (AMRH) in order to harmonized the medicine importation in various region of Africa. Their goal is to promote regional harmonization of medicines regulation in Africa by reducing time to register essential medicine, by supporting local manufacturing of generics, and developing partnership with BRICS (Brazil, Russia, India, China, South Africa), diversifying funds for procurement of drugs, and improving pharmacovigilance of counterfeit medicines. Consequently, a sustainable access, affordability and availability of effective, safe, and high quality medicines would improve on the continent. In order to grow the project, many influential organizations are supporting the AMRH such as the African Union Commission (AUC), Pan African Parliament (PAP), WHO, World Bank (WB), Bill and Melinda Gates Foundation (BMGF), UK Department for International Development (DFID) and Clinton Health Access Initiative (CHAI), UNAIDS and the African Development Bank. The East African Community (EAC) was the first region of Africa to launch the AMRH project in March 2012. The other regions of Africa should be following the trend soon. 23

Pharmacy Practices

Pharmacists are scarce in Africa compared to other developed countries. On average, there are one pharmacist per 10,000 people: in Chad it is 0.04 , while in Sudan, it is 2.25. Moreover, there is national disparities regarding the distribution of pharmacies with more pharmacies present in urban areas and very few pharmacies rural areas. ²¹

Community pharmacy remains the most popular area of pharmacy practice in most countries in Africa. In many of those countries, pharmacists are perceived as the front line primary health care provider due to their accessibility, relatively dense presence in the community, lower cost of services, and surprisingly, the confidentiality of the encounters. Moreover, the uneven distribution of health clinics has favor the pharmacist seeking behaviors of rural dwellers. ⁹ However, the quality of the services are often criticized. It is very common for pharmacists to dispense prescriptions medications without proper diagnosis as they are the one performing the diagnosis of the patients and dispense them without a written prescriptions. The Federation Internationale Pharmaceutique (FIP) has published a guideline, Good Pharmacy

Practice (GPP), in order to define and explain the expected role of the pharmacist. It also published a stepwise guideline for the implementation of such practices, however, very few African countries have been reported to comply.²⁴

Compared to developed nations where the community pharmacist's role has evolved toward a more clinical approach, the role of the community pharmacy in African countries has been fairly steady with an emphasis on the traditional dispensing and selling role. The main reason for the accepted fact that pharmacies are « businessmen » is because most pharmacies, unlike the US where chain pharmacies monopolize community pharmacy, are owned by individuals who hold a legal pharmacy degree, hence the incentive for profits and focus on business and management. Interviewed patients have complained about pharmacists sometimes not being present in the pharmacy, leaving the store managed by pharmacy assistants or less skilled personnel.¹⁰ In 2003, the South African Pharmacy Act of 1974 was ratified allowing chain super shops to own pharmacies requiring pharmacists to run the drug dispensaries. This is highlighted by Click, a large retailer that opens pharmacies in 130 of its 700 retail stores with additional services such as screenings and basic health care. Other retailers such as Pick n' Pay, Shoprite, and Dis-Chem have taken advantage of this deregulation. The positive side is the increase of pharmacies by 15% but one drawback is the dense competition and struggle experienced by independent pharmacies.¹¹ South Africa is one of the very few countries in Africa including Ghana, Nigeria, and Uganda that have reported the existence of chain pharmacies, with the latter expanding to Kenya.^{24, 25}

The high prevalence and incidence of infectious diseases such as HIV/AIDS, Malaria, tuberculosis, has forced a shift in the community pharmacists' roles toward a more clinical approach rather than the traditional « merchant » role. Moreover, the top leading causes of death or morbidity draw up to 60% of the healthcare budget in some countries, accentuates the need for a pharmacist to be first line by their involvement in selecting optimal cost-effective therapies for patients, act as public health leaders by offering preventative services to their clientele such as mass immunizations, screenings for common ailments, and health educations. Many pharmacy schools have been implementing clinical education to their curriculum. For instance, University of Nairobi partnered with Purdue University to develop local services provided by pharmacy students for urban needs.^{26, 27}

Within the community, the unequal geographical distribution of pharmacies, with fewer in rural areas has favored the development of patent medicine sellers (PMS), also called patent medicine vendors (PMV) in African countries. PMS are non-pharmacists who sell over-the-counter medicines which includes anti-malarial and other medicines for common diseases. They are well recognized as community health providers in rural, urban areas and low-income people. In Nigeria, the Pharmacy Council of Nigeria (PCN), the same regulatory body that accredits Nigerian pharmacy schools and pharmacy practice, grants permits and regulates PMS. However, they are not unqualified to provide services to the level of trained pharmacists such as pharmacovigilance, counseling, drug information, drug administration, pharmacokinetics, pharmacodynamics, and therapeutic alternatives. Consequently, there are programs to improve their training to provide basic services.^{28, 29}

Pharmacy industry is also an area of pharmacy that is present in certain countries in Africa such as South Africa, Ghana, Nigeria, Kenya, and Tunisia. Kenya supplies 50% of the medicines of eastern Africa; Tunisia supplies 15% of European medicines. Very few pharmaceutical industries are involved in innovative research and drug discoveries. Most

manufacturing company are dedicated in producing generics for mass distribution. There is approximately 37 manufacturing plants in Africa. South Africa was the only country meeting the WHO manufacturing standards until 2010, when it was joined by the Kampala based company, Quality Chemicals. Not is not the case of many countries in Africa since those countries lack the financial support to afford the energy cost and the importation of needed ingredients to manufacture generics. This is the case of Ghana. Therefore, several foreign partnership is being created to guide countries with poor standards to reach the WHO qualification level. The german development company GTZ is sending inspectors to assess manufacturing plants in Ethiopia and Democratic Republic of Congo. Indeed, with the promulgation of the Doha Declaration regarding the Trade-Related Aspects of Intellectual Property Rights (TRIPS) in 2001 at the World Trade Organization (WTO) in Doha, Qatar. TRIP allows developing countries to have access to a more affordable medicines, therefore, it is primordial for african countries to manufacture generics and supply the continent. The African Union is encouraging regional collaboration among african countries with each country specializing in the production a specific generics. In order to achieve such goals, it is important that governments support manufacturing companies, harmonize and coordinate the legislation of medicines.^{21, 30, 31}

Conclusion

Pharmacy in Africa is evolving. The traditional pharmacist role is still existent but there is a raise of awareness about the valuable resource that a pharmacist could be in a community by positively impacting patient's health. Africa concentrates most of the ailment of the world and have scarce health care workers. Pharmacy are, for some, the only health care services. Therefore, pharmacy must be improved. Curricula are being revised in order to train pharmacy students to develop clinical skills in order to be involved in counseling, pharmacovigilance, drug information, and health education. Community pharmacy is the most popular practice but other area are being improved such as industry. There is a need for African countries to locally manufacture their medicine to reduce cost. Such change require appropriate legislation to regulate medicine within countries. The ongoing harmonization of medicine regulation is a promising project that will benefit the future of pharmacy in Africa.

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