FIP pharmacy education in sub-Saharan Africa

The FIP-UNESCO UNITWIN Programme: A decade of education partnership across Africa

2020

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UNESCO United Nations Educational, Scientific and Cultural Organization

uniTwin UNITWIN Network in Global Pharmacy Education Development

Colophon

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Cover page and graphics: Ready for take off

Recommended citation: International Pharmaceutical Federation (FIP). FIP pharmacy education in sub-Saharan Africa. The Hague: International Pharmaceutical Federation; 2020.

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Foreword by the FIP President

It is my privilege to introduce this report on "FIP pharmacy education in sub-Saharan Africa". The report shares a decade of partnership through the FIP-UNESCO UNITWIN Global Pharmacy Education Development Network's Centre of Excellence in Africa, and I am proud to share both the outcomes and impact on countries, and the evidence and best practices achieved together with our colleagues in Africa, seeking to advance our profession through pharmacy education.

The role of education is central to advancing the profession to meet the needs of our populations. FIP agrees with the World Health Organization that there is no "healthcare without a health workforce" and there is no workforce without education. Leaders in academic pharmacy and educators are accountable for building a competent, flexible and adaptable pharmaceutical workforce while shaping pharmacy and pharmaceutical sciences education by anticipating the emerging and increasing needs of health systems, new trends and societal challenges.

In 2016, FIP developed Pharmaceutical Workforce Development Goals and the Nanjing Statements at a global education conference in Nanjing, China, followed by a global vision for education and workforce in 2017. We must have the right education for our current and future pharmacists, and these have been vital tools for universities and schools of pharmacy in anticipating the challenges of our patients and populations that lie ahead. This report is a great example of showing how our academic pharmacy colleagues in Africa have contributed to the development of these tools and how they have utilised them to draw a comprehensive picture of needs and priorities in pharmacy education in their countries and institutions.

While we were working to deliver this important report in 2020, the world has been amid the COVID-19 pandemic. There has never been such a period in our recent history where the phrase ''Health for all'' and universal health coverage have resonated more than ever. We continue to witness heroic work from our pharmacists and pharmacy teams around the world, with every country and region facing distinct challenges in practice, science and education to combat COVID-19.

The time has come to narrow the gaps in provision between the different regions of the world in a pragmatic way. The past decade in Africa with FIP-UNESCO UNITWIN now provides us with evidence and examples and ways to unite under the "One FIP" vision: "a world where everyone benefits from access to safe, effective, quality and affordable medicines and pharmaceutical care".

FIP will continue to support our colleagues across Africa in a sustainable way, while taking this learning to other regions in the world to continue the pharmacy education transformation globally. We have created the vision and the tools to now be One FIP and deliver, through trust and solidarity and with actions, the changes required for the people and societies across our globe. I am convinced that if we continue our efforts towards supporting the transformation and development of pharmacy education globally, we will build a bright future for our profession and patients.

Long live pharmacy! Long live FIP!

Dominique Jordan
President
International Pharmaceutical Federation (FIP)

Preface by the FIP-UNESCO UNITWIN Director

The combination of variations in health workforce through shortages and imbalances across regions and countries has been a global health challenge in achieving universal health coverage. An integral part of universal health coverage is access to essential medicines and appropriate use of medicines, which require a competent, adaptable and adequate pharmaceutical workforce as medicines experts.

Africa ranks as the second most populated continent in the world. It has about 17% of the world's population but only 3% or less of the global health workforce is available to meet health needs**.** The resultant fragile health system translates to the continent being burdened with 25% of the world's disease. The unavailability of sufficient, high quality and competent health workers, including a pharmaceutical workforce, has placed public health at major risk.

About one-third of the African population does not have access to quality medicines and pharmaceutical services. One contributing factor is the critical shortage of pharmacists, who are the custodians of and experts on medicines. Improvement in the quality of education and training has been identified as one of the key elements for the sustainable development of the pharmaceutical workforce to improve health and well-being, with the ultimate aim of achieving universal health coverage.

In 2010, FIP and UNESCO, in collaboration with the FIP University College London School of Pharmacy Collaborating Centre, established the FIP-UNESCO UNITWIN Cooperation Programme in Global Pharmacy Education Development. This was the first UNESCO programme for healthcare professions' education of its kind, with non-governmental organisation involvement through FIP.

Having identified the need for capacity building of the pharmaceutical workforce in Africa, the FIP-UNESCO UNITWIN Cooperation Programme in Global Pharmacy Education Development started its activities by setting up the FIP-UNESCO UNITWIN Centre for Excellence in Africa (CfEA) with founding partners, deans or heads of pharmacy schools, from Ghana, Namibia, Nigeria, Malawi, Uganda and Zambia. Since its inception in 2010, FIP-UNESCO UNITWIN CfEA network acted as a platform for knowledge and experience exchange, as well as for discussion and debate on education trends and developments. To further pharmacy education development, the network established a forum for regional and international collaboration and used FIP Education resources — the FIP Global Competency Framework, the FIP Nanjing Statements on pharmacy education and the FIP Pharmaceutical Workforce Development Goals — to address academic capacity, workforce development, needs-based education, quality assurance and advocacy challenges in sub-Saharan African countries.

By looking back on a decade of experience of pharmacy education and innovation across Africa, through the FIP-UNESCO UNITWIN Centre for Excellence in Africa, we now seek to renew the agreement with UNESCO to strengthen the CfEA and roll out centres across other regions globally.

FIP is pleased to launch this "FIP pharmacy education in sub-Saharan Africa" report — a first of its kind on African pharmacy education — providing an overview of the needs and priorities of pharmacy education in sub-Saharan African countries, with a particular focus on academic capacity and needs-based education. This report highlights the most challenging and pressing needs in sub-Saharan Africa in health care, the pharmaceutical workforce and pharmacy education, and provides a decade's worth of evidence on how pharmacy schools and programmes have taken on these challenges and developed strategies to educate the future pharmaceutical workforce.

In Part I, we lead with a discussion on societal and health care needs in Africa, drawing insights from key stakeholders such as the World Health Organization and the African Development Bank. We link these insights with African principles and needs in higher education and explain how the FIP-UNESCO UNITWIN programme and outcomes of the FIP Global Conference on Pharmacy and Pharmaceutical Sciences Education, held in Nanjing, China, in 2016, have supported the transformation of pharmacy education over the past years.

In Part II, we take a continental tour of pharmacy education and the pharmaceutical workforce through a review of existing literature and evidence, followed by an in-depth focus into the sub-regions of sub-Saharan Africa — west, east and south — to provide diversities and alignments in pharmacy education in the context of needs-based education, workforce development and policies.

In Part III, we strengthen the statement "There is no pharmaceutical workforce without pharmaceutical education" with a high-level overview of pharmaceutical workforce strategies across sub-Saharan Africa based on the FIP pharmaceutical workforce development goals.

In Part IV, we share 10 years of experiences, achievements and impacts of the FIP-UNESCO UNITWIN CfEA. We honour our past and present FIP-UNESCO UNITWIN CfEA members through their views on needs-based education, academic capacity and advocacy as well as celebrate real-life successes of how the FIP-UNESCO UNITWIN CfEA contributed to the transformation of pharmacy education in member countries. This part includes country pharmacy education profiles, current and aspiring educational trends and best practices in Ghana, Kenya, Malawi, Namibia, Nigeria, Uganda, and Zambia through FIP's tools.

In Part V, we have four areas of focus. First, we provide an overview of quality assurance systems, gaps and challenges in pharmacy education and describe an envisioned state of quality assurance in pharmacy education. Secondly, we hear from the future pharmaceutical workforce — young pharmacists and pharmacy students — who provide evidence from a study conducted by the International Pharmaceutical Students' Federation African Regional Office on the roles of younger generations in making a difference in pharmacy education. Thirdly, when we started to write this report, little did we know that the world would be facing one of the most challenging global health crises of modern history and the COVID–19 global pandemic has clearly highlighted the challenges and inequities in pharmacy education. As a result, we include interviews of past FIP-UNESCO UNITWIN CfEA members to provide an overview of the status of pharmacy education in their countries and shared learnings and good practices to navigate challenges amid this pandemic. Fourthly, we discuss strategies to empower women in pharmaceutical science and pharmacy education in sub-Saharan Africa, through FIP's FIP-WiSE (Women in Science and Education) campaign.

The report concludes with a "Way forward and recommendations" building on the findings of this report.

I hope you will enjoy reading this report and its findings and messages that provide a call for continued engagement and collaboration to carry on the important work of meeting the health care needs of communities across Africa. We invite all stakeholders in sub-Saharan Africa, students, faculty members, national pharmacy organisations and governments to use this report, a decade's worth of evidence and experience, as a roadmap to advance pharmacy education and pharmaceutical workforce across Africa and throughout the world.

It has been a privilege for FIP to collaborate on this report with UNESCO through the FIP-UNESCO UNITWIN programme, the WHO Regional Office for Africa, International Pharmaceutical Students' Federation, the FIP Young Pharmacists' Group and FIP members from sub-Saharan Africa. We extend our sincere gratitude to all our partners and we are especially thankful to past FIP-UNESCO UNITWIN colleagues who have contributed to the writing of this report and all the efforts they have undertaken over the past decade and more that have gone into every aspect of its contents to inspire colleagues across Africa and beyond.

Professor Ralph J. Altiere
Director (2017–2019)
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Interview with the World Health Organization Regional Office for Africa

FIP has conducted an interview with Jennifer Nyoni, technical officer at the Health Workforce Unit, Universal Health Coverage Life Course Cluster, WHO Regional Office for Africa, to obtain a regional overview on the emerging issues and trends during the COVID-19 pandemic and on the needs and priorities in health care, health workforce and health care education, with a particular focus on pharmacy and pharmaceutical workforce.

What are the major areas of impact due to the COVID-19 pandemic in the WHO African region and how is WHO AFRO supporting health workforce in countries in preparing for, responding to and mitigating the risks of the pandemic?

After the first case was recorded in the WHO African region, the spread of the COVID-19 pandemic has progressed to all 47 countries in Africa, with unparalleled socio-economic, societal and health consequences.[1] The impact of the pandemic in Africa will vary from the rest of the world due to factors tied to demographic, environmental, social and economic growth factors.[1] In the African region, the generally weak health systems are faced with shortages in workforce capacity, lower density of health infrastructures and inequity in distribution, and inadequate or poor medical equipment and medical supplies. And the COVID-19 pandemic has added an extra burden. Indeed, this pandemic is testing the health system and services.[1] In the WHO African region, healthcare workers have been infected due to a combination of factors including low awareness of infection prevention and control measures, lack of or insufficient personal protective equipment (PPE), inappropriate PPE use and unrecognised disease (e.g., due to diagnostic insufficiency) as well as due to occupational health and community engagement. To support health workforce in the COVID-19 response, WHO AFRO is increasing the capacity and expertise of countries in collaboration with international and regional partners and institutions. This increase includes but is not limited to: (i) conducting virtual regional and nationwide training to enhance the response to the pandemic, further preparedness and data communication; (ii) deploying appropriate experts as surge capacity to affected countries to provide necessary support; and (iii) having repurposed existing WHO staff at regional hubs and country levels and recruited consultants (local or international) to fill the gaps in the region during the pandemic.[1] Countries have been and are being supported to plan for their workforce using WHO tools, including the AFRO COVID-19 simulation tool that includes the health workforce component.

What is your vision for the future of health care across Africa and how pharmacists can support WHO AFRO to achieve this vision?

United Nations Sustainable Development Goal (SDG) 3 calls for, within the context of universal health coverage (UHC), all individuals and communities to have access to quality essential health services without suffering financial hardship, and access to safe, effective, quality and affordable essential medicines and vaccines for all. This means that by 2030, African countries, like those in other continents, are envisioning making great progress towards universal coverage of essential services for all their populations.

The African regional framework for the implementation of the "Global strategy on human resources for health: Workforce 2030"[2] provides the vision to accelerate progress towards achieving UHC in member states by ensuring universal access to skilled and motivated health workers. The goal is to guide the efforts of member states in making adequate investments to enable implementation of effective policies that ensure universal availability and accessibility and quality of the health workforce.

Pharmacists, as core, skilled health professionals, contribute to the achievement of UHC through being qualified healthcare professionals and sufficient in numbers. Pharmacists are supporting national governments in a number of ways. These include but are not limited to making themselves available to serve in the areas where they are needed. At the moment at least 85% of pharmacists are found in capital and large commercial cities. They can

contribute to government efforts especially when organised into entities like FIP, in the hard-to-reach areas of countries.

The role of pharmacists is not restricted to dispensing medicines. They are actively involved along the pharmaceutical value chain, including research and development, health technology assessment, manufacturing, procurement and supply management, regulation, dispensing, etc.

What are the most pressing needs and skill gaps of the health workforce across Africa and why?

In Africa generally, countries have had severe shortages of skilled health workers in absolute and relative terms. With the SDG/UHC density threshold of 4.5/1,000,[3] in most countries the needs and skill gaps are even wider. Countries need to better assess their staffing requirements using available tools to better inform their health workforce policies and strategies and investment plans.

At this time of the COVID-19 pandemic, the existing skills gaps have been exposed in many countries where the available healthcare workers have been repurposed to the pandemic response, and continuity of essential services (e.g., maternal and child health, HIV/AIDS, non-communicable diseases) has been significantly compromised. The main reason is a lack of adequate implementation of evidence-based comprehensive health workforce policies and strategies, and a lack of investment plan development (in the context of health sector policies and strategies).

There is a lot that needs to be put in place in order to bridge the gaps: Systematic and consistent implementation of the key areas of health workforce in the production (education and training), institutional health workforce leadership, strategic planning management capacity of the available and future workforce such as recruitment/deployment, managing migration and implementing retention strategies, generation and use of the evidence to inform decision making.

How should health care education respond to the needs and challenges in health care and the health workforce across Africa?

As part of the comprehensive national health workforce strategies in health worker education, training and professional development, there are a number of key focus areas. In the area of health sciences education systems, including medical education, focus is on supporting countries for strengthening national education systems, including health science schools and universities, to support the production of all types of health workers with the appropriate skills and competencies to respond to the healthcare challenges in Africa. This happens through: supporting the evaluation of training programmes in terms of their relevance and capacity for scaling up production of health workers; strengthening countries' accreditation mechanisms; reforming health sciences training programmes and competence-based curricula; introducing innovative training methods using digital health options such as telemedicine; strengthening training capacity in countries in terms of training of trainers, teaching equipment and materials, infrastructure investment and development; networking and twinning of training institutions, WHO Collaborating Centres and exchanging expertise within and outside the region; and strengthening national continuing education processes and the strategic management of fellowships.[4]

How should international and regional collaborations address the health workforce shortfall in the region?

Partners, including the WHO, at national, regional and international levels must support countries in the development and implementation of evidence-based national policies and plans. This means allowing countries to determine their own priorities and focus that will contribute to the systematic improvement in the quality and quantity of the health workforce, including pharmacists. Partner efforts that are piecemeal and fragmented will have little value in the medium to long term addressing of staffing shortages in the countries. For example, the African regional framework for the implementation of the "Global strategy on human resources for health: Workforce 2030",[2] endorsed by the ministers of health in the 47 countries of the WHO Africa Region, provides the basis/content of what countries need to consider in their plans. While partners are not expected to take over the role of government in implementation of the plan, they can propose their area of focus that contributes to the

overall agenda or plan and priorities of countries. Whatever focus area is selected, the aspect of building and strengthening national or local capacity should be embedded in that support or assistance.

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Acknowledgements

The International Pharmaceutical Federation (FIP) thanks FIP Pharmacy Education in sub-Saharan Africa Report authors, editors and institutions that were part of the FIP-UNESCO UNITWIN Centre for Excellence in Africa for their contributions.

The development of this report was led by the co-editors and co-authors Ralph J. Altiere (United States), Nilhan Uzman (The Netherlands) and Alison Williams (Nigeria).

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FIP acknowledges the work of the FIP volunteers, Melody Okereke (Nigeria) and Khalid Garba Mohammed (Italy) for their substantial contributions to the literature search, editorial work and country profiles' development.

The report was reviewed by FIP President Dominique Jordan (Switzerland), FIP Chief Executive Officer Dr Catherine Duggan (The Netherlands) and FIP Education Executive Committee Members.

Executive summary

1. Key messages

- Over 10 years the density of pharmacists has increased by approximately 11% (from 6.63 per 10,000 population in 2006 to 7.36 in 2016). Even though there has been a sizeable increase in the density of pharmacists across all regions of the globe, countries across Africa still have capacity building challenges with regard to the pharmaceutical workforce needed to deliver the health care and pharmaceutical needs of the region.

- Although pharmacy is a relatively young profession across the whole African continent, initial education and training capacity has been largely increased in recent years through the opening of new schools and faculties of pharmacy but is not yet sufficient to meet the primary health care needs of the societies and national strategies.

- Pharmacy schools and departments in the sub-Saharan African region have been striving for a needs-based pharmacy education to meet regional and national societal health care needs and the ever-changing role of pharmacists. The pharmacy curricula across the region have developed and responded to specific health care needs, such as the burden of priority communicable diseases like malaria, tuberculosis and HIV, expanding the clinical roles of pharmacists to deliver universal health coverage and to strengthen primary health care, economic growth and development priorities such as pharmaceutical manufacturing and drug development.

- Common educational trends seen in the region include the transition from BPharm to PharmD programmes; the addition of MSc clinical pharmacy programmes to meet the increasing role of pharmacists in primary health care settings; and the development of specialist postgraduate programmes; continuous professional development courses for practicing pharmacists to deliver patient-centred care, drug development and manufacturing.

- Major challenges for pharmacy education in the region are related to an acknowledged shortfall of pharmacy academics, as outlined in Section 2 of this report, with the higher qualifications required for effective teaching, limited infrastructure, limited access to teaching and learning resources, insufficient experiential learning opportunities and limited research capacity and funding. Academic pharmacy staff numbers are less than required based on the country profiles in Section 4 of this report, with a shortfall of 50% in some countries.

- The pharmaceutical workforce in all areas of practice across Africa, including academia, is dramatically affected by the migration of pharmacists to other countries in search of improved practice settings partly due to limited remuneration, lack of enabling workplace environments, and high workload due to limited academic capacity in numbers and infrastructure.

- The workforce capacity gap between African countries, based on income level, is increasing with time. The gap between pharmacist capacities in low-income countries has a significantly lower gradient compared with higher-income countries. The difference between upper-middle and lower-middle income is considered alarming and is clearly evident. The disparity reveals a significant effect in terms of accessing pharmacists, and that gap is continuing to increase.

2. Recommended actions

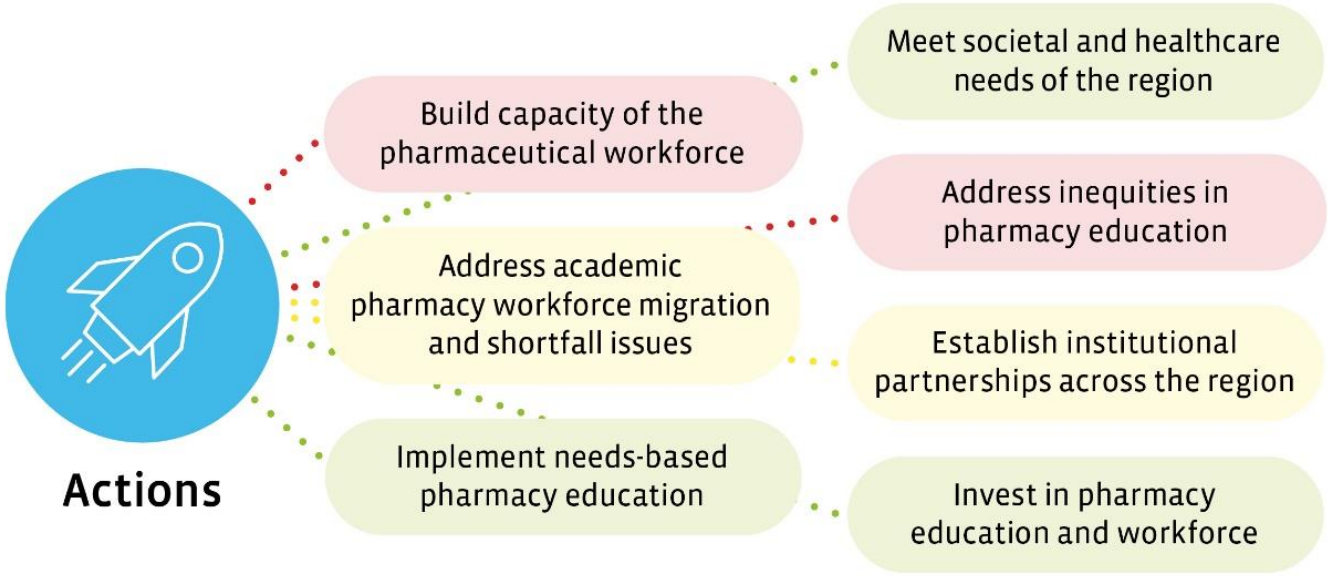

Figure 1. Recommended actions from the ''FIP pharmacy education in sub-Saharan Africa" report

- African countries will need to anticipate and build a flexible and productive workforce to meet existing and future societal and healthcare challenges through a regional and/or national strategy for education and skills development.

- Adequate funding is required to meet emerging trends in pharmacy education informed by societal and healthcare needs in the region. Inter-professional education and collaboration, professionals' skills mix training, postgraduate specialist development, public health skills, lifelong learning, experiential learning and development of academic staff and infrastructure are among the key areas of investment required to advance pharmacy education.

- Adequate funding is required for workforce expansion, which includes socio-economic incentives such as addressing access to initial education and training, decent working conditions and remuneration, and national planning where there are shortages.

- Pharmacy regulators and professional pharmacy organisations need to step up measures in countries and advise governments to address workforce migration and shortfall in order to advance pharmacy education and pharmacy as a profession.

- Partnerships across the sub-Saharan African region have significantly supported the advancement of pharmacy education. Successful partnerships through FIP-UNESCO UNITWIN CfEA added significant value to pharmacy schools and departments in Ghana, Kenya, Malawi, Namibia, Nigeria, Uganda and Zambia. Current and future academic pharmacy networks in Africa should build on the foundation laid by FIP-UNESCO UNITWIN CfEA and consolidating the gains to widen networks and advance pharmacy education in the continent.

- Addressing inequities in pharmacy education, establishing intra-regional and institutional partnerships, building the foundations of an African Association of Pharmacy Schools for academic networking and sharing of ideas, innovations and expertise to advance pharmacy education and health care will contribute to addressing the needs and priorities outlined in this report.

- For the next decade, FIP will focus on the renewal and expansion of the FIP-UNESCO UNITWIN programme across other regions of the world in future to expand the original mandate as a global pharmacy education development programme.

1. Introduction and background

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Summary

- The African continent has the most severe shortage of health workers. In order to relieve the burden on fragile health systems in the region, the development of a robust health workforce, through needs-based and quality education, is key.
- African countries will need to anticipate and build a flexible and productive workforce to meet future challenges through a national strategy for education and skills development.
- As one of the most accessible healthcare providers, pharmacists have an integral role to play in meeting the health needs of the African region.
- The future of the African region is reliant on the integrity of the existing health systems intertwined with the competencies and capabilities of the pharmaceutical workforce for meeting complex population, societal and health needs. Investing in the education, training and development of the pharmaceutical workforce is therefore a necessity.
- Health care education and training devoid of quality assurance is a major risk to public health as this will result in the proliferation of an inadequate and insufficient pharmaceutical workforce. Therefore, it is essential that all educational initiatives and systems are quality-assured and outcomes-focused.

African pharmacy schools, associations, and country and regional stakeholders can benefit from FIP Education resources, as the FIP-UNESCO UNITWIN CfEA member schools have, to identify the pharmaceutical needs of their country and develop a national or regional strategy for pharmacy and pharmaceutical education, thereby ensuring that a competent, flexible and adaptable African pharmaceutical workforce will meet their societal, health care and pharmaceutical needs.

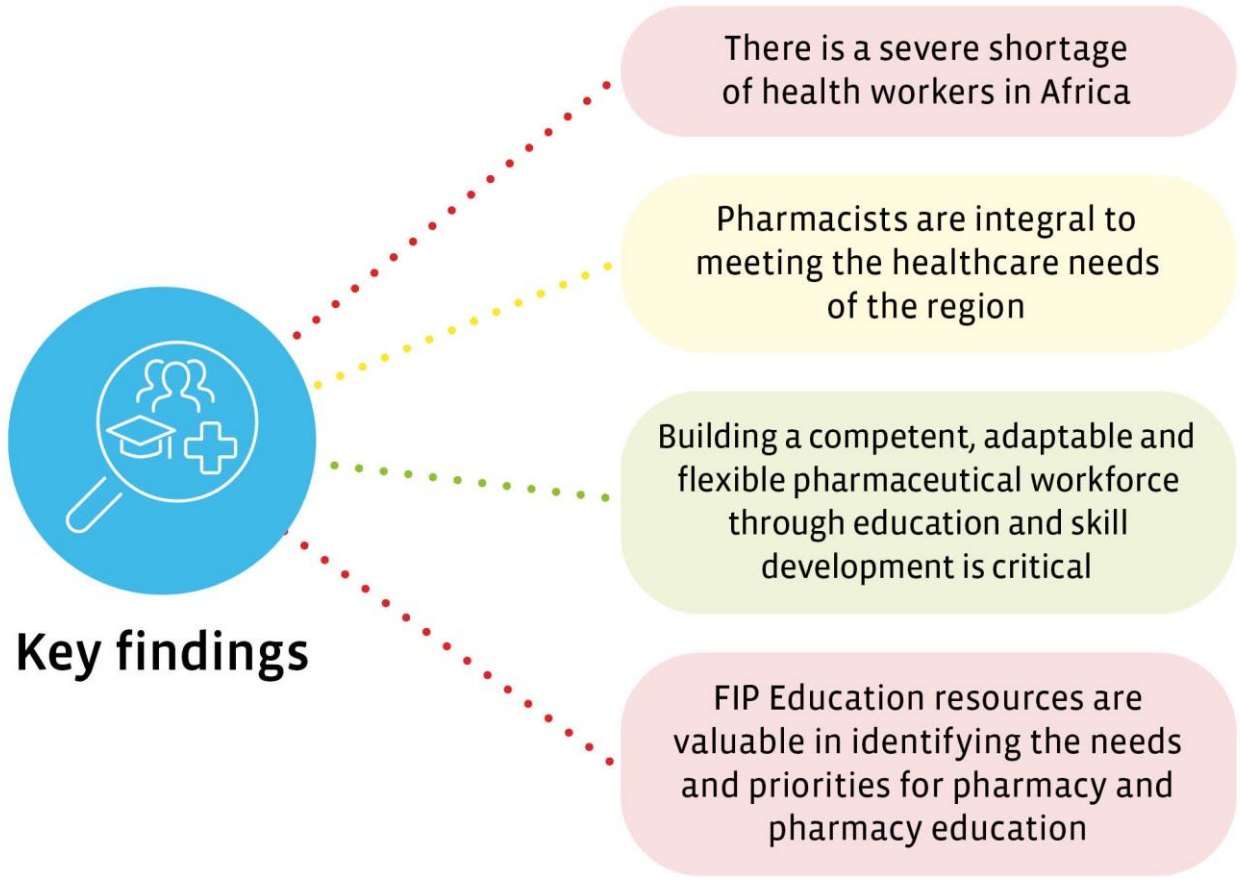

Figure 2: Key findings from the "Introduction and background" chapter

1.1 Building the pharmaceutical workforce for a stronger health system

The African region, despite being endowed with natural and human resources, has been facing economic, demographic, socio-cultural and epidemiological threats[1] which have contributed exponentially to the burden placed on the already fragile health systems. This burden exerts pressure on the quality of education, economic growth and infrastructures, and has a pronounced impact on the healthcare needs of the African population. This has invariably posed a barrier towards achieving the United Nations Sustainable Development Goals (SDGs). To minimise this impact on health outcomes, the development of a robust health workforce is key[2] through needs-based and quality education.

In order to enhance the production, performance and retention of health workers and resources in Africa, WHO member states in Africa have adopted the Regional Roadmap on Human Resources for Health in 2012[3] but limited progress has been observed ever since.[2] Although these efforts and proactive measures have been put in place to reduce the human resources for health crisis in Africa, a severe shortage of health workforce still remains a

challenge due to factors tied to continued poor health coverage and inequity in access to health workers.[2] This is in accordance with the reports released in 2006[2] and 2009[4] by the WHO that the African region has the most severe shortage of health workers and that there will be a global shortfall of 18 million health workers by 2030.

To further tackle health worker shortages, the WHO's "Global strategy on human resources for health: Workforce 2030"was developed to ensure universal health coverage and health for all.[2] This initiative urged African countries to make efforts to improve the capacity of the African health workforce. This, however, requires a multisectoral response and increased investment in education, recruitment and retention in the health workforce, including the pharmaceutical workforce.

Approximately 15 to 20 million well-educated young people are projected to join the African workforce yearly over the next three decades.[5] Ensuring equitable distribution of jobs in order to meet the increasing demands of the region is still a major challenge resulting in disruptions in the different markets, including health systems. The present expansion of education and skills across generations and the expected possible trend of jobs in the African region have invariably resulted in the growing demand for readily accessible experts that can meet the social and health needs of the increasing African population effectively.

As one of the most accessible healthcare providers, pharmacists have an integral role in meeting the societal and health needs of the African region. This emphasises a need for the training of an adequately prepared pharmaceutical workforce with a focus on pharmacy and pharmaceutical sciences education. Education and skill levels of a country's working population are indicative of the country's available human capital and have a direct impact on labour market outcomes.[6] A skilled workforce is vital for achieving structural transformation, by spurring technological progress and innovation, which are important determinants of economic growth. A health system can only thrive when the health workforce is adequately prepared through proper education and training.[7] Developing a strong pharmaceutical workforce in the African region by scaling up education and training is a key determinant of better health outcomes results and delivery of pharmaceutical care and services.

The future of the African region is reliant on the integrity of the existing health systems intertwined with the competencies and capabilities of the pharmaceutical workforce for meeting complex population, societal and health needs. Investing in the education, training and development of the pharmaceutical workforce is therefore a necessity.

1.2 Understanding higher education in Africa

Despite progress in recent decades, Africa still lags behind other developing regions in education and skills development. There is significant room for many African countries to achieve higher education outcomes for their level of development. African countries will need to anticipate and build a flexible and productive workforce to meet future challenges through a national strategy for education and skills development. Governments need to develop a needs-based education system in sync with employers' needs.[6]

The African Union, the continental union consisting of 55 member states located in Africa, seeks to work with relevant international partners in the eradication of preventable diseases and the promotion of good health across the continent.[8] This cannot be achieved without the existence of a robust, competent and sufficient health workforce in which the pharmaceutical workforce plays a vital role through ensuring availability and accessibility to medicines, medicines information and pharmaceutical services. The education of health workers is an important determinant of health outcomes and healthcare delivery. The framework of this chapter is developed around the higher education clusters drawn from the African Union's Continental Education Strategy for Africa (CESA).[9] This includes:

- Harmonised education and training systems — essential for the realisation of intra-Africa mobility and academic integration through regional cooperation;
- Quality and relevant education, training and research — core for scientific and technological innovation, creativity and entrepreneurship;

- Equality and equity throughout the education system;
- Strengthened institutional capacity; and
- Bringing together actors for credible partnership between government, civil society and the private sector.

The CESA seeks to provide each education stakeholder with the opportunity to make its best contribution to education and training through these higher education clusters, and this forms the basis of quality education and educational systems in the African region.[10] This aligns with the International Pharmaceutical Federation (FIP) global strategy to advance pharmacy education. FIP is a non-governmental organisation and the global leader in pharmacy representing four million pharmacists, pharmaceutical scientists and educators around the world. Through its partnerships and extensive pharmacy and pharmaceutical sciences network, FIP works to support the development of the pharmacy profession and pharmaceutical scientists, through practice and emerging scientific innovations, and through advancing pharmacy education and the pharmaceutical workforce in order to meet the world's healthcare needs and expectations. Quality education and training are key elements for the development of a sustainable pharmaceutical workforce and there is currently a shortfall of sufficient, competent and highly qualified health workers to meet the public health and healthcare needs of the African region, including access to medicines and pharmaceutical services.[11]

1.2.1 Harmonisation of pharmacy and pharmaceutical sciences education

Education in pharmacy and pharmaceutical sciences varies across the globe dependent on needs and priorities. Harmonisation of pharmacy and pharmaceutical sciences education in the African region can benefit public health and health outcomes through development of a competent, adaptable and flexible African pharmaceutical workforce that will meet pharmaceutical needs of the region such as availability and accessibility of quality medicines, vaccines, medical devices and pharmaceutical services. According to the WHO, the harmonisation of education has been shown to improve people's health by assuring a minimum range of competencies for pharmacists in the Southern Africa region.[12] A region-wide harmonisation of curricula may be valuable as this will enable sharing human, physical and financial resources which are scarce in these resource-limited settings while also ensuring uniform evaluation of quality and interventions. This also will ensure the realisation of intra-African mobility and academic integration through regional cooperation, a major goal of the African Union.[9]

1.2.2 Quality pharmacy and pharmaceutical sciences education and training

Pharmacy education and training devoid of quality assurance is a major risk to public health as this will result in the proliferation of an inadequate pharmaceutical workforce. Therefore, it is essential that all educational initiatives and systems are quality-assured and outcomes-focused and are set to meet the health needs of society. The existence of an established quality assurance system is a necessity in pharmacy education.

1.2.3 Needs-based pharmaceutical education and the FIP Nanjing Conference outcomes

Education and training components are core to the development and implementation of educational curricula. The FIP needs-based education model suggests that pharmaceutical education should be locally determined, socially accountable, globally connected and quality assured to meet the given health needs of communities. FIP advocates for a needs-based education approach as the training and education of the pharmacy workforce should ensure that health needs, especially the pharmaceutical needs, of society are met.[13]

There is a clear need for outcomes of pharmaceutical education to strongly align with the health needs of the population and the country's priorities.[13] Adopting the needs-based education approach will lead to a pharmaceutical workforce which will greatly add value to society.

Using a series of interventions in past years, FIP has created a pathway for ensuring the quality education and training of the pharmaceutical workforce. Its "Global vision of pharmacy education and workforce'' was developed

in 2016 at the Global Conference on Pharmacy and Pharmaceutical Sciences Education at Nanjing, China[7] (Figure 3 through a consensus of the participants which aims to advance pharmaceutical practice and science through transformative education for better healthcare. The FIP Pharmaceutical Workforce Development Goals[7] were designed to facilitate implementation of the "Global vision of pharmacy education and workforce" through measurable, feasible and tangible goals while the FIP Nanjing Statements[7] describe the envisioned future for education to enhance and ensure professional pharmaceutical educational standards across the globe.

It is expedient that African pharmacy schools, associations, and country and regional stakeholders can benefit from the FIP Nanjing Conference outcomes, as well as the FIP Global Competency Framework, the FIP Quality Assurance Framework and other FIP Education tools[7] to identify the pharmaceutical needs of their country and develop a regional or national strategy for pharmacy and pharmaceutical education to ensure a competent, flexible and adaptable African pharmaceutical workforce that will meet their countries' societal, health care and pharmaceutical needs.

1.2.4 Strengthened institutional capacity

The existence of a robust institutional capacity is a necessity in pharmaceutical education. Pharmacy, like medicine, is a dual role profession, i.e., it is a science-based profession and a patient-facing profession. To support and inform patients, pharmacists need to be adequately grounded in the applicable knowledge of science and practice. The availability of sufficient and quality academic capacity, resources including technological and laboratory infrastructure, and appropriate practice sites are important for the delivery of quality education and training. All these and more are important building blocks in the realisation of a strong and competent pharmaceutical workforce.

1.2.5 Equity through the education system

In all domains of the education sector, all human resources must achieve equity and equality. All students, academic staff and stakeholders in the pharmaceutical education system must have equal access to learning and resources, including opportunities, irrespective of their race, ethnicity, nationality, religion, belief, sex, gender, language, sexual orientation, age, health or other status. Existence of transformative policies and implementation of such policies that ensure fairness and equal treatment for women and men according to their respective needs should be core components of educational systems.

1.2.6 Bringing together actors for partnerships between government, civil society and the private sector

Through educational collaborations and partnerships, higher education outcomes can be achieved for the aspired level of development in the African region. Mutually beneficial pharmacy education partnerships between schools of pharmacy and other organisations such as governments, civil society and private sector establishments may provide a wide range of opportunities to achieve improved learning and development for the pharmaceutical workforce. The FIP-UNESCO UNITWIN Programme, which brought together pharmacy schools and organisations from sub-Saharan Africa, has greatly benefited its members by providing access to regional resources, experience and expertise. Expansion of partnerships across the whole African region is strongly required to advance pharmaceutical education.

Figure 3: FIP Global Conference on Pharmacy and Pharmaceutical Sciences Education at Nanjing, China, 2016

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2. Pharmacy education in sub-Saharan Africa

2.1 Pharmacy education in sub-Saharan Africa: A continental tour

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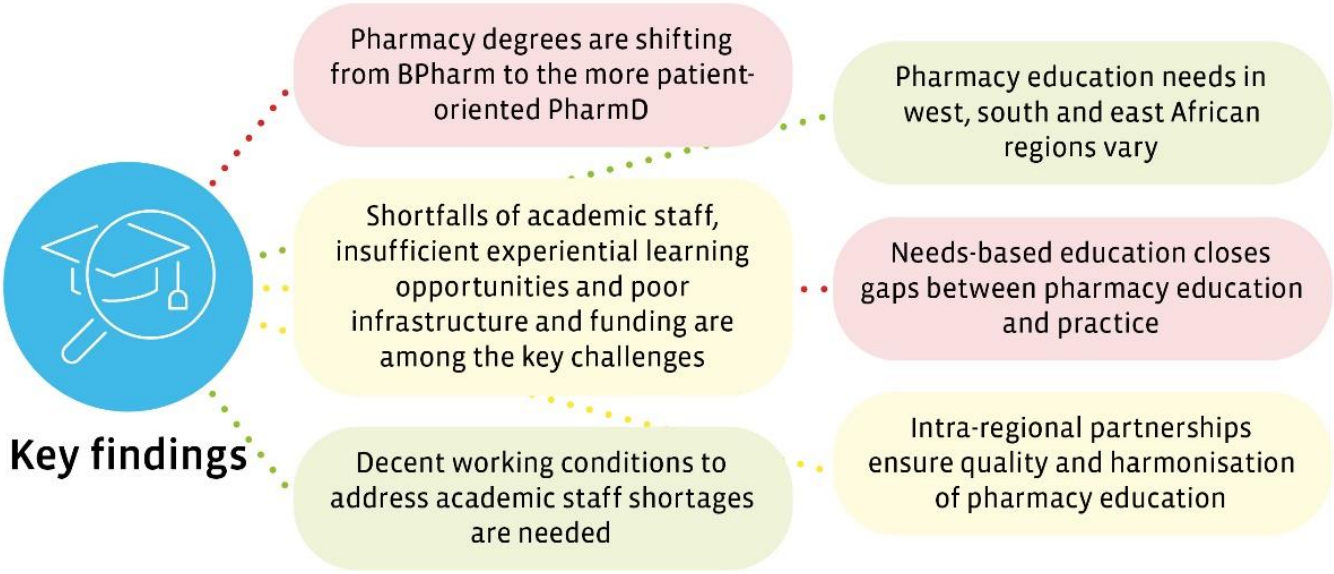

Figure 4. Key findings from the ''Pharmacy education in sub-Saharan Africa: A continental tour'' chapter

Summary

- The initial pharmacy professional degree offered in the sub-Saharan African (SSA) region is the BPharm degree in most of the Anglophone SSA countries. The PharmD degree is offered mostly in Francophone SSA countries. Different degrees imply a potential variance between the skills set and competencies of the pharmaceutical workforce across the region.

- Currently, in some countries, pharmacy degrees are shifting from the BPharm to the PharmD, which is more patient-oriented in terms of pharmaceutical care. Overall, many pharmacy schools in the SSA region are making efforts to align with the international best practices on innovations in teaching and research.

- Major challenges for pharmacy education in the SSA region are related to the shortfall of academic capacity with highly qualified faculty members for effective teaching, poor infrastructures, and insufficient experiential learning opportunities and poor research funding.

- The pharmaceutical workforce in all areas of practice, including academia, is dramatically affected by the migration of pharmacists to other countries in search of better practice conditions, partly because of poor remuneration, non-supportive workplace environments, and high workloads due to insufficient academic capacity in numbers. Therefore, pharmacy regulators and professional pharmacy associations need to step up measures in countries and advise governments to address workforce migration and shortfall in order to advance pharmacy.

- There is a gap between pharmacy education and practice because graduates practise only a fraction of the knowledge and skills they learn at pharmacy school. Needs-based education strategies need to be implemented through advocacy support in order to expand the scope of pharmacy practice in the SSA region.

2.1.1 Introduction

Pharmacists in sub-Saharan Africa play a pivotal role in the healthcare system of the region and, to ensure a steady and efficient flow of pharmaceutical workforce in the region, pharmacy education must be given the attention it requires. Pharmacy education is a priority area for the International Pharmaceutical Federation (FIP) and this goes along with achieving the universal health coverage priority of the World Health Organization (WHO). Considering the diverse importance of pharmacy education to the different practice aspects of pharmacists, there is a need for pharmacy education to attain greater visibility on the global human resources for health agenda.[1,2]

Pharmacy training in developed countries focuses majorly on clinical practice where pharmacists have been empowered to close the gaps between their practice and required skills. These pharmacists have been improving, standardising and optimising the role of pharmacists in healthcare settings. However, in most African countries, there is still less emphasis on the aspects of pharmaceutical care and patient management, and, most importantly, there is a lack of effective collaboration with other healthcare professionals. Therefore, the curriculum for the training of pharmacy students in many pharmacy schools in sub-Saharan African countries has yet to align with global best practices, as it focuses mainly on the knowledge and science of medicines, with less emphasis on clinical skills.[3,4] Inasmuch as some pharmacy schools across the region are trying to embrace the global trends in how pharmacy students are trained, a lot needs to be done to attain the maximal potential of trained pharmacists in the region considering the rising burden of diseases in the region, where communicable, maternal, nutritional and new-born diseases continue to dominate.[5]

Acknowledging the worldwide variability that exists in how pharmacists and pharmaceutical scientists are educated, trained and utilised, FIP underscored the importance of collaboration, supporting and developing high standards of education and training, producing high quality professionals for high quality patient care, public health and scientific advancement.[6] Even though there has been a remarkable increase in the density of pharmacists across all WHO regions, African countries are still lagging behind in terms of pharmacy workforce with very low and inadequate pharmaceutical services to deliver the pharmaceutical needs of the region.[2] Therefore, improving quality pharmaceutical education and training has been identified as one of the key elements for the sustainable development of a pharmaceutical workforce with improved expertise to guide on access to essential medicines, appropriate use of medicines, health promotion and general well-being.[4]

This section of the report provides a critical appraisal of the current status and paradigms in pharmacy education and pharmaceutical workforce in the sub-Saharan African region with a focus on the key challenges affecting pharmacy education in the region and a potential way forward.

2.1.2 Pharmacy graduate and postgraduate programmes in sub-Saharan African countries

The basic qualification to practise as a pharmacist in most Anglophone sub-Saharan countries (Botswana, Gambia, Ghana, Kenya, Liberia, Malawi, Namibia, Nigeria, Rwanda, Sierra Leone, South Africa, Sudan, Swaziland, Uganda, Tanzania, Zambia and Zimbabwe) is the Bachelor of Pharmacy (BPharm) degree. The practice-based model Doctor of Pharmacy (PharmD) degree, which evolved from industrial and compounding pharmacy to a more patient-focused programme, is gradually being integrated in the region in countries like Ghana, Nigeria and South Africa.[3,7,8]

The BPharm curriculum is usually a five to six-year programme tuned to combine research, experiential and more clinical practical experience. Students study pharmacognosy, analytical and organic chemistry, pharmacology, pharmaceutical microbiology, pharmaceutics and pharmaceutical technology, pathology, human anatomy and physiology, and biochemistry, in addition to having other didactic practical and elective courses. This is followed by a post-graduation one-year period of mandatory internship under close supervision in sectors such as community, hospital, industry, administration or research-based institutions.[9] To further ascertain that those who have undertaken the internship training programme have acquired the requisite knowledge, attitudes and skills to practise pharmacy without endangering public health, the pre-registration examination for pharmacists has been recently introduced by some countries like Nigeria and South Africa, taken immediately after internship.[2,10]

In most Francophone African countries (Algeria, Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Guinea, Mali, Mauritania, Morocco, Niger, Senegal and Tunisia), the degree obtained after two cycles of didactic and experiential training is the PharmD. There is an optional additional four-year period of residency, which gives room for specialisation.[7]

Nigeria began a special PharmD conversion programme in 2018 tailored to university lecturers and hospital pharmacists with a BPharm qualification to support alignment with the PharmD programme that is evolving in the country. It is a one-year programme with three modules. Modules 1 and 2 are intensive online courses related to clinical pharmacy and pharmaceutical care with an examination on campus, while module 3 is a clerkship in different practice areas ranging from community outreach, community pharmacy posting and hospital pharmacy posting, with a final examination. The programme is a collaborative initiative between the Pharmacists Council of Nigeria, the University of Benin and facilitators from the Nigerian Association of Pharmacists and Pharmaceutical Scientists in the Americas.[11]

Most sub-Saharan African pharmacy schools continue to carry out postgraduate academic training for pharmacists and pharmaceutical scientists wishing to advance their knowledge in the various core areas of pharmacy education to the level of Master or Doctor of Philosophy (PhD) in the fields of pharmaceutics, pharmaceutical and medicinal chemistry, pharmacognosy, toxicology, pharmacology, therapeutics, pharmaceutical microbiology, pharmaceutical technology and clinical pharmacy.[7,9]

2.1.3 Challenges in pharmacy education in sub-Saharan African countries

Communication skills is one of the essential foundations for undergraduate university training, especially for training healthcare professionals such as pharmacists, who require to have effective competencies for successful verbal communication with patients and patients' relatives.[12] In particular, for pharmacy programmes in sub-Saharan African countries, there is limited access to patient interaction for students during training, which in other countries serves as the means by which communication skills in pharmaceutical care are developed. In addition, teaching and research tools are mostly obsolete in many educational institutions. These and more are related to poor infrastructures,[12] lack of a conducive environment for teaching and research (e.g., insufficient electricity supplies), and lack of an integrated system of research and training. Poor funding also results in poor meaningful research outputs, poor implementation of need-based strategic plans in pharmacy education and an inadequate academic capacity.[7,9]

For instance, inadequate academic capacity can be largely attributed to problems of postgraduate education in the region, including an inability of students in these programmes to graduate at stipulated times due to a lack of research funding, poor status of functional equipment, and a lack of quality supervision.[9] Other problems are related to university administration and external examiners. Overall, these challenges stagnate the progress of many of the postgraduate students needed to boost academic capacity, leaving the system with fewer qualified teaching staff (professors, associate professors and senior academics) with higher working demands.[13,14]

The lack of a competent pharmaceutical workforce hinders achieving the concept of pharmaceutical care in Africa.[9,15] A clinical knowledge gap due to non-clinical focused curricula and communication challenges with other health care challenges are among the competencies that are lacking. There is a lack of awareness and a poor attitude from other healthcare professionals towards clinical pharmacy services and reluctance to accept pharmacist preceptors in the healthcare team. At the same time, hospital management related factors include an absence of clear job descriptions/scope of practice for the clinical pharmacists involved in students' experiential training, a lack of additional benefits and incentives, a lack of proper monitoring and supervision, a lack of standard documentation formats, poor hospital management support, a lack of appropriate setup for the service, and an absence of pre-established systems in the hospital.[15]

2.1.4 Pharmaceutical workforce in sub-Saharan African countries

Pharmacists in sub-Saharan Africa practise in multidisciplinary sectors addressing the healthcare and pharmaceutical needs of the region. Most practise in hospital or community pharmacy settings,[8] where they provide services related to pharmacotherapy as well as non-drug related therapeutic interventions.[16] Other areas of practice include the pharmaceutical industry, regulatory and administrative pharmacy practice, and military and paramilitary pharmacy practice. Other emerging sectors in the region where the services of pharmacists are being explored are in the health-related non-governmental organisations (NGOs) such as the WHO and international NGOs dealing with the supply of medicines such as antiretroviral drugs and test kits and tuberculosis drugs, and other non-communicable diseases prevention and control.

The major challenges are related to there being an insufficient pharmaceutical workforce in the region which has left the healthcare system with a wider gap in terms of the pharmacist-to-patient ratio[8]. Some of these challenges are related to the migration of pharmacists to other regions of the world in search of better opportunities and higher renumeration.[17] Unfortunately, in some African countries, most of the young generation of pharmacists are denied job opportunities because of poor government policies with regard to healthcare systems. Many fresh pharmacist graduates are stranded and searching for jobs even though the healthcare systems in the region need their services.[18]

2.1.5 Disparity between pharmacy education and practice across sub-Saharan African countries

Pharmacy schools in the sub-Saharan African countries strive to produce qualified pharmacy graduates prepared to be acquainted with the essential skills and competencies required for good practice. However, pharmacy graduates in many developing countries are the only graduates among other healthcare professions who do not apply what they have been taught in school to its fullest.[19] FIP's policy document on Good Pharmacy Education Practice, recommended that "the basic (first degree) course of education is designed to ensure that the newly qualified pharmacist has the necessary knowledge and skills to commence practising competently in a variety of settings including community and hospital pharmacy and the pharmaceutical industry". It was emphasised that continuing professional development must then be a lifelong commitment for every practising pharmacist regardless of practice area.[20] It is therefore stressed that, schools of pharmacy need to have a comprehensive curriculum on pharmaceutical sciences and practice-related courses,[21] which most African pharmacy schools are lacking.

In contrast, pharmacy graduates from many sub-Saharan African countries utilise a fraction of the knowledge and skills that they have been given as pharmacists. In most cases, pharmacists' jobs are occupied by non-pharmacists,

such as patent medicine vendors, pharmacy technicians, traditional drug sellers and veterinary doctors. Even non-health-related individuals are often employed to replace pharmacists in the field of marketing and promotion of pharmaceutical products, and chemists and chemical engineers in the pharmaceutical industry. Therefore, there is a substantial discrepancy between pharmacy education and the practice of pharmacists in the region. These disparities persisted for decades in the region and, in most cases, the pharmacy curriculum is not up to date to address the ever-evolving practice needs in and consumer demands of the profession.[19]

Pharmacy education in sub-Saharan Africa is undergoing a transformation, thanks to the efforts of FIP in providing guidance through the FIP Nanjing Statements, which is a powerful document to help countries increase educational standards in pharmacy education. However, in order to achieve the full potential of this transformation, pharmacy schools in sub-Saharan Africa must be ready to cooperate and collaborate regionally. Opportunities offered by FIP such as FIP Pharmabridge initiative and the FIP-UNESCO UNITWIN programme will provide venues for regional collaboration.

2.2 Pharmacy education in sub-Saharan Africa: Focus on the sub-regions

2.2.1 Pharmacy education in East Africa

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Summary

- The training of pharmacists has evolved from a science perspective to a clinical perspective in the East African Community (EAC).
- For the purpose of ensuring the free movement of labour, the EAC partner states initiated a protocol for mutual recognition of academic and professional qualifications and harmonisation of training curricula, examinations, standards, certification and accreditation of educational and training institutions.
- At the beginning of the 21st century, there has been a tremendous increase in schools training pharmacists in East Africa and this calls for regulators to increase their responsibility to ensure the quality of education meets societal needs.
- In order to meet the requirements of the growing scope of pharmacy practice and the complexity of the medicines managed in practice, there is a need to introduce the PharmD degree as a minimum licensure qualification.

As part of the global sustainable growth and development agenda, the United Nations member countries, East Africa member states included, adopted the Sustainable Development Goals (SDGs) of which Goal 3 with its eight targets aims at achieving universal health coverage, including financial risk protection, access to quality essential healthcare services and access to safe, effective, quality and affordable essential medicines and vaccines for all.[22,]

[23] Achieving Target 8 of Goal 3 of the SDGs requires a competent pharmacy workforce. Producing a competent pharmacy workforce demands universities and other training institutions initiate contemporary training programmes that address continually evolving practice aspects.

This section of the report provides an overview of pharmacy education in the East Africa sub-region, particularly in the EAC, which is a regional intergovernmental organisation of six partner states: Burundi, Kenya, Rwanda, South Sudan, Tanzania and Uganda.[24] The report excludes Burundi and South Sudan because few or no data were available on pharmacy education.

2.2.1.1 Pharmacy schools in East Africa

East African pharmacy education began at the University of Nairobi, Kenya, in 1974, with a Bachelor of Pharmacy degree. This was followed by the University of Rwanda in 1981 and Makerere University, Uganda, in 1988.

In addition, the training of pharmacists has been initiated in different universities across East Africa in the early 21st century:

- In Kenya: Kenyatta University in 2004, Mount Kenya University in 2006, Methodist University in 2008, Jomo Kenyatta University of Agriculture and Technology in 2010 and United States International University in 2014[25]
- In Uganda: Mbarara University of Science and Technology in 2003, Kampala International University in 2004[26]
- In Tanzania: Catholic University of Health and Allied Sciences, Muhimbili University of Health and Allied Sciences, St. John's University of Tanzania[27]
- In Rwanda: The Mount Kenya University, Kigali campus, used to train pharmacists in Rwanda, however it closed the department in 2017.[28]

Admission into pharmacy programmes in the EAC is coordinated by different established national regulators of higher education. The minimum entry requirements are commonly principal passes in physics-chemistry-biology, or mathematics-chemistry-biology, or biology-chemistry-geography.[29,30]

2.2.1.2 Regulation of pharmacy education in East Africa

In EAC countries, the regulation of pharmacy education is a shared responsibility between higher education councils (HECs) and professional bodies. The HECs (the Commission for University Education in Kenya, the National Council for Higher Education in Uganda, the Higher Education Council in Rwanda, and the Tanzania Commission for Universities) are mandated to enhance the quality of education and make sure that those graduating are knowledgeable.[31–33] The professional regulatory bodies (the Pharmacy and Poisons Board in Kenya, the Council of the Pharmaceutical Society of Uganda, the National Pharmacy Council in Rwanda, and the Pharmacy Council of Tanzania) ensure that universities and other training institutions conduct teaching and learning activities in such a manner that their graduate pharmacists are able to provide appropriate and satisfactory professional services.[26,34,35]

2.2.1.3 Education and curriculum

In EAC countries, HECs have established general guidelines for development of curricula. Universities are responsible for establishing curricula based on HEC guidelines. The training of pharmacists has evolved from a science perspective to a clinical perspective. At the University of Rwanda, the department of pharmacy moved from the college of science and technology to the college of medicine and health science in 2008 and such moves are common in EAC countries.[36]

The duration of the training programme is four years in Uganda and Tanzania and five years in Rwanda and Kenya, consisting of pre-clinical training followed by clinical training.[29,35]

The main teaching method in universities offering pharmacy education remains the lecturing method with or without the use of information and communications technology. The training programme aims to take students through a process of development to a point where they will be able to function as independent practitioners. It develops the skills required and their applications in professional practice.[37] Pharmacy education in EAC countries focuses on training pharmacists to fit into the various areas of specialisation of pharmaceutical services, but each university has its own specific mission, vision and philosophy.

For the purpose of ensuring the free movement of labour, the EAC partner states initiated a protocol for mutual recognition of the academic and professional qualifications and harmonisation of training curricula, examinations, standards, certification and accreditation of educational and training institutions.[38] Implementation is being initiated through mutual recognition agreements.

2.2.1.4 Postgraduate pharmacy education in East Africa

The training programmes approved by HECs in EAC countries are:

- University of Nairobi: MPharm, MPharm (Pharmaceutical Analysis), MPharm (Industrial Pharmacy), PhD in Clinical Pharmacy, PhD in Industrial Pharmacy; PhD in Pharmaceutical Chemistry, PhD in Pharmacognosy and Complementary Medicine, MPharm (Pharmacovigilance and Pharmacoepidemiology), MSc in Pharmacognosy and Complementary Medicine, MSc in Molecular Pharmacology, MSc in Pharmacology and Toxicology
- Kampala International University (KIU): Master of Pharmacology
- Mbarara University of Science and Technology: MPharm in Clinical Pharmacy, MSc in Pharmacognosy and Natural Medicine Sciences, PhD in Pharmacy
- University of Rwanda: MPharm in Quality Control and Quality Assurance, Master of Health in Supply Chain Management

At the beginning of the 21st century, there has been a tremendous increase in schools training pharmacists in East Africa and this calls for regulators to increase their responsibility to ensure the quality of education meets societal needs. Training competent and qualified pharmacists will expand the availability and quality of care provided to the population.

A look at available training programmes shows a need to expand training programmes to train lower level pharmacy cadres such as pharmacy technicians and assistants and high-level specialised pharmacists with Masters and PhD degrees.

Pharmacy education in EAC countries needs continuous improvement to bring it up to international levels. Curricula need to be upgraded continuously to meet the requirements of the growing scope of pharmacy practice and the complexity of the medicines managed in practice. This calls for the introduction of a PharmD degree as a minimum licensure qualification.

2.2.2 Pharmacy education in Southern Africa

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Summary

- Many pharmacy schools in Southern Africa currently offer a four-year undergraduate Bachelor of Pharmacy (BPharm) degree programme and some of the pharmacy schools are in the process of redesigning their undergraduate degrees to programmes such as the Doctor of Pharmacy (PharmD) degree.

- It is of paramount importance, however, that as countries remodel pharmacy training, particular attention is paid to their societal needs and the competencies required to produce the desired pharmaceutical workforce.

- Like other regions in Africa, Southern African countries continue to face pharmacy education challenges which include inadequate academic capacity, limited infrastructure, reduced access to teaching resources and reduced research capacity.

- Given the current pharmacy education system in Southern African countries, there is an urgent need for continuous curricula upgrades to harmonise pharmacy competencies to have a minimum standard degree requirement.

2.2.2.1 Introduction

The Southern African Development Community (SADC) has 15 member states, namely, Angola, Botswana, Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. The populations in SADC member countries range from under 100,000 to over 60 million.[36] The national annual per capita expenditure on health, in general, varies from USD 10 to USD 400. On average, public sector expenditure on health accounts for 60% of the total national expenditure on health. Only a few countries devote 15% or more of their national budget to health as pledged by the Abuja Declaration of 2001. Among other healthcare needs, human health resource, particularly pharmaceutical personnel, is still scarce in most countries in this region.[39]

2.2.2.2 Pharmacy education and curricula in Southern Africa

Currently 13 out of 15 pharmacy schools in Southern African institutions of higher learning offer a four-year undergraduate BPharm degree programme.[40] Selection and admission of students is largely based on pass marks in A-level subjects such as mathematics, chemistry, biology and physics/geography or an approved equivalent; no special consideration is given to a student's commitment and passion. In the Southern African universities, pharmacy education has widely been diverse in its scope and emphasis due to differences in curricula.[13] Pharmacy education in this region varies depending on whether the country was in the past an Anglophone or a Francophone colony.[7] By 1997, attempts were made to harmonise pharmacy training through revision and upgrading of the undergraduate pharmacy curricula in the region. The recommendations then included: (i) adoption of a four-year pharmacy degree programme; (ii) special attention to be given to skills, competency, problem-based learning and assessment methods; (iii) inclusion of practice-based learning, e.g., industrial pharmacy, retail pharmacy, hospital pharmacy and rural attachments; (iv) development of patient-oriented curricula which cover the ethical responsibilities of professional pharmacists; and (v) a review of curricula every five years.[41] Currently, some of the pharmacy schools are in the process of remodelling their undergraduate pharmacy curricula to ensure compliance with the FIP Nanjing Statements[42] on contemporary pharmacy training.[43] In any case, it is advisable that when considering a suitable model of pharmacy education, it is of paramount importance that countries pay particular attention to their societal needs and the competencies required to produce the desired pharmaceutical workforce.[44]

2.2.2.3 Regulation of pharmacy education in Southern Africa

Individual SADC countries have health professions councils and pharmaceutical associations which regulate pharmacy education and licensure of pharmacy professionals although some are currently undergoing restructuring. For instance, in Zambia, the pharmacy profession is in the process of forming a council independent from the Health Professions Council of Zambia. In addition, most of the countries have a national medicines policy and a drug regulatory authority responsible for marketing authorisations of pharmaceuticals.[41] These professional bodies and authorities, including international cooperating partners, influenced the initiation of pharmacy training in the region. For example, in South Africa, policies and legislation including the National Drug Policy of 1996, the 1997 Pharmacy Amendment Act, and the Medicines and Related Substances Control Act of 1965, have influenced the development of the undergraduate pharmacy degree curriculum. Training of pharmacists started at MEDUNSA/Technikon, Pretoria, in 1999, which became the Sefako Makgatho Health Sciences University in 2015. In Tanzania, the training of pharmacists started in 1974 with support from British Council and Aston University, Birmingham, United Kingdom, as a three-year pharmacy training programme. The curriculum was later revised into a four-year programme in 1986, with financial assistance from the WHO and DANIDA (Danish International Development Agency). In Zambia, the undergraduate pharmacy training programme started in 2001 at the University of Zambia. The development of the undergraduate pharmacy curriculum was supported by Zambia's National Drug Policy, the American Association of Colleges of Pharmacy, the Unit Standards of South Africa's Pharmacy Council, and undergraduate pharmacy curricula from the United Kingdom and Zimbabwe.[41]

2.2.2.4 Challenges in education in Southern Africa

Like other regions in Africa, Southern African countries continue to face pharmacy education challenges which include inadequate academic capacity, limited infrastructure, reduced access to teaching resources and reduced research capacity.[45] In order to address the many challenges that confront pharmacy education in this region, there is a need for continued engagement with all stakeholders, including national governments and international cooperating partners such FIP.[46] A lot of efforts have been made thus far to address these challenges such as bringing African universities to work together by FIP-UNESCO UNITWIN Centre for Excellence in Africa (CfEA) but there remain unresolved, long-standing barriers to delivery of quality pharmacy education in Southern African countries, namely, inadequate teaching and learning space, too few specialised lecturers and limited quality time for research activities.[47]

2.2.2.5 Key focus for pharmacy education improvement in Southern Africa

Given the current pharmacy education system in Southern African countries, there is an underscored need for continuous curricula upgrades to harmonise training so as to have a minimum standard degree requirement as suggested by FIP.[45] Many agree that the PharmD degree uniquely appears to offer an opportunity for improved pharmaceutical care in the region and beyond.[47] South Africa has undergone seismic transformations in the profession and seems to be leading the way in the region.[47,48] Since the BPharm degree still predominates in most Southern African universities, transitioning to the PharmD degree should be encouraged with the aim of creating and applying new knowledge based on integrated research in pharmaceutical, clinical and social sciences. However, the number of members of the pharmaceutical workforce competent enough to mentor upcoming pharmacy professionals in both academic and clinical settings is not yet adequate and should be addressed if sufficient pharmaceutical workforce is to be realised in the region.[49]

Another aspect to pharmacy education in Southern Africa entails growing a robust pharmaceutical manufacturing industry sector to provide local medicines for the population rather than having to depend on imported medicines. That, in turn, provides economic growth and improvements in health care. The WHO attests that “the needs of the health system should shape the way in which the workforce is educated —not the other way around”.[50–52]

Pharmaceutical manufacturing still presents an untapped potential in the Southern African region and a needs-based pharmacy education is at the centre of developing this sector for many of its countries. Institutions of pharmacy education in the region should provide education, research and training that is attuned to pool the limited resources of the health system to ensure the most effective return on investment for the health system and society at large. The design of an industry-oriented pharmacy education framework directed at creating and sustaining a resourceful local pharmaceutical manufacturing sector is needed.

Deliberate and collaborative leadership is required between academia and industry to pioneer local and cross-border programmes within the region to facilitate development of the critical skills needed for a more industrialised pharmaceutical sector. Countries that are going through health care transformations within the region, such as South Africa, are focused on enhancing access to medicines by implementing universal health coverage (UHC). A critical component to UHC (in particular, medicines access) is for countries to be capable of producing medicines locally with less reliance on product imports to meet patient needs.

The Southern African region should focus on the following for improvement in pharmacy education, workforce, policies and regulation:

- Developing a regional strategy for the pharmacy education sector to contribute to the local pharmaceutical manufacturing imperative and reverse brain drain; and
- Reviewing and revising pharmacy education curricula to address the needs of developing a more innovative pharmaceutical manufacturing sector by incentivising academia-industry partnerships.

2.2.2.6 Pharmacy workforce in Southern Africa

There are several factors that contribute to limited access to pharmacy human resource, medicines and related pharmaceutical services in Southern African countries. One of them is an insufficient number of qualified pharmaceutical personnel.[53] The importance of the pharmaceutical workforce for the efficient functioning of a healthcare system was stressed in the 2006 World Health Report.[36] However, the pharmaceutical workforce in Southern African countries is not likely to increase any time soon due to the coronavirus pandemic that has continued to adversely affect academic delivery and outputs in most universities.[54] Moreover, pharmacists continue to be a reliable front-line health workforce serving communities and maintaining the pharmaceutical supply chain of essential commodities functioning during the COVID-19 pandemic in Africa. If left unchecked, health human resource will remain a formidable challenge in this part of the continent. What is encouraging is that there is evidence of various organisations currently attempting to come up with lasting solutions to the challenges brought about by the COVID-19 pandemic in this region and elsewhere. For example, the FIP-UNESCO UNITWIN CfEA held a webinar on 5 August 2020 on "Addressing inequities in pharmacy education due to COVID-19 — Learnings from Africa, Asia and Latin America", for which the recording can be accessed through FIP's website www.fip.org. Through such activities, there is hope for improvement in pharmaceutical workforce in terms of numbers and competency.

2.2.2.7 Conclusion

As Southern African countries design pharmacy education systems and curricula, the models to be used should focus on societal needs and the competencies required to produce a pharmaceutical workforce that is relevant to the demands of the region. As pharmacy education evolves and develops further in this region, continued engagement with all stakeholders, including national governments and international cooperating partners, ought to be encouraged to mitigate the perceived challenges in the pharmacy education systems.

2.2.3 Pharmacy education in West Africa

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Summary

- ECOWAS (Economic Community of West African States) ministers of health have recognised the lack of skilled human resources for health, the disparity in training and regulation of health professionals and the lack of recognition of qualifications across borders as a hindrance to regional integration, and have tasked the West African Health Organisation (WAHO) to harmonise the training of health professionals within the region.

- The regional pharmacy curriculum has been developed by the deans of pharmacy schools and a six-year Doctor of Pharmacy (PharmD) degree programme is recommended. In order to inculcate competencies in

professional values, ethics and professionalism in students, the curriculum is currently under development, aligned with FIP Nanjing Statements.

- The key areas of development in pharmacy education in the sub-region are: strengthening continuous professional development; capacity building of trainers; and enhancing advanced practitioner and specialist training, underpinned by collaboration among schools of pharmacy and all pharmacy stakeholders within the region and beyond.

- A more vibrant regional and continental network of deans and regulators for education and workforce development should be established.

West Africa is a regional political and economic union of 15 countries comprising Benin**,** Burkina Faso, Cape Verde, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. The union, known as ECOWAS (Economic Community of West African States), has three distinct blocs according to whether they once were French, English or Portuguese speaking colonies. Consequently, pharmacy education in the region has been modelled according to the historical experiences of countries. The region has a total population of nearly 400 million.[55]

Pharmacy education in the region is provided by both public and private institutions. Countries with schools of pharmacy include The Gambia (2), Ghana (6), Sierra Leone (1), Liberia (1), Cape Verde (1), Nigeria (23) and Senegal (7). The Gambia has 24 pharmacists to a population of 2,416,668 (1:100,695); Senegal 850 to a population of 16,743,927 (1:19,699); Ghana 3,237 to 31,072,940 (1:9,599) and Nigeria 25,870 for a population of 206,139,589 (1:7,968).

The ECOWAS ministers of health, recognising the lack of skilled human resources for health, the disparity in training and regulation of health professionals and the lack of recognition of qualifications across borders as a hindrance to regional integration, tasked the West African Health Organisation (WAHO) to harmonise the training of health professionals within the region.[56]

2.2.3.1 Pharmacy curriculum in West Africa

A team comprising deans of pharmacy from the region developed the draft curriculum for pharmacy. The curriculum was subjected to further validation by other leaders and regulators of pharmacy in the region. The curriculum,[57] completed in 2015, recommends a six-year PharmD programme. Broadly, the curriculum content includes general education, basic and biomedical sciences, pharmaceutical sciences and professional studies. A revision of the curriculum to include the soft skills of critical thinking/problem-solving, communication, team work and collaboration was recently proposed[57] to inculcate competencies in professional values, ethics and professionalism in students, as recommended for foundation training under the FIP Nanjing Statements.[58]

We are developing a curriculum that responds to our needs and yet is consistent with the global vision of pharmacists to accept responsibility for the development and sustainability of an adaptable and capable global workforce working in partnership for better health care through transformative and continuous education. Our professional workforce will continuously strive to develop new medicines and to improve the use of existing medicines for better health care. Professional leadership organisations and government agencies can contribute to this vision by supporting progressive policies for professional development and practitioner recognition processes.[6]

With regard to developing new medicines, the region has made significant investments in infrastructure, creating regional centres of excellence and institutes in molecular biology techniques and tropical diseases. Expertise within pharmacy schools exists for research into secondary metabolites of interest from natural products. There is a need for effective collaboration among schools nationally, regionally and elsewhere for building staff capacity in more strategic research and better use of resources. Courtesy of COVID-19, the potential of technology in harnessing regional academic capacity has been amply demonstrated. Through investments in ICT infrastructure, the West

African Postgraduate College of Pharmacists now makes use of subject experts in different countries to deliver, at the same time, lectures to students of the college located in different countries. A challenge remains on how technology can be used to effectively demonstrate trainees' skills and attitudes.

COVID-19 and the consequent disruption of the global supply chain for pharmaceuticals have impressed on governments the need to support local pharmaceutical manufacturing. Academia is challenged to show its relevance in the response to the crisis through demonstrating competence and leadership in practitioner development. Nigeria and Ghana may provide leadership for the rest of the region building on their experiences.

2.2.3.2 Gaps in education and workforce in West Africa

The following gaps have been identified in education and workforce in West Africa:

- The coronavirus pandemic reveals gaps. In the crisis, society looks to pharmacy to lead in ensuring the continued availability of quality medicines. How prepared are our graduates for this responsibility? The public health content of the curriculum needs a review in line with Guideline 1.8 of the Nanjing Statements, which states: "Pharmacists should be champions for good health and wellness promotion, preventive medicine and holistic patient management. Pharmacists must undertake this through an economic, social, cultural and ethical perspective."[58] The reality appears different now. Pharmacy's role beyond medicines provision in health emergencies is not visible to society and policymakers. Research from the profession to inform policy has not been included in the public debate agendas.
- Quality assurance of continuous professional development (CPD) is lacking.
- Advanced-practitioner development and specialist training is still developing. Too many generalists not only deprives the system of advanced pharmaceutical care but also creates unemployment in the public sector and devalues the profession, especially in countries like Ghana and Nigeria with high numbers of pharmacists.
- The West African Postgraduate College of Pharmacists and the Ghana College of Pharmacists need to carry out tracer studies on their graduates to discover their impact on healthcare delivery.
- A regional quality assurance mechanism for international accreditation of country programmes is required.
- Experiential education programmes need to be strengthened. Thus, accreditation of practice sites and teacher-practitioner development is necessary in adequate skills-building laboratories. These prepare students for real-life settings. They can also be used for CPD.
- With regard to policies and regulation, in Ghana and the English-speaking countries, pharmacy is regulated by ministries of health through pharmacy councils. Food and drugs authorities regulate the quality of medicines. The pharmaceutical societies are voluntary organisations concerned with the welfare of their members but have powers to sanction errant members. These structures are missing in the French-speaking countries.

2.2.3.3 Key focus for improvement of pharmacy education in West Africa

The following points are recommended key focus areas for improvement of pharmacy education in West Africa:

- Capacity building of trainers (academics, practitioners and other stakeholders);
- Equipment for skills building in science and practice;
- Building leadership and advocacy skills in students and professional leaders;
- Building collaborative relationships among schools of pharmacy within the region and Africa for resource sharing;
- Building collaborative relationships with related professions and society;
- Taking advantage of global opportunities offered by agencies like FIP;
- Building capacity for CPD content development for different modes of delivery; and
- Enhancing advanced practitioner and specialist training.

The Centennial Declaration,[59] Nanjing Statements on pharmacy education[58] and the accompanying document on workforce development goals[60] and the quality assurance framework are excellent guides for education and workforce development.

2.2.3.4 Next 10 years for pharmacy education and workforce development

There is no simple answer to what will happen in the next 10 years as countries' needs vary. There has been, however, sufficient disruption by technology and warnings that pharmacy must reinvent itself within the next decade to remain relevant.

The future of the profession depends on visionary leaders capable of taking bold decisions about training. Pharmacy is a patient-centred profession, so the goal should be pharmacists assuming greater responsibility and accountability as independent prescribers and monitors of patients' therapy.

A breed of technologically driven educators capable of adapting and integrating science with practice is the future. Schools will need to invest heavily if their graduates are to be globally competitive.

The future requires greater networking and innovation for resource mobilisation.

A more vibrant regional and continental network of deans and regulators for education and workforce development should be established. This network should be the voice of pharmacy and a tool for advocacy for the profession at the regional and continental levels. The seed for this vision was planted by the FIP-UNESCO UNITWIN network.

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3. The African pharmaceutical workforce: There is no pharmaceutical workforce without pharmaceutical education

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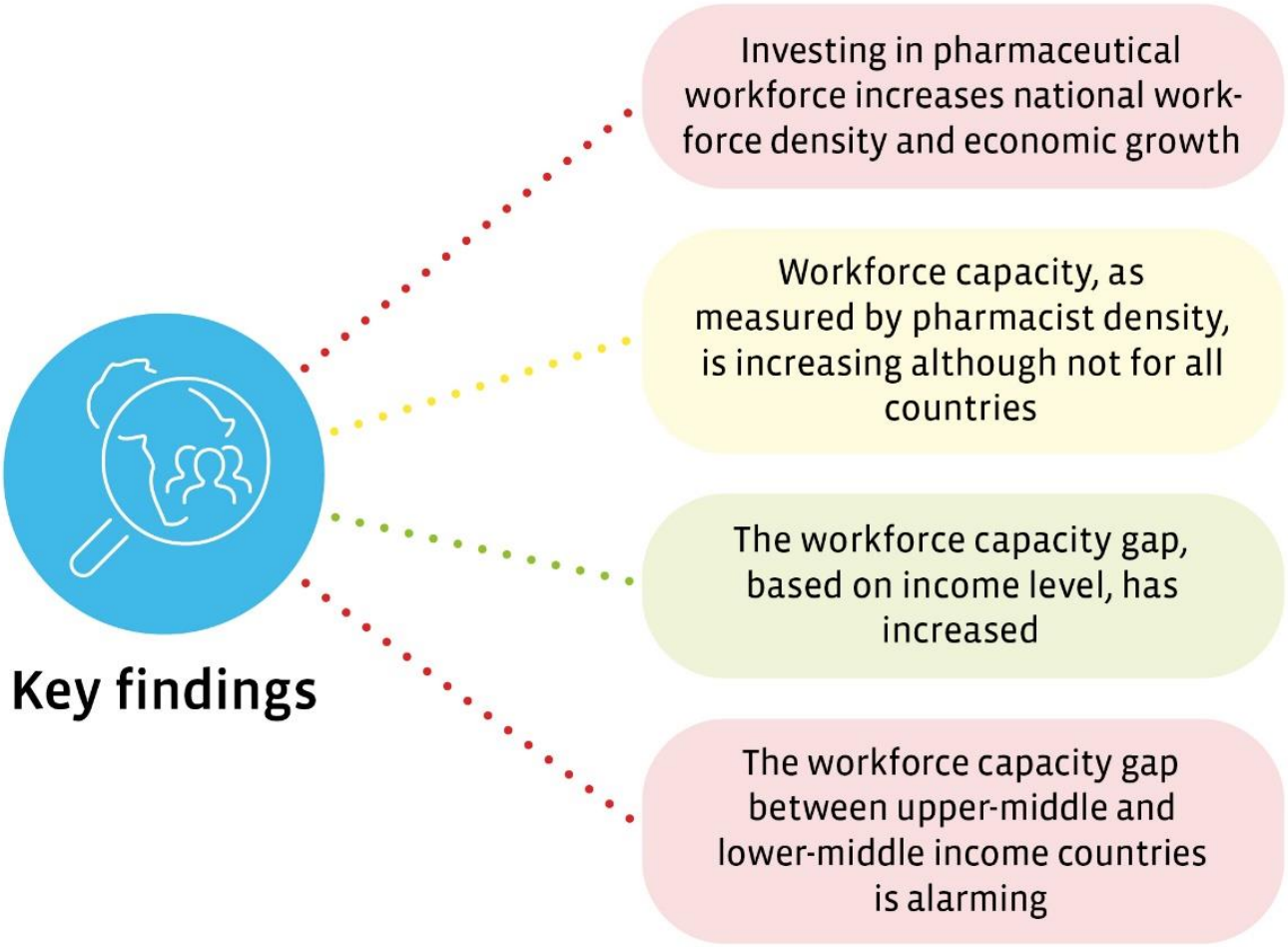

Figure 5. Key findings from the "The African pharmaceutical workforce: There is no workforce without education'" chapter

Summary

- Investment in the health workforce has a positive impact on a nation's economy and the observed economic increases may have been a result of investment in the workforce. Funding of the pharmacy workforce will also influence national workforce density and economic growth, because it is the third largest healthcare workforce in most countries.

- Adequate funding is required for workforce expansion, and this should include socio-economic incentives such as addressing access to initial education and training, decent working conditions and remuneration, and national planning where there are shortages. There is a dependency on national economic strength and the creation of wider healthcare scope and service opportunities for pharmacists appropriately driven by the challenges of primary healthcare needs and universal health coverage.

- There has been an increase in workforce capacity in Africa as measured by pharmacist density — although not for all countries. Changes in overall population denominators may be contributing to the negative relative change seen for some countries, as may changes to pharmacists' migration patterns, and, for other

countries, large increases in initial education and training capacity through new schools and faculties of pharmacy may now be influencing the larger changes seen.

- The "capacity gap" between African countries, based on income level, is increasing over time. The gap between pharmacist capacity in low-income countries has a significantly lower gradient compared with that in higher-income countries. The difference between upper-middle and lower-middle income is considered alarming and is clearly evident. The disparity reveals a significant effect in terms of accessing pharmacists, and that gap will continue to increase in years to come.

- On average, pharmacist workforce density had a small increase of around 0.034 per year in the Africa region. The average predicted pharmacist density in 2030 would be 1.82. Comparing with 2016, the percentage growth of pharmacist density from 2016 to 2030 would be 61%.

- As of 2016, Africa is the only WHO region where the average aggregated proportion of female pharmacists is below 50% — this may be due to economic or cultural reasons, or sampling insufficiency. It requires investigation with a more comprehensive data set.

3.1 Introduction

The World Health Organization (WHO), together with FIP, is clear that there can be "no healthcare without a workforce".[1] The capacity to deliver quality healthcare depends on having an available, competent and flexible pharmaceutical workforce that can deliver the pharmaceutical and medicines-related services needed to achieve universal health coverage (UHC) within our health systems. Pharmaceutical workforce refers to the whole of the pharmacy related workforce (e.g., registered pharmacist practitioners, pharmaceutical scientists, pharmacy technicians and other pharmacy support workforce cadres, preservice students/trainees) working in a diversity of settings (e.g., community, hospital, research and development, industry, military, regulatory, academia and other sectors) with a diversity of scope of practice. This, in part, explains why pharmacists are recognised in the global indicator selected by the United Nations to follow-up on the achievement of its Sustainable Development Goal 3: to ensure healthy lives and promote wellbeing for all at all ages.[2]

The FIP "Global vision for education and workforce" acknowledges the worldwide need to enhance the focus on the education, training and utilisation of pharmacists, pharmaceutical scientists and pharmacy support staff. This global vision is underpinned by a systematic framework of Pharmaceutical Workforce Development Goals (PWDGs), including one on workforce intelligence (PWDG 12) which outlines the importance of a strategic approach to workforce planning through data and intelligence.[3] Workforce intelligence provides strategic workforce information to support workforce planning and can also be used for evaluating the performance and outputs of the workforce, i.e., the impact on patient care. Workforce development plans that are built on workforce data from local, regional and national perspectives also ensure that the pharmaceutical workforce is effectively integrated into the health workforce to meet the health needs of patients and the public.[4] This implies the need for workforce intelligence systems and workforce planning models. PWDG 12 for workforce intelligence therefore links closely to other goals such as PWDG 11 on workforce impact (evidence of the impact of the workforce on patient outcomes) and PWDG 13 on workforce policy formation (i.e., strategies to implement needs-based workforce development).[1]

This chapter focuses on the pharmaceutical workforce in Africa, and its findings provide a significant contribution to understanding the current, and persistent, workforce capacity inequities in pharmacy — including country income level and gender — and highlighting the future need to explore implications of these inequities of access to both medicines and the collective medicines expertise of the global pharmaceutical workforce. This chapter reports on findings originally published in the 2018 "Pharmacy workforce intelligence: Global trends report" by FIP.[5] This gateway to pharmacy workforce statistics informs more effective workforce development and workforce planning to transform and scale up the workforce, for those countries that face workforce shortages, since they can benchmark themselves against other nations.

3.2 Methodological approach

Pharmacist capacity data were collected for four successive time points: 2006, 2009, 2012 and 2016. The data are derived from declared licensed pharmacists' registration data and are not disaggregated by practice areas. In this report, we use the term "capacity" to describe the concept of the overall size of the pharmacy workforce and, therefore, the general capability of the workforce to provide access to pharmacy-related services across all sectors. Consistent with our previous FIP reports, the standardised unit of measurement of capacity is pharmacists per 10,000 population.

Data were collected from successive surveys of national agencies (which included professional leadership bodies, healthcare workforce regulators and ministries) using a consistent methodology, which has been replicated at specific calendar intervals since 2006. This repeat survey sought data relating to pharmacy workforce capacity and was available in English, French and Spanish. It was conducted using FIP member organisation contacts at repeated intervals over the period 2007–17 (2006 data were collected in 2007, 2009 data were collected in 2010, and so on), with follow up for non-respondents.

The survey used mixed methods in selecting, collating and analysing country data, including national population size at specified year dates (as reported by the World Bank), pharmacist registries, WHO regional comparisons, and with national demographic and economic data such as Gross National Income & Expenditure obtained from World Bank data.[6] As a consequence of the data collection method and archiving processes at country level, including unavailability of certain historical data, the data set inevitably has some missing values for some countries at some time points; the use of a mixed-methods repeat measures analysis model provides a statistical contingency for dealing with this reality. As a minimum, an individual country case data set had at least two data points out of a possible four (2006, 2009, 2012, 2016) — See Data Table in Annex 1 for a full list of Africa region data included. Limitations also include reliance on published and secondary sources for some national data.

Where possible, statistically outlying data entries were validated with country respondents before being prepared for analysis*. Basic headcount capacity data for each valid country case was standardised with the date-specific country population for each data point to provide a measure of capacity (capacity is measured as "density", the number of pharmacists per 10,000 population).

3.3 Findings

3.3.1 Africa region country characteristics and sample overview

After quality control and validation, data from 14 African countries (representing 24.2% of the 47 WHO African member states and 18.7% of the 75 global country respondents) were included in the overall general analysis, across the four principal time points of 2006, 2009, 2012 and 2016; not all of these 75 case countries contribute data to all of the four time points, which is a key influence on the data analysis approach adopted. However, all countries contributed to at least two of these time points, as set out in the inclusion criteria.

Future work will aim to further enhance our engagement with all member organisations as this programme of workforce intelligence continues to expand the global evidence base. The FIP Global Pharmaceutical Observatory will be enhancing its engagement with FIP members across the Africa region and calls on all members to contribute to this important project to co-create an accessible database for the region.

*Statistical analysis software used: SPSS Statistics V25.0

3.3.2 Pharmacist workforce comparative trends for Africa between 2006 and 2016

Figure 6 and Figure 7 provide a wider contextual view of the global snapshot. Figure 6 shows the most recent density data, which illustrate the global variance and the inherent challenge of using means or any benchmarking process to set workforce targets. Figure 7 shows the proportional changes in pharmacist density at country level drawn from our available sample; the scale axis measures proportional change per country (as a proportion calculated from the earliest time point for each country, displayed as pharmacists per 10,000 population). This graphic avoids the pitfalls of using arithmetic means and indicates that, for most sample countries, there has been an increase in workforce capacity as measured by pharmacist density — although not for all. Changes in overall population denominators may be contributing to the negative relative change seen for some countries, as may changes to pharmacists' migration patterns, and, for other countries, large increases in initial education and training capacity through new schools and faculties of pharmacy may now be influencing the larger changes seen.

More detailed pharmacist capacity trends are shown in Section 3.3. See Annex 2 for a reference table of the ISO three-digit country codes.

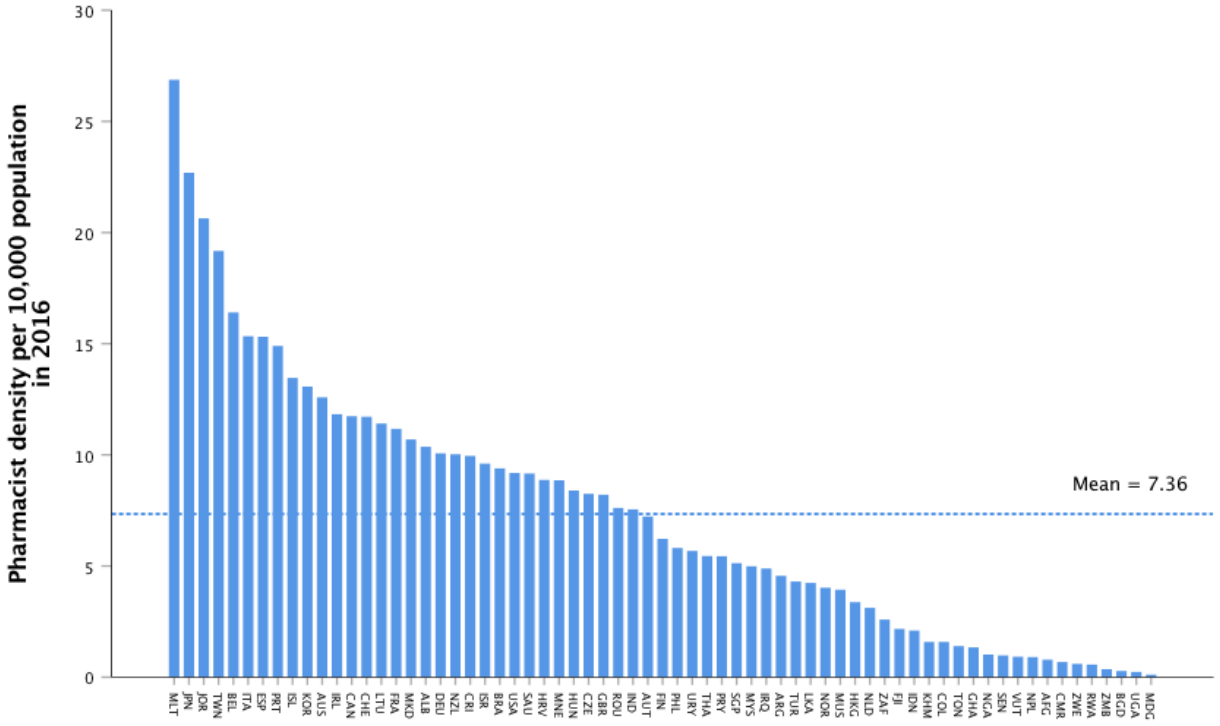

Figure 6. Pharmacist density per capita in 2016 by individual countries (See Annex 2 for the legend

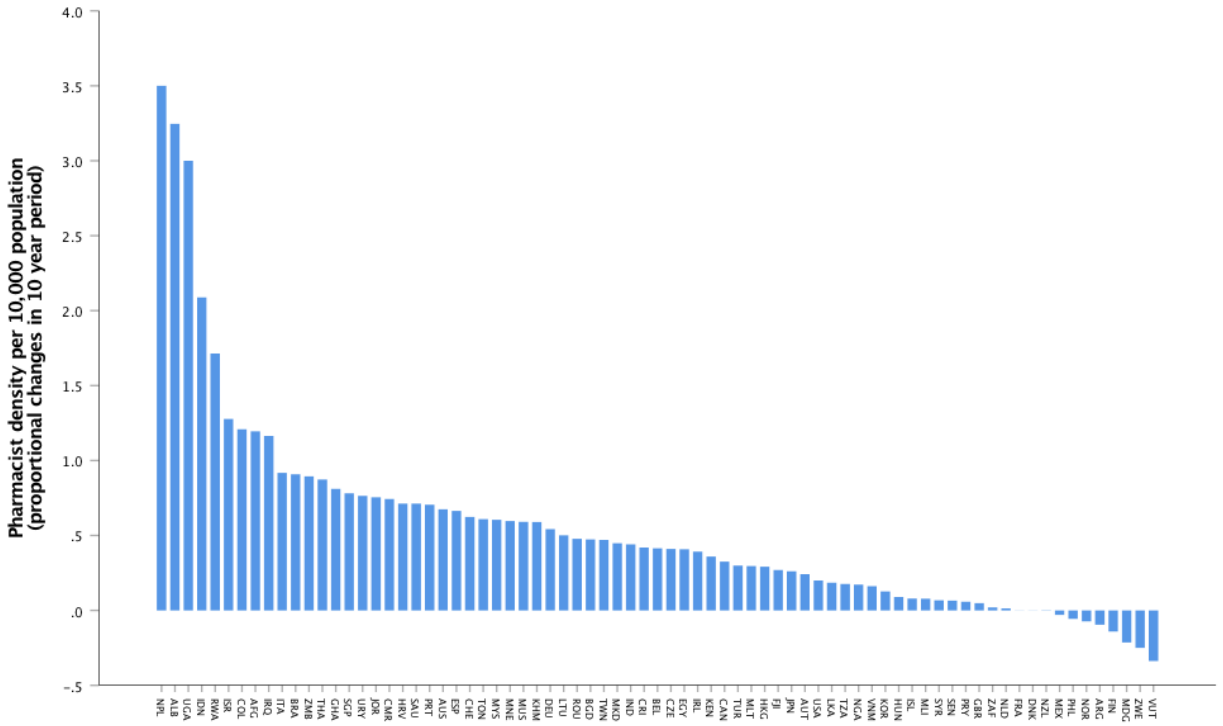

Figure 7. Proportional change in capacity 2006–2016 by individual countries

Comparison of absolute and proportional change by WHO region

The comparison of absolute change in capacity and relative proportional change in density, based on WHO regions, is shown in Figure 8.

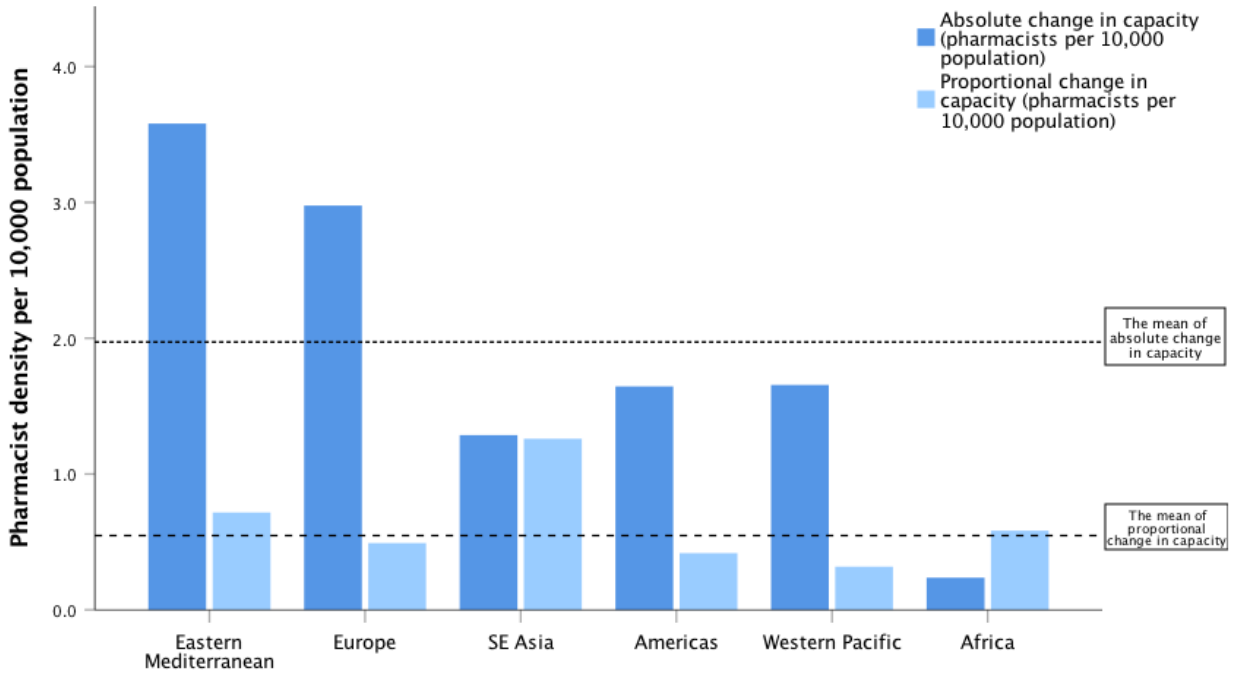

Figure 8. Changes in capacity 2006–2016 by WHO region

As seen in Figure 8, the Africa region as a whole has a higher proportional change (calculation based on subtraction of the latest time point to the earliest time point for each country, displayed as pharmacists per 10,000 population) compared with the absolute change but nonetheless has the lowest global workforce capacity — again, a significant "real world" issue.

Global trends in female workforce proportions

Forty-one (out of 75) countries, of which seven were from Africa included in this analysis, provided data on gender. The initial starting date for the data trend analysis was 2009 because no gender-related data were captured from the 2006 survey, resulting in a reduction to three discrete time data points (2009, 2012, 2016). There has been an incremental increase in female workforce proportions across the Africa region. The aggregated mean percentage change in the region over time was 4.35%.

Linear trends model based on WHO regions

Using regional geography as a factor for capacity trends, Figure 9 shows the outcomes of the linear mixed-model analysis as a series of regression lines (coefficients) and corresponding predicted values of pharmacy density. Since the primary focus is the Africa region, geographical comparisons are made between the African region with the other WHO regions in relation to pharmacist density and comparison between the different African countries individually. Using our sample in this analysis shows that the WHO Africa region has the lowest rate of growth in pharmacy capacity compared with other regions. The projections to 2030, assuming no change in linearity, indicate that the global variance in pharmacist density will continue to widen (see also Figure 7) which will have implications associated with a rise in inequity of accessing medicines expertise and pharmaceutical service provision as these workforce density gaps continue to widen.

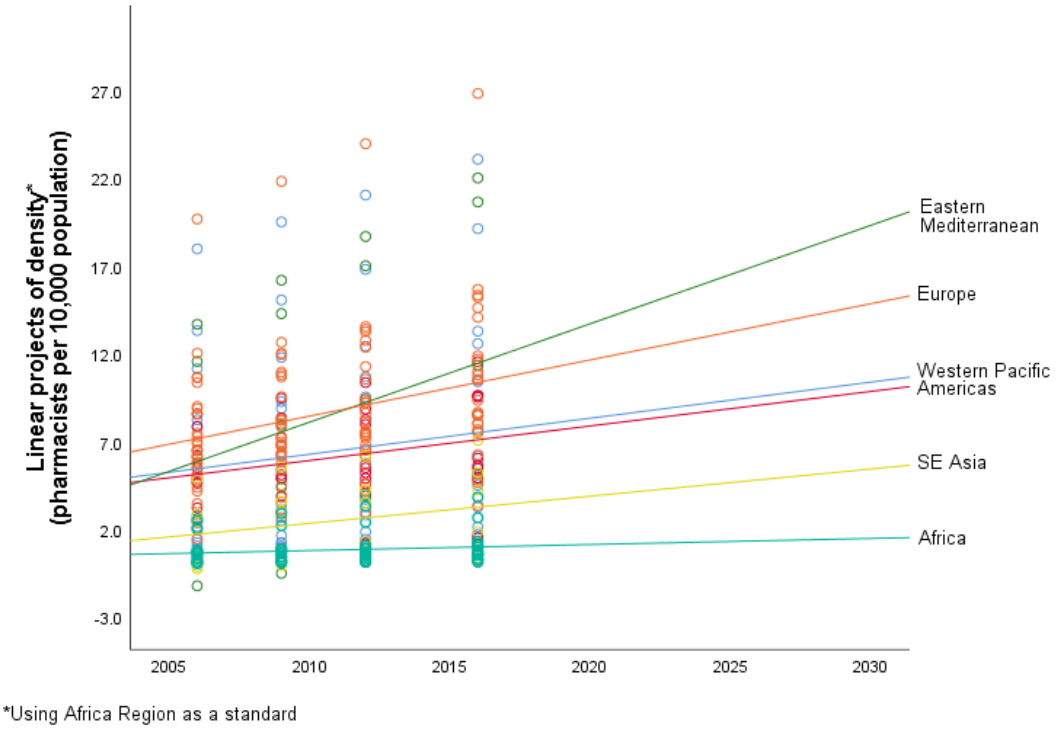

Figure 9. Projections of trend increases in capacity over time compared by WHO regions

Linear trends model based on income levels in the Africa region

Using income level as a factor for workforce capacity trends, Figure 10 shows the outcomes of the linear mixed-model analysis as a series of regression lines (coefficients) and corresponding predicted values of pharmacy density. Income levels for countries in the Africa region were classified as either low, lower-middle and upper-middle-income countries.

Figure 10 indicates that the "capacity gap" between countries, based on income level, is increasing over time (assuming no change in linearity). The gap between pharmacist capacity in low-income countries has a significantly lower gradient (and corresponding trend increase) compared with higher-income countries ($p<0.05$). The difference between upper-middle and lower-middle income is considered alarming and is clearly evident. The disparity reveals a significant effect in terms of accessing pharmacists, and that gap will continue to increase in years to come.

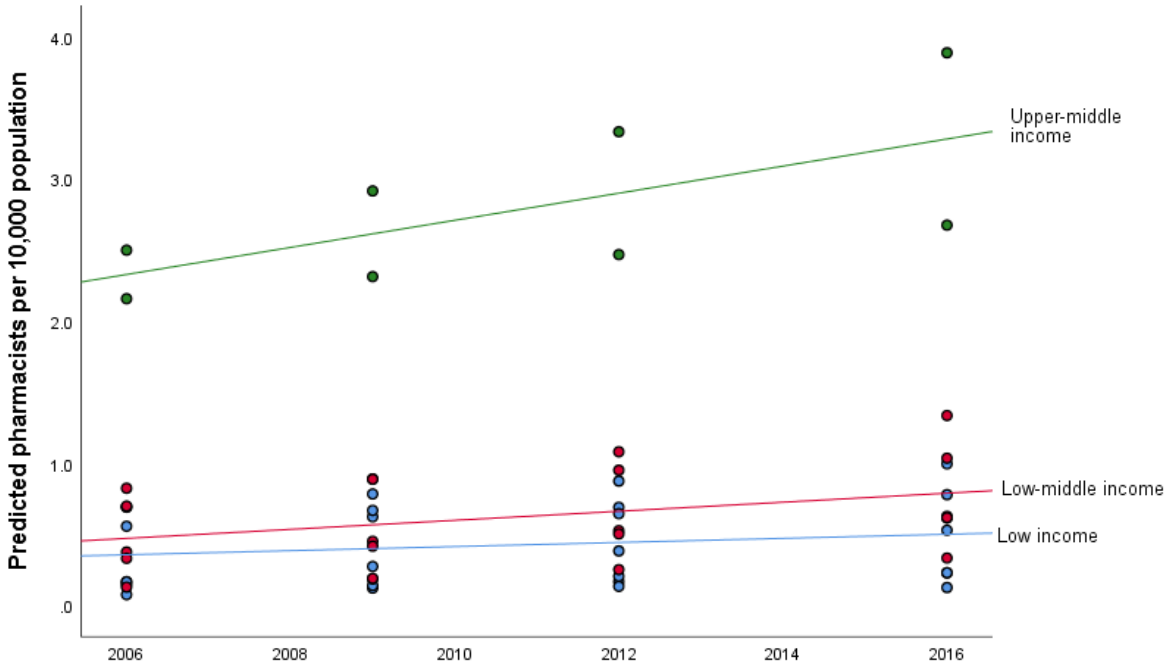

Figure 10. Trends in capacity for the sample African countries compared by income levels

3.4 Trends in the WHO Africa region pharmacy workforce capacity by country

This section displays the Africa country-level data derived from time points of 2006, 2009, 2012 and 2016 as described earlier in the report. There are, inevitably, missing values for some data points despite efforts by the analysis team to track historical archived data.

Where possible, data entries were validated with country respondents before being prepared for analysis. In the following charts, "headcount" capacity data for each valid country case were standardised with date-specific country population for each data point to provide a measure of capacity (capacity is measured as "density": the number of pharmacists per 10,000 population). If two validated data points were available for any country, the data have been included where possible.

Figure 11 shows individual trends for case countries in the WHO Africa region. This segregated chart more clearly indicates where there are contrary trends, such as shown by Zimbabwe (ZWE).

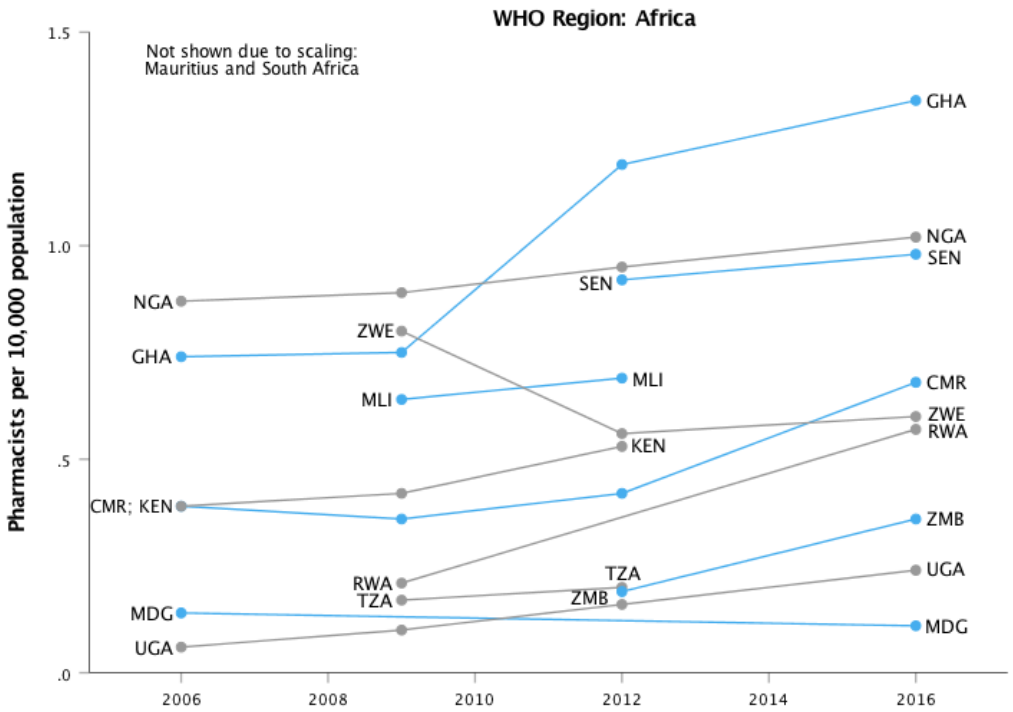

Figure 11. Individual trends for case countries in WHO Africa region

Future predictions and growth rate estimation for African countries

Figure 12 shows the forward look and future predictions of pharmacist density in each African country if no interventions are being made. The mixed-model analysis indicates, on average, that pharmacist workforce density had a small increase of around 0.034 per year in the Africa region (p=0.009). The average predicted pharmacist density in 2030 would be 1.82. Comparing with 2016, the percentage growth of pharmacist density from 2016 to 2030 would be 61%.

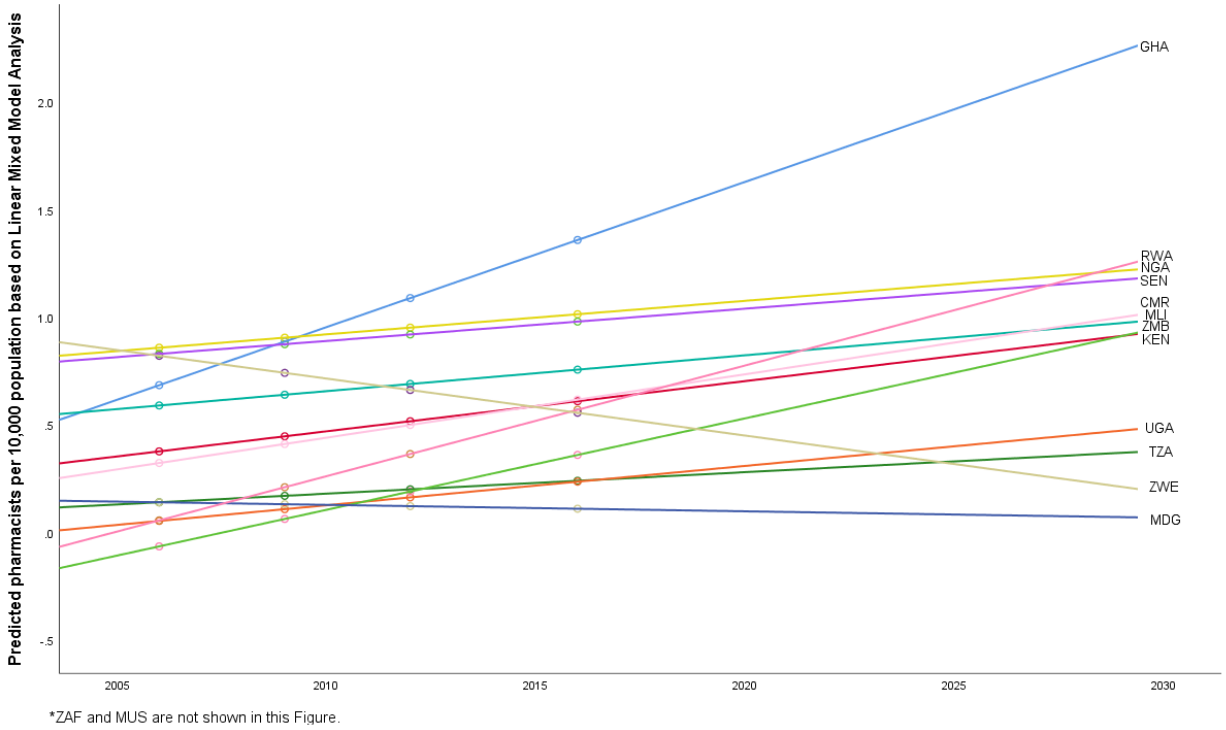

Figure 12. Projected pharmacist workforce density for sample case countries in the WHO Africa region

3.5 Discussion

All WHO regions have experienced an increase in the standardised workforce density of pharmacists per capita over the period 2006–16. Evidence is emerging from global WHO analyses and reports[7] that investment in the health workforce has a positive impact on a nation's economy and the increases may have been a result of investment in the workforce. Funding of the pharmacy workforce will also influence national workforce density and economic growth, because it is the third largest healthcare workforce in most countries. Adequate funding is required for workforce expansion, and this should include socio-economic incentives such as addressing access to initial education and training, decent working conditions and remuneration, and national planning where there are shortages. There is a dependency on national economic strength and the creation of wider healthcare scope and service opportunities for pharmacists appropriately driven by the challenges of primary healthcare needs and universal health coverage. This general pharmacy labour market could be adjusted through progressive regulatory changes that affect the recruitment of pharmacists in community and hospital pharmacies and in other sectors where the expertise of pharmacists has been shown to provide added value (for example, the pharmaceutical industry, clinical biology laboratories, and governmental and other public agencies). The World Bank classifications have generally remained static over the period analysed. However, an increase in GDP wealth may not necessarily result in an increase in the availability of pharmacists. Some national decreases that were observed in the availability of pharmacists may be a result of net migration to other countries or other factors such as changes in national health policy.

Although the density of pharmacists has increased substantially in many lower-income countries, the baseline remains low compared with those of higher-income countries. The FIP Workforce Development framework identifies the need for strategies to address gender (and diversity) imbalances. Several nations may be actively addressing these issues, but this is currently beyond the scope of the data collated for this report. As of 2016, Africa is the only WHO region where the average aggregated proportion of female pharmacists is below 50% — this may be due to economic or cultural reasons, or sampling insufficiency. It requires investigation with a more comprehensive data set.

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4. The FIP-UNESCO UNITWIN Programme and Centre for Excellence in Africa: 2010 to 2019

4.1 Fostering partnerships in pharmacy education

Authors

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Alison Williams, Project Coordinator of the FIP-UNESCO UNITWIN Global Pharmacy Education Development Network, Centre for Excellence in Africa (Nigeria)

Professor Ralph J. Altiere, Director of the FIP-UNESCO UNITWIN Global Pharmacy Education Development Network, Interim Chair of FIP Education (USA)

Summary

- The FIP-UNESCO UNITWIN Programme was the first in the field of higher education for health professions and the first for global pharmaceutical education that seeks to advance research, training and curriculum development in pharmacy education by building university networks and encouraging inter-university cooperation worldwide.

- The FIP-UNESCO UNITWIN Centre for Excellence in Africa (CfEA) was FIP's active regional network since the programme's inception in 2010 and its partners, who are the leaders of the sub-Saharan African schools of pharmacy from Ghana, Kenya, Malawi, Namibia, Nigeria, Uganda, and Zambia participate to facilitate development of academic capacity, implementation of needs-based education strategies and establishment of enabling pharmaceutical policies through advocacy to transform pharmacy education.

- FIP-UNESCO UNITWIN CfEA member countries identified needs and priorities in pharmacy education in their countries through FIP Education resources and tools.

- The FIP-UNESCO UNITWIN CfEA provided support for peer-to-peer knowledge, resource and experience exchange for the improvement of academic capacity

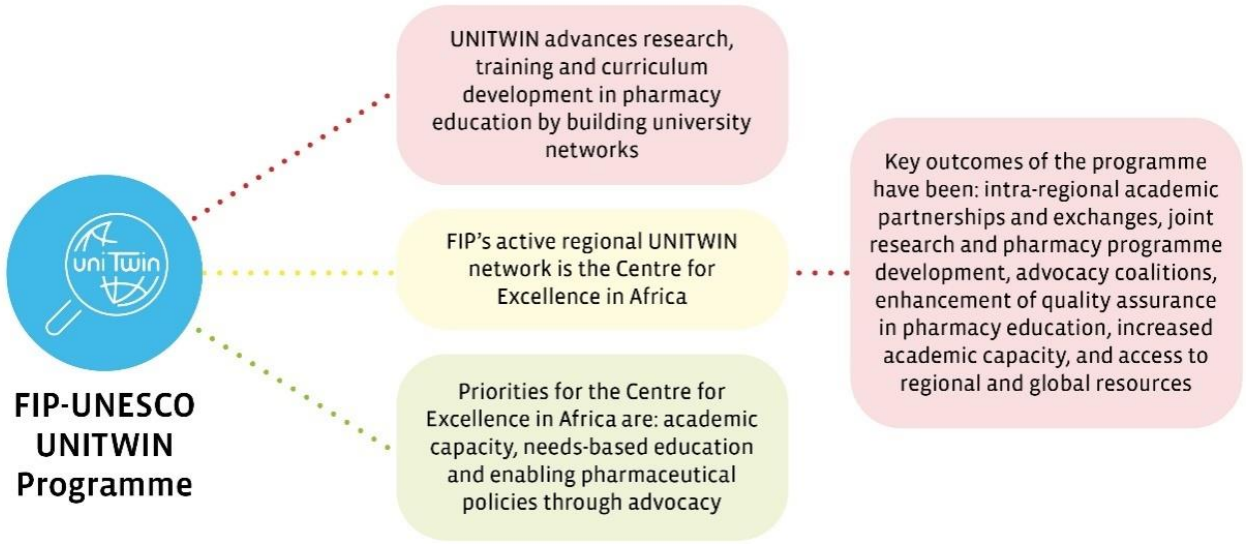

Figure 13. Key findings from the "The FIP-UNESCO UNITWIN Programme and Centre for Excellence in Africa" chapter

- The FIP-UNESCO UNITWIN CfEA advocated for an education system that responds to the healthcare requirements and needs of communities. Pharmacy curricula should reflect the wide range of career directions that future pharmacists will take in ever-changing health systems. Education and training on substandard and falsified medicines and antimicrobial resistance are current focus areas.

- Good practices from Ghana, Kenya and Zambia demonstrated that multi-sectoral and multi-stakeholder efforts are required to achieve an enabling policy environment for the development of pharmacy education and pharmacy as a profession. These advocacy efforts resulted in recognition and implementation of the extended roles of pharmacists and improved pharmacy education and training programmes.

- FIP-UNESCO UNITWIN CfEA members provided insights into how the CfEA network supported their institution since 2010 through intra-regional academic partnerships and exchanges, joint research and programme development, advocacy coalitions, enhancement of quality assurance in pharmacy education, increased academic capacity, and access to regional and global resources.

FIP went into official relations with UNESCO through the FIP-UNESCO UNITWIN Global Pharmacy Education Development Network, which was established in 2010 between FIP, University College London (UCL) School of Pharmacy and UNESCO United Kingdom National Commission. The FIP-UNESCO UNITWIN programme was the first in the field of higher education for health professions and the first for global pharmaceutical education. It was led by Prof. Ralph Altiere, FIP-UNESCO UNITWIN Director at FIP and Prof. Ian Bates, FIP-UCL Collaborating Centre Director at UCL School of Pharmacy.

The FIP-UNESCO UNITWIN Programme sought to advance research, training and curriculum development in pharmacy education by building university networks and encouraging inter-university cooperation worldwide. It had a particular area of focus to promote gender equity and empowerment of women in science and education to achieve their full potential and thrive in their roles. It is a platform for FIP to implement its global pharmaceutical education and workforce strategies. Pharmacy schools in the FIP-UNESCO UNITWIN Programme are regionally clustered as centres for excellence and innovation that actively contribute to the development of their respective fields at national, regional and international levels.

The FIP-UNESCO UNITWIN CfEA has been FIP's active regional network since the programme's inception in 2010 and its partners, who are the leaders of the sub-Saharan African schools of pharmacy from Ghana, Kenya, Malawi, Namibia, Nigeria, Uganda, and Zambia, participate to facilitate development of academic capacity, implementation of needs-based education strategies and establishment of enabling pharmaceutical policies through advocacy to transform pharmacy education.

Since 2010, the FIP-UNESCO UNITWIN CfEA network had been an incubator of transformation in pharmacy education and, to celebrate these achievements, FIP is publishing this "FIP pharmacy education in Sub-Saharan Africa" report in October 2020 to demonstrate a decade of impact and evidence in African pharmacy education.

Through the FIP-UNESCO UNITWIN CfEA network, FIP had been engaging its resources, expertise and networks towards transforming pharmacy education in sub-Saharan African countries building on the premise that there is no workforce without education.

FIP-UNESCO UNITWIN CfEA partners contributed to an expertise and network mapping activity in order to purposefully match needs and priorities with the existing experience in the group. This mapping and matching resulted in academic exchanges between the founding partners. The members established joint teaching programmes for their students, where the visiting academics had a chance to improve the academic capacity through these rapid knowledge exchanges.

In 2018, following the FIP Global Conference on Pharmacy and Pharmaceutical Sciences Education held in 2016 in Nanjing, China, the FIP-UNESCO UNITWIN CfEA underwent a strategic retreat to align its objectives with FIP's global education transformation agenda. The members of the FIP-UNESCO UNITWIN CfEA responded to a series of questionnaires, based on FIP's Nanjing Statements, Pharmaceutical Workforce Development Goals and FIP's Global Competency Framework, to have a comprehensive understanding of educational standards, the academic curriculum, the scope of practice and pharmaceutical workforce needs.[19]

This activity was particularly significant because it was the first multi-country effort to successfully implement the outputs of FIP's Nanjing conference to attain FIP's global vision for education and workforce. The results were discussed in face-to-face meetings held in Nigeria in 2018 and in Kenya in 2019, and the FIP-UNESCO UNITWIN CfEA workstreams were identified as follows:

- Increasing academic capacity;
- Establishing needs-based education strategies; and
- Creating an enabling policy environment through advocacy.

4.1.1 Increasing academic capacity

Author

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The availability of highly trained and skilled pharmacists ensures good healthcare delivery. Thus, the training of pharmacists is of great significance if the health care of the populace in sub-Saharan Africa is to improve. The abilities, skills and expertise of educators in pharmacy schools contribute to the building of academic capacity.

Improvement of quality education and training has been identified as one of the key elements for the sustainable development of pharmaceutical workforce to improve health and well-being.[1]

Through the FIP-UNESCO UNITWIN CfEA network, FIP has been engaging its resources, expertise and networks towards transforming pharmacy education in sub-Saharan African countries building on the premise that there is no workforce without education.[2] Improvement of academic capacity involves increasing staff numbers as well as the expertise of staff in the various areas of pharmacy specialisation. Increasing staff numbers will positively impact the staff-student ratios in pharmacy schools in Africa, which are currently substandard. Again, increasing the expertise of staff through exchange programmes in order to learn best practices from sister institutions will benefit academic capacity. FIP's Pharmabridge programme, which FIP-UNESCO UNITWIN CfEA members had the opportunity to access, seeks to achieve an increase in academic capacity through global and regional exchange of academic staff of pharmacy schools.

While increasing academic capacity is aimed at academic staff improvements, there are milestones proposed by FIP, which are assessed for pharmacy schools regularly, and the assessors include pharmacy students. The improvement of academic capacity through peer-to-peer sharing of best practices is another approach. During a FIP-UNESCO UNITWIN CfEA face-to-face meeting held in June 2019 in Mombasa, Kenya, participants presented reports on the key highlights on the pharmacy education survey for their various institutions (Figure 14). Presenters from the different institutions across sub-Saharan Africa shared challenges as well as best practices at their institutions. The interactions and discussions were centred on curriculum review, among other pertinent issues. Participants therefore had the opportunity to learn, first-hand, what pertains in other pharmacy schools in other countries and in some cases their own countries in terms of pharmacy education. The FIP-UNESCO UNITWIN CfEA platform has been an excellent source for improving academic capacity, as participants would implement best practices learnt from other institutions at their own schools. Furthermore, UNITWIN colleagues at the face-to-face meeting held in June 2019 also learnt about postgraduate courses offered in other institutions, which they could assess or recommend to their undergraduate students.

Increasing staff numbers requires a number of pharmacists to attain the appropriate expertise and specialisations through postgraduate studies. Thus, by promoting the attainment of these postgraduate degrees in pharmacy, the academic workforce for training pharmacists would increase across sub-Saharan Africa. The West Africa Postgraduate College of Pharmacists, which was also duly represented at this meeting, is equipped to provide specialisation to pharmacists in the various areas of practice and is a good example of building academic capacity of pharmacists in the sub region.

Figure 14. Attendees at the FIP-UNESCO UNITWIN Centre for Excellence in Africa meeting held in Mombasa, Kenya, 2019

The FIP-UNESCO UNITWIN CfEA initiative has immensely contributed to increasing academic capacity in sub-Saharan Africa. Members' institutions will continue to work towards achieving the gold standard in pharmacy education in sub-Saharan Africa by increasing academic capacity for the training of pharmacists, in order to improve health outcomes in the region.

4.1.2 Establishing needs-based education strategies

Author

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Needs-based education refers to the development of an education system that meets the current needs and future demands of a given profession and community.[4] The WHO recommends that needs of the health system should shape the way in which the health workforce is educated and not the other way round.[5] Similarly, FIP advocates for a needs-based approach to guide pharmacy education and recognises that a global competency framework using a single global curriculum would not adequately address the needs of developed and developing countries.[6] In this context, regardless of the type and duration of the pharmacy degree being followed, the needs of the specific country should be considered when designing the programme.[6] This is because the roles of pharmacists and competencies required are different, depending on specific country needs. For instance, the healthcare system in the United States of America is different from that of the United Kingdom hence the USA pharmacy training is more clinically oriented.[7]

This is also reflected in the naming of the pharmacy degrees. The United States changed the title of the pharmacy degree from Bachelor of Pharmacy (BPharm) to Doctor of Pharmacy (PharmD) whereas the United Kingdom changed it to Master of Pharmacy (MPharm). In Africa, most countries are still following the BPharm programme[8] and few countries have adopted the USA PharmD model. However, the common goal of the pharmacist should be to improve patient health irrespective of the model used.[9] Recent studies have demonstrated how the PharmD model of training has positively impacted patient treatment outcomes.[7] Hence the PharmD is quickly gaining wide acceptance and recognition, especially in Africa. Despite its wide acceptance in Africa, PharmD programmes have not been implemented as expected due to limited resources, such as clinically skilled human resource and infrastructure.[10] The challenges in developing countries are compounded by the lack of a strong pharmaceutical industrial base.[11] These countries are unable to manufacture drugs to meet the needs of their populations due to high cost of production. Most drugs in Africa come from countries like the USA, UK, India and China.

Africa should create an education system that responds to the healthcare requirements and needs of the community.[8] This envisioned education system should modify behaviours of the pharmacy workforce as well as impart pharmaceutical knowledge and skills.[12] This can be achieved through curricula that reflect the wide range of career directions that future pharmacists will take in ever-changing health systems. Clearly, there seems to be a strong desire to prepare pharmacy graduates for a varied future, but Africa is not moving quickly enough towards these envisioned goals.[8] There is lack of academic and clinical training capacity in many African countries. This realisation has made FIP advocate for a needs-based education and workforce development approach that builds adequate skilled human resource in Africa. The future human resource should be able to adequately manufacture and distribute medicines as well as provide best clinical pharmacy services that are aligned to local health services and the labour market needs in Africa. Studies have demonstrated that health care cannot be adequately provided without medicines and a competent pharmacy workforce.

To address some of the challenges related to needs-based education in Africa, FIP through the FIP-UNESCO UNITWIN CfEA has developed strategies. The FIP needs-based education model suggests that pharmaceutical education should be locally determined, socially accountable, globally connected and quality assured to meet the given health needs of communities.[13] Towards this cause, some of the activities being undertaken include the following:

- A scope of practice survey was conducted at the FIP-UNESCO UNITWIN CfEA Meeting in 2018 (see Figure 15) with CfEA member countries that laid the foundation of an understanding of what are the healthcare needs and how the pharmaceutical workforce provided services tailored to those needs.

- Drawing from the survey results, CfEA members from the University of Makerere, Uganda, and University of Benin, Nigeria, have been recruited to a pilot project jointly delivered by the WHO and FIP. Uganda and Nigeria are among the countries that have been highly affected by substandard and falsified medicines, which is a major public health issue. This project aims to co-create and deliver a curriculum on substandard and falsified medical products to pharmacy students.

- The WHO published the "Health workers' education and training on antimicrobial resistance: curricula guide" in 2019.[14] CfEA member countries had been onboard to implement antimicrobial resistance curricula at their institutions to equip their students and existing pharmaceutical workforce with competencies for effective antibiotic stewardship.

Building on its pharmaceutical workforce development goals, FIP developed the FIP Development Goals, which will set the standards for pharmaceutical services, sciences and innovation, and workforce.[11] The CfEA members will be a platform for FIP to deepen the understanding of health needs in CfEA countries and establish needs-based education strategies.

Figure 15. Attendees at the FIP-UNESCO UNITWIN Centre for Excellence in Africa meeting held in Lagos, Nigeria, 2018

4.1.3 Creating an enabling policy environment through advocacy

Increasing academic capacity and implementing needs-based education strategies requires appropriate regulations, legislation and governmental support to be in place. The policies must be right to achieve transformation in pharmacy education. Due to diverse governmental and institutional policies, the advocacy strategy must be tailored to each country's specific needs. This section covers enabling advocacy good practices from Kenya, Ghana and Zambia.

4.1.4 Advocacy for pharmacy practice and pharmacy education in Kenya

Author

Dr Stanley Njagih Ndwigah, Chairman, Department of Pharmaceutical Chemistry, School of Pharmacy, University of Nairobi, FIP-UNESCO UNITWIN Centre for Excellence in Africa, Lead for Advocacy (Kenya)

Kenya has seen rapid growth in all aspects of pharmacy practice since liberalisation of the Kenyan economy in 1992. The number of pharmacy outlets grew exponentially, as did the number of training institutions. Currently Kenya has seven universities offering a degree course in pharmacy and 20 diploma training colleges.[15] The said rapid growth has led to challenges in ensuring proper standards in both training and practice. There are approximately 3,600 registered pharmacists in Kenya and over 10,000 commercial retail pharmacies and drug stores, commonly referred to as chemists. Over half of these outlets are operated by non-pharmacists, some being run by pharmaceutical technologists, and others illegally by unqualified staff. The Pharmacy and Poisons Board (PPB) only licenses registered pharmacists and enrolled pharmaceutical technologists to operate drug outlets.

A lack of professionally managed pharmacies has led to major challenges in offering pharmaceutical care to Kenyans, with reports of substandard drugs, wrong dosages, drug interactions and falsified drugs being sold at low prices to unsuspecting Kenyans. This is made worse by the fact that Kenyans flock to pharmacies for primary health care. There is also a shortage of qualified pharmacists in the country. These challenges have led to an increase in advocacy to ensure improvement in provision of pharmacy services.

The following groups are working to ensure better provision of pharmaceutical care in Kenya. These are:

- Pharmacy academia
- Pharmacy and Poisons Board (PPB)
- Pharmaceutical Society of Kenya (PSK)
- Kenya Pharmaceutical Association (KPA)
- Kenya Medical Practitioners, Pharmacists and Dentists' Union (KMPDU)

Pharmacy academia comprises most of the lecturers who train pharmacists in Kenyan universities. Currently there is a social media group, namely, "Pharmacy Academia" with 61 members, and it includes all deans, chairs of departments and most lecturers. The group discusses issues touching on training and research. The group, formed in October 2019, is also looking at the modality of formation of an Association of Kenya Schools of Pharmacy to

bring a more structured engagement between private and public universities. There is also an ongoing debate about shifting from the current BPharm training to the more clinical PharmD programme.

The PPB is the drug regulatory authority established under the Pharmacy and Poisons Act, Chapter 244 of the Laws of Kenya, and its mission is to regulate the profession of pharmacy and ensure quality, safe and efficacious medicines. In 2000, the PPB formed a Training and Assessment Committee (TAC) with a responsibility of evaluation and assessment of the qualifications of pharmacy personnel for purposes of registration/enrolment to practise in Kenya. The TAC achieves its mandate working with a Training and Assessment Technical Committee whose mandate includes inspecting institutions to ensure training is being carried out according to PPB guidelines and ensures

quality graduates. The PPB through its inspectorate directorate also does routine inspections countrywide and has so far closed down 994 illegal pharmaceutical outlets and arrested 881 offenders in crackdowns since 2016. In the Nairobi region alone, a crackdown by the PPB has seen 89 people arrested for prosecution and 105 pharmacies closed.

The PSK has a vision is to empower pharmacists in the care of patients in their practices while promoting professionalism and ethics. To supplement PPB work, and to ensure patients are dealing with qualified pharmacists, the PSK came up with the Green Cross Charter. The Green Cross logo is displayed in pharmacies superintended by registered pharmacists to differentiate these from the ones run by pharmaceutical technologists. The PSK has also demanded pharmacists' involvement in all legislative processes touching on health laws in Kenya and has made a number of presentations of memoranda to parliament. The PSK president has appeared several times in Kenyan media advocating for this. Recently, possibly due to advocacy, the Cabinet Secretary of Health declined to appoint a new board of directors of the PPB, promising a change in its governance structure to make it more effective in providing guidance to the profession and to make it more responsive to modern trends.

The KPA brings together all pharmaceutical technologists enrolled by the PPB and has 11 chapters across Kenya. It has over 10,000 members, compared with fewer than 3,500 PSK members, and has a strong lobbying arm. KPA members work in the retail sector, hospitals and primary healthcare facilities. They represent the first cadres of pharmacy professionals trained in Kenya before the launch of degree training in 1974 at the University of Nairobi (UoN). Because of their numbers, dedication, teamwork and advocacy, members of KPA sit in boards of management of the PPB and the National Quality Control Laboratory, and in the Ministry of Health there is an office of chief pharmaceutical technologist. KPA members have also been passionate in upgrading their training to degree level with a number having already graduated with BPharm degrees from UoN and other universities. In February 2018, in consultation with the KPA, Mount Kenya University introduced a special pharmacy degree study for diploma holders known as the Bachelor of Pharmacy (Diploma Entry) Programme, which will help many transitions from diploma to degree level practice.[16]

The Kenya Medical Practitioners, Pharmacists and Dentists Union (KMPDU) is the trade union that represents Kenyan doctors in employment and labour relations with aim of improving doctors' welfare. With emphasis on the public health sector, it has been actively engaged in health advocacy with aim of ensuring Kenyans have access to high-quality healthcare. Its advocacy and dedication were remarkably noted in early 2017 when its national leaders were jailed for championing the rights of its members and calling for better financing of health care in Kenya. The first KMPDU vice chairman is a pharmacist, and many pharmacists hold offices in branches all over Kenya. Health is one part of the "Big Four Agenda" of the President of Kenya's second and final term, and therefore closely defines his legacy. The KMPDU has been agitating for reforms within the health sector, and in conjunction with the Former Parliamentarians Association, and the Boresha Maisha NGO held various build up meetings just to ensure the proposed health bills were properly done.[17]

A lot of work is being done by all the above groups and pharmacy practice is expected to get better as we move ahead as a country.

4.1.5 Advancing pharmacy education and practice in Ghana through advocacy

Author

Dr Mariam El Boakye-Gyasi, Senior Lecturer, Faculty of Pharmacy and Pharmaceutical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Lead for Academic Capacity, FIP-UNESCO UNITWIN Centre for Excellence in Africa (Ghana)

To achieve transformation and progress in pharmacy education, there is a need to create an enabling environment through advocacy.[13] Advocacy can improve pharmacy education for students, lecturers and pharmacists alike. In Ghana, advocacy led by the Faculty of Pharmacy and Pharmaceutical Sciences (FPPS) of the Kwame Nkrumah University of Science and Technology (KNUST) has led to many gains for pharmacy students and interns, as well as for pharmacy schools.

Before 2018, BPharm holders were part of a national service scheme where they served as pharmacy interns for one year. Their remuneration was the same as that of other interns with degrees in other fields. This was demotivating for pharmacy students and interns. In 2018 when the first batch of PharmD graduates from KNUST was to start their internship, the FPPS, through the Pharmacy Council of Ghana, which is the regulatory body for pharmacy practice, embarked on an exercise to petition the office of the Chief of Staff at the Presidency of Ghana.

The petition among other things included the following:

- That the PharmD holders who were interns were actually registered pharmacists and for that matter professionals;
- That the pharmacists in question were at an equivalent scale as their colleagues who had graduated from the medical school and were undergoing housemanship; and
- That the pharmacists/pharmacy interns deserved remuneration that was commensurate with their position.

The request was granted and the remuneration of the PharmD graduates at that level was adjusted upwards. This has given a good sign to pharmacy students in Ghana and has also lifted the image of pharmacy education and advancing of pharmacy education and practice in Ghana.

Finally, through advocacy from the FPPS and other stakeholders, such as the Ghana College of Pharmacists, universities in Ghana have agreed to recognise fellowships in pharmacy as equivalent to terminal degrees and to employ holders of fellowships as lecturers in pharmacy practice at pharmacy schools in Ghana. In 2020, three fellows have been employed at the Department of Pharmacy Practice, KNUST. This will go a long way to improve academic capacity and lecturer-student ratios in pharmacy schools. All the knowledge and skills acquired by the fellows in the various fields of specialisation will be available to pharmacy students.

4.1.6 An example of advocacy activity for pharmacy education in Zambia

Author

Dr Derick Munkombwe, Senior Lecturer, Department of Pharmacy, University of Zambia, FIP-UNESCO UNITWIN Centre for Excellence in Africa, Lead for Needs-Based Education (Zambia)

The University of Zambia (UNZA) Department of Pharmacy in 2017 demonstrated a successful advocacy activity in an effort to improve the Bachelor of Pharmacy training programme in Zambia.[18] The aim of this advocacy process was to garner support from stakeholders so as to reinforce knowledge and skills for the extended roles of a pharmacist through revision of the 2013 version of the BPharm curriculum. A consultative process with relevant stakeholders was undertaken.[18]

The formal engagement in the advocacy process included stakeholders such as the Pharmaceutical Society of Zambia, the Health Professions Council of Zambia, the Ministry of Health, the Higher Education Authority, the Zambia Medicines Regulatory Authority, the Hospital Pharmacists Association of Zambia, the University Teaching Hospital, the Zambia Pharmaceutical Business Forum, Medical Stores Limited, Evelyn Hone College, Lusaka Apex Medical University and Global Health Supply Chain—Procurement and Supply Management. During the advocacy meeting, stakeholders discussed widening the scope of pharmacy practice to strengthen areas such as veterinary pharmacy, industrial pharmacy, pharmaceutical public health, pharmaceutical supply chain management, leadership and management. Furthermore, an entrepreneurship course was discussed for inclusion in the BPharm curriculum due to the national need for increased pharmacist participation in the private sector. Also, the consultative meeting proposed for the introduction of information and communication technology and behavioural courses in the curriculum while maintaining the common core pharmaceutical science courses. These proposals resulted in a curriculum with a wider scope, depth and content coverage aimed at producing a pharmacist with the requisite competences to meet contemporary practice demands. After an all-inclusive consultation exercise with the various stakeholders mentioned above, the 2017 BPharm curriculum was developed. This 2017 version has since been implemented at UNZA. The first graduates from this curriculum are expected in 2021. It is hoped that the recognition and implementation of the extended roles of the pharmacist[13] shall be adopted in private and government health facilities through the Ministry of Health in Zambia.

4.1.7 Hear the perspectives of members of FIP-UNESCO UNITWIN Centre for Excellence in Africa: 10 years of collaboration

Author

Adjunct Associate Professor Jennifer Marriott, Senior Associate Editor, *Pharmacy Education* Journal, Past Director FIP-UNESCO UNITWIN, Faculty of Pharmacy and Pharmaceutical Sciences, Monash University (Australia)

The FIP-UNESCO UNITWIN project was developed as a major component of the Global Pharmacy Education Development network that was developed and formally signed off in Lisbon in 2010. The FIP-UNESCO UNITWIN Centre for Excellence in Africa (CfEA) was formed at a summit meeting convened by FIP Education (FIP*Ed*) and held in Ghana to discuss the potential of FIP*Ed* and UNESCO with pharmacy leaders from a number of African countries and FIP representatives. The original signatories to the UNITWIN programme were: Ghana (Professor Mahama Duwiejua), Namibia (Dr Tim Rennie), Nigeria (Professor Cyril Usifoh), Uganda (Professor Richard Odoi Adome) and Zambia (Dr Lungwani Muungo). It was agreed that development and oversight of the CfEA would be led by Associate Professor Jennifer Marriott (as FIP-UNESCO UNITWIN director), supported by Professor Ian Bates (as the named FIP-UNESCO UNITWIN coordinator). Malawi (Dr Nettie Dzabala) joined the CfEA in 2015.

The delegates recommended the following domains as starting projects within the CfEA:

- Communications and publications;
- Capability training;
- Quality in teaching and learning;
- Innovations in IT and ICT delivery;
- Monitoring medicines use; and
- Networking and resources.

Ghana

By Professor Mahama Duwiejua, School of Pharmacy, University of Ghana, Legon, Accra (Ghana)

The FIP-UNESCO UNITWIN Global Pharmacy Education Development Network is a product of the partnership, launched in 2010, between FIP and UNESCO to mitigate challenges of infrastructure, academic capacity, quality assurance and institutional capacity deficits impeding provision of quality needs-based pharmacy education in developing countries.

The programme was piloted in Africa through creating a network of pharmacy schools from five African countries (Ghana, Namibia, Nigeria, Uganda and Zambia) to form the nucleus of the FIP-UNESCO UNITWIN CfEA. The foundation members (later joined by Malawi) have, with leadership provided by FIP, held annual meetings to exchange ideas on strategies for mobilising resources globally to provide quality pharmacy education in Africa.

It is difficult for me to separate my experience with the CfEA from the overall influence of the FIP Education (FIP*Ed*) taskforce on me. FIP*Ed*'s earlier activities on quality assurance, stakeholder mapping and engagement, and competency building have shaped my views on matters at CfEA meetings. My contribution to development of the PharmD programme in Ghana, pharmacy council accreditation visits to schools of pharmacy, programmes of the West African Postgraduate College of Pharmacists, the West African Health Organization and the Gambia are a result of my experiences of FIP*Ed* and the CfEA project.

Most of the founding members of the CfEA are no longer in leadership positions at their institutions. It was, therefore, time to change the guard. A new generation of younger academics from seven countries led the CfEA from 2018. They have hit the ground running, demonstrating clarity of vision. A foundation is laid for the current generation to build on, consolidate the gains and widen the network across Africa to advance pharmacy education.

Namibia

By Professor Timothy Rennie, Dean, Faculty of Health Sciences, University of Namibia, Namibia. Founding partner, FIP-UNESCO UNITWIN CfEA (Namibia)

The FIP-UNESCO UNITWIN CfEA provided a platform for networking between institutions across different regions in Africa to engage with common challenges, but especially for the University of Namibia (UNAM) starting the first school of pharmacy in Namibia, to seek support from established institutions that were more in touch with the problems to be overcome. In addition, the CfEA connected UNAM with the broader networks and resources in FIP and associated institutions. A great example of this was in the first use in Africa of My Dispense developed by Monash University Faculty of Pharmacy and Pharmaceutical Sciences in Australia. Furthermore, a number of CfEA members have provided service to UNAM, for example, as external examiners and consultants to strengthen the quality of output of the educational programmes in a part of the world where there are fewest healthcare practitioners. This group has also signposted to training resources and expertise around Africa and beyond to support UNAM.

In 2016, the CfEA hosted the annual conference of FIP-UNESCO UNITWIN CfEA in Namibia which coincided with the UNAM launch of the first postgraduate clinical pharmacy training in Namibia (Master of Pharmacy); CfEA members provided great support and authority to this launch, demonstrating international and regional support. The opportunity to attend the FIP annual conference regularly to present activities related to the CfEA has similarly exposed UNAM to the resources available and to an understanding of the international context of pharmacy education and beyond.,

A number of collaborative projects have been embarked on that were vital in ensuring the CfEA had tangible impact — one example being the lab boxes provided for Malawi (see Chapter 4.3.2). This provided the opportunity to engage with members and wider networks on projects of mutual benefit to build capacity in pharmacy in Africa. UNAM has certainly benefited from this in developing pharmacy education from scratch and standing on the shoulders of giants.

Uganda

By Professor Richard Odoi Adome, Pioneer, Pharmacy Programme, Pioneer Dean, School of Health Sciences, Makerere University (Uganda) *[picture unavailable]*

The pharmacy training programme at Makerere University has existed since 1988 as a pioneer pharmacy training institution in Uganda. It began with a humble BPharm enrolment of 10 students selected from a large cohort of high science-scoring "A"-level students in the country. Typically, there was limited space and a grave shortage of teaching staff. In later years there was a gradual increase in the areas of enrolment, and increased teaching faculty. Currently we are admitting over 65 undergraduate students. There is also a new block housing administration, classrooms and laboratories.

A more significant turnaround was, however, realised in 2010 when the leadership teamed up with leaders from a few other pharmacy training programmes from other African countries under the auspices of the FIP-UNESCO UNITWIN CfEA, a group that seeks to advance research, training and curriculum development in pharmacy education. An advocacy coalition framework is a big component of this network.

To start with, that advocacy expanded the possibility for the department to attract a large pool of external examiners. That has led to the enhancement of quality control in the training system, and the sharing of experiences and lessons through meetings that rotate annually through the different institutions in the countries in the region. Through such collaboration we have since, at Makerere, improved our training curriculum. While Makerere changed from the traditional lecture system to a problem-based learning (PBL) system of training in 2005, promoting a deep learning experience among students that makes the development of retention of knowledge in the long term and the sharing of information afforded through FIP-UNESCO UNITWIN made the department concretise the PBL process.

Also through advocacy, the Ministry of Health recognised the wide-ranging possibilities of pharmacy participating in the country's health system, which had hitherto not taken root in Uganda. The Ministry of Health currently allots scholarships to the department to support postgraduate training annually and opening up placement positions for pharmacy graduates in government hospitals. Looking at the success of Makerere, other universities in Uganda have started their own pharmacy programmes. Now, there are three in Uganda.

Malawi

By Nettie Dzabala, Department of Pharmacy, College of Medicine, University of Malawi, Malawi. FIP-UNESCO UNITWIN CfEA, Founding member (Malawi)

The department of pharmacy was established in 2006 within the University of Malawi College of Medicine and was the first academic training programme for pharmacists in Malawi. This was to help address the widespread problems of drug shortages, inappropriate quality of medicines and irrational use of drugs, as well as a response to the HIV epidemic, which needed pharmaceutical personnel to handle the new, potentially toxic HIV drugs. The new department, however, faced many challenges relating to staffing, laboratory equipment and other resources.

The pharmacy department joined the FIP-UNESCO UNITWIN CfEA through an agreement signed in 2015 between our college and FIP during the 3rd Annual Summit of the CfEA in Blantyre, Malawi. The benefits of membership are multifold. A memorandum of understanding was also signed regarding a collaborative project named "Lab Box Project". This ensured the provision of 50 boxes of laboratory utensils for the department with basic laboratory equipment for student practicals.

Through this programme, the shortage of academic staff was relieved by My-dispense software, which can be used for teaching and marking, and student self-assessment for pharmacy practice and clinical pharmacy.

The programme has made available a number of resources for us, such as curriculum review expertise, enabling our pharmacy degree to be in line with global trends. We also have available external examiners from Universities of Namibia and Nigeria. I am currently an external examiner for the Namibian pharmacy programme.

Kenya

By Dr Stanley Njagih Ndwigah, Chairman, Department of Pharmaceutical Chemistry, School of Pharmacy, University of Nairobi(Kenya)

The University of Nairobi School of Pharmacy (UoN) has been involved in UNITWIN since 2018 in the context of the "Strategic Partnerships for Higher Education Innovation and Reform — Kenya Nottingham" (SPHEIR-KN) project. The SPHEIR-KN project, ending in 2020, was a partnership of five universities in Kenya with the objective of carrying out transformative curriculum development and review with regard to the BPharm programme. This is focused on realigning the curriculum with market needs and international training and practice trends.

The UoN was integrated into the CfEA programme in order to benefit the curriculum project in an efficient and practical manner. The UoN joined the FIP-UNESCO UNITWIN CfEA Lagos meeting held in June 2018, where gaps were identified in training and practice that required attention in the curriculum. These were clustered into three parts, namely, academic capacity, needs-based education and advocacy, together with the necessary funding sources. The UoN took leadership of needs-based education in tandem with execution of the SPHEIR-KN project.

Several themes were subsequently developed which culminated in the FIP-UNESCO UNITWIN CfEA Mombasa meeting, held in June 2019 and led by the UoN. The meeting brought together all partners in the SPHEIR-KN project together with all members of the CfEA to tackle common problems associated with curriculum development and review. The Mombasa meeting was scheduled to partially coincide with the Pharmaceutical Society of Kenya (PSK) annual symposium. Half day interactions with the PSK delegates yielded important inputs from the perspective of practitioners and employers. During the three-day workshop, partners benefited from experiences of UNITWIN partners, especially universities already running PharmD training. The forum permitted needs identification and pairing of some partners for mentorship. Recommendations from the proceedings have proved instrumental in the ongoing BPharm programme review.

Aside from this, the UoN is aware that there are opportunities within the CfEA for staff and student exchange, which are critical in capacity building and technology transfer in pharmacy practice. This will be very helpful as we move to make our curriculum more clinically based so as to have graduates fitting better in practice. The Kenya government is rolling out universal health coverage, whereby pharmacists are expected to offer primary healthcare in fields such as vaccination, contraception and public health.

Nigeria

By Dr Ifedola Isimeme Olojo, Clinical Pharmacist, Nigeria Institute of Medical Research, Lagos State (Nigeria)

The FIP-UNESCO UNITWIN CfEA was initiated basically to bridge the gap in pharmacy education in African universities. As a project lead of a sub-unit (academic capacity) of the CfEA, I together with my team carried out various educational standard assessments across CfEA member countries to determine limitations and strengths of pharmacy institutions. For most member countries staff strength and low institutional financial support were observed to be major limitations. Working with the FIP-UNESCO UNITWIN CfEA team in line with FIP Education strategic objectives, we were able to develop university staff exchange programmes, and mentorship programmes to assist in getting pharmacy staff in attending some international educational projects such as FIP's Pharmabridge.

In 2018, CfEA member countries were hosted for three days in Lagos, Nigeria, under the chairmanship of Professor Cyril Usifoh, who was the FIP-UNESCO UNITWIN CfEA chair in 2018. Stakeholders of the Nigerian Pharmaceutical Society were invited to give a brief history of pharmacy education and the gaps observed. CfEA country representatives were also given the opportunity to discuss more on their pharmacy educational status and which areas they would like FIP-UNESCO UNITWIN CfEA partners to come in and assist in. Being part of the Lagos meeting, I was exposed to proper training techniques of assessment and mapping of each country's pharmacy curriculum as well as providing support to member countries in the area of academic capacity.

Zimbabwe

By Jocelyn M.Chaibva, Vice President, African Pharmaceutical Forum (Zimbabwe)

I attended the FIP-UNESCO UNITWIN meeting in Mombasa in 2019. This was a great opportunity for me, and strengthened my leadership skills. The three broad areas of learning for me were as follows:

- Pharmacy education in sub-Saharan Africa and regional collaboration;
- Pharmacy education in Zimbabwe, practice framework and regulatory framework: The linkages; and
- Advocacy: The role of pharmacists towards achieving universal health coverage through good quality workforce and government recognition of such.

The FIP-UNESCO UNITWIN programme opened doors for regional collaboration and networking for schools of pharmacy in the region. The African Pharmaceutical Forum and regional pharmaceutical societies are interested parties in this. Funds permitting, more schools of pharmacy should join the FIP-UNESCO UNITWIN programme, which would create great opportunities for collaboration among schools of pharmacy. The benefits are immense.

Uganda

By Winnie Nambatya, Commonwealth Pharmacists Association (Uganda)

As a technical adviser for the Commonwealth Pharmacists Association in Uganda, FIP-UNESCO UNITWIN Centre for Excellence in Africa Meeting 2019 in Mombasa, Kenya, was my first encounter with the FIP team and, as a clinical pharmacy lecturer in academia, it was great to listen to all the possible solutions to the challenge of translating theory into practice. Also, the discussions on how best to change the curriculum in a transforming world to best equip our students with practical skills was very interesting. I did appreciate all the discussions in the meetings.

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4.2 Pharmacy education needs-assessment and country cases of the members of FIP-UNESCO UNITWIN Centre for Excellence in Africas

Authors

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All seven members from the FIP-UNESCO UNITWIN Centre for Excellence in Africa (CfEA) have completed a three-phase needs-assessment process in the years 2018, 2019 and 2020. The data generated from this needs-assessment process form the basis for this chapter of the report.

In 2018, the first phase of needs-assessment included an assessment of the use of FIP tools developed by FIP Education (FIP*Ed*) followed by a focused group discussion at the FIP-UNESCO UNITWIN CfEA meeting held in Lagos, Nigeria, in 2018. The aim of this consultation was to identify the needs and priorities in pharmacy education and pharmaceutical workforce.

The FIP-UNITWIN Needs Assessment Framework (Figure 16) includes the following steps:

1. **Educational standards assessment:** Using the FIP Nanjing Statements, CfEA members indicated the importance level from their school's perspective for each statement by choosing "high", "medium" or "low", including answers on how each of the statements is meeting the standards of their educational programme.
2. **Curriculum assessment:** Using the FIP Global Competency Framework, CfEA members indicated the importance level from their school's perspective for each competency/behaviour by choosing "high", "medium" or "low", including answers on how each competency/behaviour is meeting the learning outcomes of their curriculum.
3. **Curriculum mapping:** Members provided the list of courses in their curriculum including the year and credits under the themes of basic sciences, clinical sciences, pharmacy/healthcare, clinical experientials and electives.
4. **Workforce needs assessment:** Using the FIP Pharmaceutical Workforce Development Goals, the members indicated the importance level from their school's perspective for each development goal by choosing "high", "medium" or "low", and also how each of the development goals are meeting the national strategies or projects for pharmaceutical workforce development in their country.
5. **Needs analysis questionnaire:** This comprised 18 questions focused on assessing the state of pharmacy education and practice in the countries.

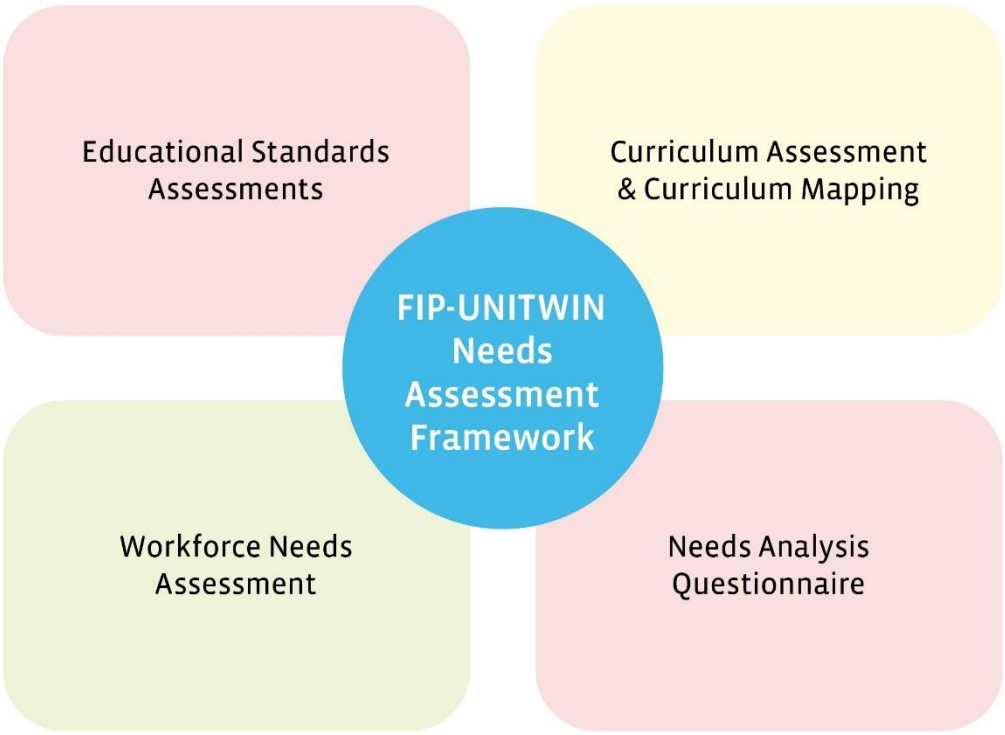

Figure 16. FIP-UNITWIN Needs Assessment Framework

In 2019, the second phase was conducted through an upgraded needs analysis survey using global education indicators from FIP Global Pharmacy Education Report and WHO National health workforce account indicators.

In 2020, the final consultation was done by developing each country's case built on the 2018 and 2019 needs assessment and validating country cases with colleagues from CfEA and national pharmacy organisations from each country built upon 2018 and 2019 consultation outcomes.

The analysis presented here should be interpreted within the confines of generalisation and based on best available validated data collated by the FIP-UNESCO UNITWIN CfEA colleagues, which is shown in Table 1.

Table 1: FIP-UNESCO UNITWIN CfEA members that participated in the needs-assessment: Balanced distribution across the sub-region of sub-Saharan Africa

	FIP-UNESCO UNITWIN CfEA member	Country	Sub-regions of sub-Saharan Africa
1	School of Pharmacy, University of Nairobi	Kenya	East Africa
2	Department of Pharmacy, Makerere University	Uganda	East Africa
3	Faculty of Pharmacy, University of Benin	Nigeria	West Africa
4	Faculty of Pharmacy & Pharmaceutical Sciences, Kwame Nkrumah University of Science and Technology	Ghana	West Africa
5	School of Pharmacy, University of Namibia	Namibia	Southern Africa
6	Department of Pharmacy, University of Malawi	Malawi	Southern Africa
7	Department of Pharmacy, University of Zambia	Zambia	Southern Africa

A comparative data analysis across CfEA member countries was done with regard to the number of schools of pharmacy in relation to country population, the academic capacity assessment in relation to staff student ratio and gender representation. Below is representation of the findings.

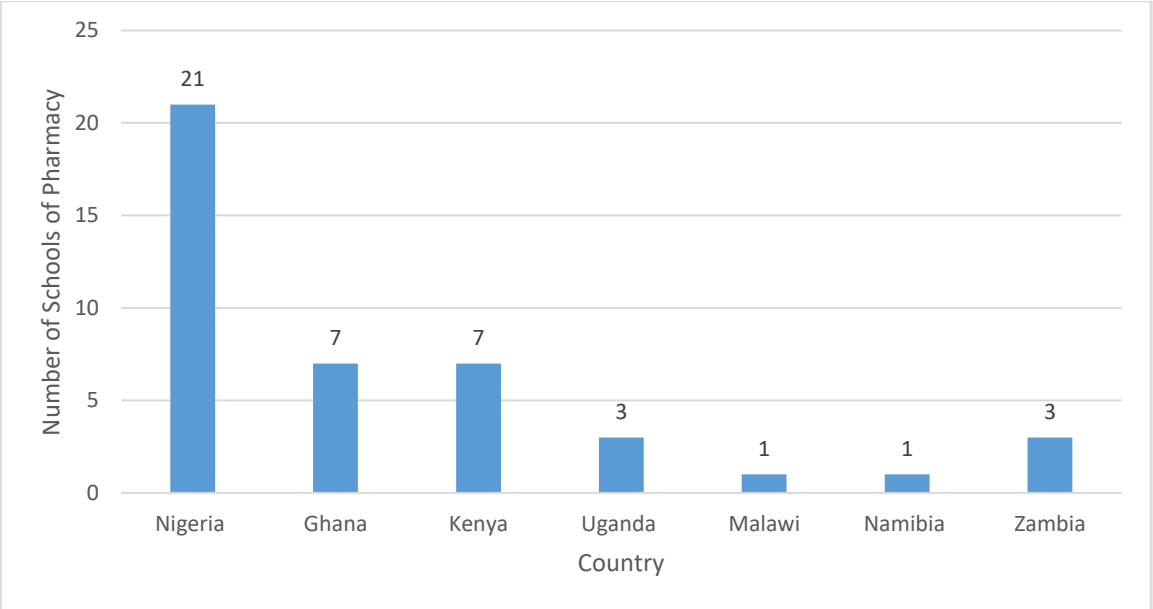

Figure 17. Number of schools of pharmacy* in FIP-UNESCO UNITWIN partner countries

**Schools of pharmacy here represent departments and faculties in accredited tertiary institutions (universities) offering training of undergraduate students to become practising pharmacists*

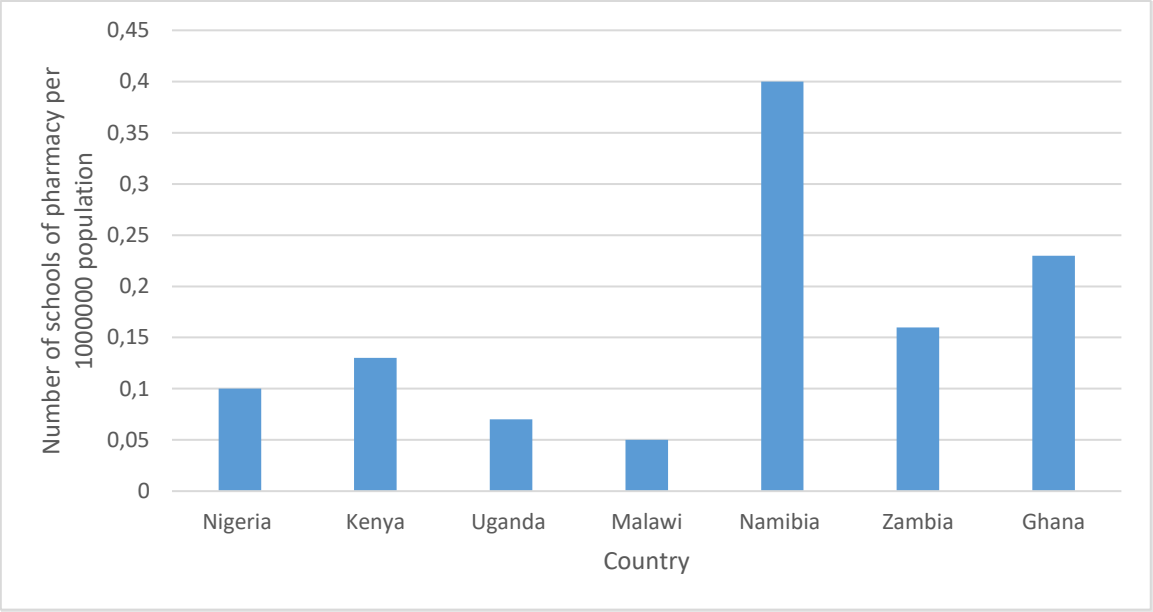

Figure 18. Number of schools of pharmacy per 1,000,000 country population

Figure 17 and Figure 18 show that there is a great disparity between the number of pharmaceutical education institutions in the countries. Nigeria has the highest number of pharmacy schools in the CfEA network; however due to the high population of the country, the proportion of schools of pharmacy per 1,000,000 population is 0.1. Conversely, Namibia has only one school of pharmacy but due to the low population of the country, the proportion of schools of pharmacy to population is 0.4. Countries like the USA and the UK have a proportion of about 0.5, so there is a need for proliferation of pharmaceutical education institutions in the region to ensure availability and access to pharmacy training for any member of the population who desires to become a trained pharmacist.

After academic capacity using indicators such as staff to student ratio, academic qualification of academic staff, and gender representation of staff were assessed, the data in Figures 19 and 20 were observed.

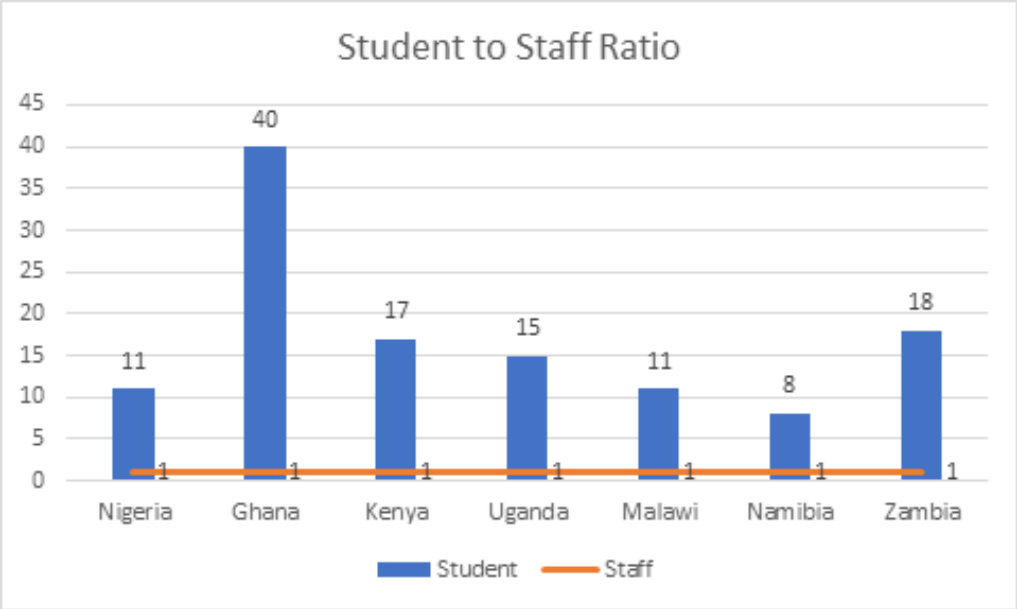

Figure 19. The student to staff ratio across FIP-UNESCO UNITWIN partner schools

Figure 19 show that all countries have student to staff ratios below 16 except for Ghana, Kenya and Zambia. The average across OECD countries is 16. Although the student to staff ratio is not a perfect indicator for staff capacity and engagement with students, it points to underfunded schools or school systems indicating a need for funding in order to have more academic staff and improve academic capacity.

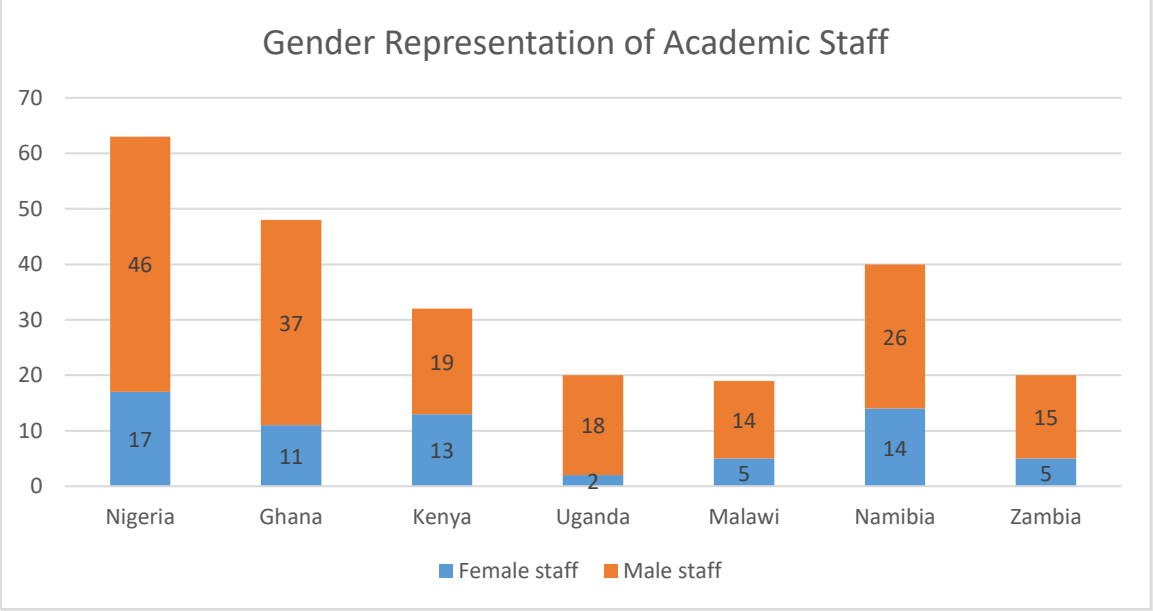

Figure 20. Gender representation of academic staff

Figure 20 shows that there is a gross disproportion in the gender distribution of academic staff with all member countries having more male than female academic staff. There is a need to strengthen policies that encourage gender equity, leading to a diverse community of academic staff.

4.2.1 Kenya

Education trends, innovation, transformations and current drivers of the pharmacy curriculum in Kenya

Authors

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Dr Dennis S.B. Ongarora, Department of Pharmaceutical Chemistry, School of Pharmacy, University of Nairobi (Kenya) *[picture unavailable]*

Pharmacy education has seen major changes in Kenya. Prior to 1974, pharmacy training was only offered at diploma level by the Kenya Medical Training College. In 1974, the country saw the need to have high calibre pharmacy professionals whose role would go beyond dispensing to involve advisory, managerial and academic responsibilities. By a Presidential Decree, the first set of pharmacy students were admitted to the Department of

Pharmacy within the School of Medicine of the University of Nairobi. They graduated in 1978 from a four-year programme with a Bachelor of Pharmacy (BPharm) degree. Since then, the number of institutions offering the BPharm degree has increased to seven universities, both public and private. Pharmacy education in these institutions is accredited by both the Commission of University Education and the Pharmacy and Poisons Board (PPB).

At the University of Nairobi, the degree programme increased to five years. In 1998, the university compressed the five-year programme into a four-year programme with extended academic years, but reverted back to the five-year programme in 2012. This is because the four-year programme still had all the units of a five-year programme, but the academic years were 44 weeks with no long holidays. Overloading of the curriculum and poor reception in the international community were major reasons for the latest change. Currently, the BPharm programme is a full-time five-year degree in all institutions nationwide.

There was a high demand for pharmacists in Kenya evidenced by the fact that all the graduates from the University of Nairobi as well as those graduating from overseas universities were rapidly absorbed into employment. Prior to 2003, the University of Nairobi used to graduate an average of 30 pharmacists per year, creating a big shortage of qualified pharmaceutical personnel. This has led to increase in number of universities training pharmacists to seven and diploma training colleges to 20.[1] Owing to the crafting of the Pharmacy and Poisons Act (Chap 244) of the laws of Kenya, both pharmacists and pharmaceutical technologists are allowed to practise in parallel in community pharmacy.[2] This has tended to discourage the involvement of pharmacists in this sector. However, there are plans to change community practice for pharmacists to a more patient-care oriented discipline.

Education trends

The pharmacy degree in Kenya was initially a heavily science-oriented programme. It prepared graduates to dispense in community pharmacies and hospitals and also play a leadership role in manufacturing and regulatory affairs in pharmaceutical industries. However, in the 1990s it was observed there was a deficiency in clinical skills in BPharm graduates and, as the USA moved to introducing PharmDs in all its universities, the University of Nairobi introduced clinical pharmacy in its BPharm curriculum. The PPB core curriculum has this clinical component and all universities have followed suit, leading to increased exposure of students to clinical pharmacy and hospital practice.

In 1997 the University of Nairobi introduced a Master's degree in pharmaceutical analysis. For the same reasons mentioned above, the MPharm in clinical pharmacy followed in 2005. Since then industrial pharmacy, molecular pharmacology, and pharmacovigilance and epidemiology courses have been launched. These programmes play a big role in establishing a pool of specialists to drive research, academia and practice.

Innovations and transformations

There has been a healthy debate about moving from BPharm to the more clinical PharmD programme in Kenya. This requires a paradigm shift in the practice arena in the region. The devolution of health to county governments in 2013 and the Kenya President's "Big 4" agenda of universal health coverage (UHC) has presented an opportunity for pharmacy innovation and transformation in Kenya to make pharmacists play a more central role. UHC adopts a primary health care approach that entails scaling up immunisation services, maternal and child health services (including family planning), and antenatal and postnatal care services. The debate about training centres on the empowerment of pharmacists to play a big role in UHC.

Recently, there has been a move to transform the pharmacy curriculum in Kenyan universities with the aim of increasing experiential learning. This was supported by the Strategic Partnerships for Higher Education Innovation and Reform (SPHEIR) project involving the University of Nottingham and five public Kenyan universities. The focus of the project was not only to increase the time spent in experiential areas but also to ensure tools to facilitate and monitor this form of learning are developed. The use of innovative learning methodologies beyond the traditional lectures, practicals and ward teaching was also to be embraced. It is envisaged that such changes will produce practice-ready pharmacy graduates. Curriculum review to adopt these approaches is in various stages in different institutions.

Drivers of curriculum change

Universities and the PPB acknowledge that since most graduates (over 90%) work in hospital and community settings, there is need to change curriculum towards a more clinically focused one. To cater for industrial pharmacists, there is talk about a master's in industrial pharmacy or pharmaceutical analysis being a minimum requirement for pharmacists who will be in charge of production and quality control of pharmaceuticals.

There has also been a call to ensure that pharmacists are well versed in science as well, so that they are distinct from other health professionals. An evolving practice environment continues to call for adaptive development. Thus, there has also been a move towards increasing leadership, management and social pharmacy components to make pharmacists better managers and team players. It has been observed that alignment of curricula with actual practice increases job satisfaction and ability to meet patient needs.[3]

National strategy

The PPB has reviewed its internship guidelines to adapt to the new requirement for involving pharmacists in UHC. In late 2019, it increased the time spent in hospitals from six to eight months, the extra two months being spent in primary healthcare facilities. The interns will henceforth spend two months in community pharmacies. For the first time in Kenya, internship in industries is not mandatory as the interns are free to choose whether to spend their last two months of internship in industry, quality control laboratories or supply chain facilities like the Kenya Medical Supplies Agency or the Mission for Essential Drug Supplies.

Conclusion

For UHC to succeed and in order to achieve United Nations Sustainable Development Goals the right personnel and availability of health products and technologies are necessary. Aligned pharmacy curricula aim to achieve both needs.

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Pharmacy education country profile: Kenya

By FIP-UNESCO UNITWIN Centre for Excellence in Africa Member, School of Pharmacy, University of Nairobi, Kenya

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Did you know?

- The pharmaceutical workforce in Kenya comprises pharmacists, pharmaceutical technologists, nurses and pharmacy assistants. Pharmaceutical technologists hold a diploma, nurses work in lower level government facilities such as dispensaries, and pharmacy assistants are not a trained and officially recognised group.

- The scope of pharmacy practice includes: dispensing prescriptions and over-the-counter medicines; pharmaceutical care services such as vaccination, diagnostic and pregnancy tests; procurement and distribution of medicines; clinical pharmacy services and therapy management in hospital settings; pharmaceutical regulations such as practice, manufacturing, import/export and pharmaceutical manufacturing; quality assurance; public health programmes management; and academia and research.

- The priorities of Kenya that are driving pharmacy education are the universal health coverage and pharmaceutical manufacturing pillars of the Kenyan President's Big Four Agenda.

Pharmacy education in Kenya

General information

Ownership: Public and stand-alone

Duration of studies: 36 weeks/year, five years in total

Language of instruction: English

Kenya has two categories of pharmaceutical personnel, i.e., those with a Diploma in Pharmaceutical Technology and those with a Bachelor of Pharmacy degree. In addition, the universities, led by the University of Nairobi, offer a variety of master's degree courses and PhD programmes.

The Diploma in Pharmaceutical Technology is a three-year programme consisting of one year of pre-clinical training followed by two years of clinical training. Graduates of this course are meant to assist pharmacists in the delivery of quality pharmaceutical care. Graduates who score better have the option of progressing to university to pursue a BPharm degree.

The BPharm degree course is a full-time programme that extends over a period of five academic years of two semesters each. All the courses in the programme are core and must be successfully completed before graduation.

The training comprises lectures, practicals, research projects and clinical ward rounds. Before the final year of study, students undertake hospital, industrial and community pharmacy attachments.

According to the PPB, as at 8 April 2020, Kenya had 3,360 registered pharmacists and 10,569 pharmaceutical technologists serving a population of approximately 50 million. In 2019/2020, 157 pharmacists were registered, and 630 pharmaceutical technologists were enrolled.

Courses and qualifications

Several different diploma and degree courses are offered, as follows:

- Diploma in Pharmaceutical Technology
- Bachelor of Pharmacy
- Master of Pharmacy in Pharmacoepidemiology and Pharmacovigilance
- Master of Pharmacy in Clinical Pharmacy
- Master of Pharmacy in Industrial Pharmacy
- Master of Pharmacy in Pharmaceutical Analysis
- Master of Science in Pharmacognosy and Complementary Medicine
- Master of Science in Molecular Pharmacology
- PhD in Pharmaceutical chemistry
- PhD in Pharmaceutics
- PhD in Pharmacology
- PhD in Pharmacognosy
- PhD in Molecular Pharmacology
- PhD in Pharmacoepidemiology and Pharmacovigilance

Admission requirements

Undergraduate admission requirements are as follows:

- Applicants from high school must have obtained grade C+ in KCSE (Kenya Certificate of Secondary Education) and an average cluster weight of B– in chemistry, biology, mathematics/physics and one language (English/Kiswahili), provided that no subject in this cluster shall have a grade below C+. Due to the limited number of places, the cut-off point is usually higher than B–.

- For diploma holders: a mean grade of C in KCSE with a minimum score of C plain in each of the cluster subjects above and a credit pass in the following qualifications from a training institution recognised by the Pharmacy and Poisons Board: Diploma in Pharmaceutical Technology, Laboratory technology, Clinical medicine, Radiology, Nursing, Public/ Environmental health.

- All graduates in basic sciences are also allowed to apply and are admissible to study the BPharm programme.

With regard to postgraduate admission requirements, any graduate from a recognised university can apply for admission to any of the graduate courses. However, due to poor performances seen with some students who have applied for admission and drop out before completing the graduate courses, some universities, e.g., the University of Nairobi, have introduced interviews for applicants before they can be admitted to postgraduate courses.

Credit transfer and recognition of prior learning

Generally, credit transfer of courses taken at the same level is allowed to maximum of 30% of taught courses. However, the rules vary from one university to the next. With the University of Nairobi, credit transfers are allowed for only years 1 and 2 of study and is only applicable to non-clinical courses. Other universities like Mount Kenya University allow for up to 100% transfer from ordinary diploma and higher diplomas to degree courses, which raises a question of equivalence. Such graduates are not admitted to pursue graduate courses at the University of Nairobi.

Main curriculum focus areas

There are three main curriculum focus areas: pharmaceutical sciences, clinical pharmacy and pharmaceutical care, and pharmaceutical manufacturing.

Key learning objectives of the curriculum

Key learning objectives include:

- Prepare graduates in the three main areas of practice: hospital, community and industry. These areas address the health needs and aspirations of the Kenyan government.
- Provide the highest standard of health care for citizens, which implies a supply of quality assured medicines and the provision of quality pharmaceutical services.
- Strengthen pharmacy practice by changing public perception of the pharmacist from shopkeeper to healthcare professional, by empowering graduates with clinical skills and regulatory control.

Objectives of the ongoing curriculum review process

Most curriculum review seems to be moving training so as to transition from BPharm to PharmD. This will increase the amount clinical training compared with the current BPharm programme. This will result in:

- Transition into a competency-based education system within the country;
- Addressing of curriculum delivery challenges such as rationalisation of semester dates and attachments; and
- Needs-based education: Changing dynamics of pharmacy practice.

Core country curriculum

Universities have organised their curricula to have two or three terms per year. Some carry out end-of-year exams and others, semester exams. The organisation of the training is generally divided into foundation/non-clinical courses and the core clinical courses. Below is a representation of the University of Nairobi's pharmacy curriculum organisation. The actual curriculum is protected and is not shared by any of our universities online.

Year 1	Year 2
Chemistry Mathematics Human anatomy Medical physiology I Medical biochemistry I Pharmaceutical chemistry I	Medical microbiology Pharmaceutics I Pharmacology I Pharmaceutical chemistry II Medical biochemistry II Medical physiology II Social and behavioural pharmacy I

Year 3	Year 4
Pharmaceutical chemistry III Pharmacology II Pharmaceutics II Pharmacognosy I Clinical pharmacy I Human pathology Social and behavioural pharmacy II	Pharmaceutics III Pharmaceutical chemistry IV Pharmacology III Pharmacognosy II Clinical pharmacy II Experiential learning (12 weeks)

Year 5
Pharmaceutical chemistry V Pharmacology IV Pharmaceutics IV Pharmacognosy III Clinical pharmacy III Leadership and management Pharmacy law and ethics Research project

Experiential learning

Experiential learning is a component of the curriculum whereby students are exposed during a fourth term rotation in their year 4 of study. Thereafter they undertake a one-year internship under the Kenya Pharmacy and Poisons Board.

At end of year 4 of study, students take on experiential learning of four weeks each in hospital pharmacy, community pharmacy and industrial pharmacy practice.

During internship, they experience the following:

- Level IV/Level V hospital (six months);
- Level II/level III hospital (two months);
- Community pharmacy (two months); and
- Industry or quality control laboratory or supply chain entity (two months).

The Kenya Pharmacy and Poisons Board is responsible for the supervision of interns through logbooks.

Delivery of the curriculum

The curriculum is delivered through face-to-face lectures, online teaching, eLearning portals, practicals, case studies, clinical ward rounds and simulations.

Assessment of learning

Students are evaluated using written examinations, oral examinations, practical examinations (where applicable) and clinical examinations (with log books). Coursework is based on: continuous assessment tests, practicals, assignments, clinical assessment, and oral examinations and presentations.

National pharmacist's competency framework

The Pharmaceutical Society of Kenya (PSK) in collaboration with FIP and the University of Nottingham has been working on a competency framework for pharmacists in Kenya. Using the FIP Global Competency Framework, we plan to carry out a survey to identify competency gaps in Kenyan foundational level pharmacists, as well as to identify which additional competencies are needed in Kenyan pharmacists in line with the country's health priorities. The process is ongoing and is expected to conclude in 2021.

A competency-based approach in education was introduced in basic education in Kenya in 2017, and the country's aspirations are that this approach will be applied at high school and university levels. The PSK hopes that the Kenyan competency framework for pharmacists will be a guide to all practising pharmacists in Kenya, as well as to schools of pharmacy in development and improvement of their curricula.

Accreditation and quality assurance

There is a five-year accreditation system by the Pharmacy and Poisons Board of Kenya together with Ministry of Health, Ministry of Education and the PSK. This covers accreditation of the educational institution/university, the faculty/school of pharmacy and the academic programme.

There is an internal quality assurance mechanism by the faculty whereby external examiners moderate examinations and master's/PhD theses/dissertations. There is also an ISO certification 9001:2015 Quality Management System (QMS) in place.

Administration and finance

Approximately 50% of students in public universities are self-sponsored and pay direct tuition fees of KES 450,000 per annum for the University of Nairobi School of Pharmacy. The Kenyan Government sponsors the fee of the other 50% through government capitation to the universities, and these government-sponsored students pay about KES 26,000 to the university either from personal funds or through loans.

Pharmacy education at the University of Nairobi School of Pharmacy — Needs-assessment using FIP's global pharmacy education tools

Educational standards assessment	
Result	The University of Nairobi School of Pharmacy's education programme has been mapped against FIP Nanjing Statements in order to perform an educational standards assessment. University of Nairobi School of Pharmacy educational standards have shown strong links with the standards under the clusters of #1 "Shared global vision", #3 "Recruitment of students" and #7 "Quality assurance". The educational standards meet the standards in the #8 "Continuous professional development" cluster to a large extent due to the collaboration between the Pharmaceutical Society of Kenya and the University of Nairobi School of Pharmacy. Cluster #2 "Professional skills mix" has been the cluster with most of the gaps where the University of Nairobi prioritised the standards under this cluster but the educational programme has not been meeting those. Clusters #4 "Foundation training and leadership", #5 "Experiential education" and #6 "Resources and academic staff" have identified gaps in comparison to the educational programme in the University of Nairobi. Inter-professional education and collaboration, scientific evidence literacy, pharmaceutical sciences, public health and social skills, regulatory sciences skills, professional skills such as lifelong learning, experiential education with a non-traditional approach, and career development of academic staff have been the common gap themes identified under the clusters.

Curriculum assessment	
Result	The BPharm curriculum of the University of Nairobi School of Pharmacy consists of the following course categories: pharmaceutical sciences courses which take 48.8% of the total credits, basic sciences courses(31%), clinical pharmacy courses (9.3%), experiential courses (8.5%) and social sciences (2.3%). Based on the curriculum assessment and educational outcomes mapping against the FIP Global Competency Framework, the pharmaceutical public health competencies, pharmaceutical care competencies, organisation and management competencies and professional and personal competencies are assigned highest priority of importance to be delivered by the curriculum. However, looking into the specific behaviours under these priority competencies, learning outcomes of the curriculum were not completely matched with public health, medicines management and dispensing, monitoring medicines usage and outcome follow-up, documentation, scientific evidence-based decisions, organisation and management, risk management and CPD behaviours. The University of Nairobi School of Pharmacy would like to transform and improve experiential learning, inter-professional learning, needs-based courses and horizontal and vertical integration of courses in its curriculum. This will drive the scope of practice towards improved patient care, supply chain management, pharmaceutical manufacturing, drug innovation and traditional/alternative medicines**.**
Workforce development	
Result	All 13 of the FIP Pharmaceutical Workforce Development Goals (PWDGs) are assigned high priority and Kenyan national pharmacy policy has been mapped against the PWDGs. Kenya has local strategies/policies in place in quality assurance of pharmacy education and foundation training for pre-registration pharmacists. Some of the PWDGs are not covered by local strategies/policies in Kenya, particularly the PWDGs under professional development and systems. Although there is a local CPD system in place, run by the Pharmaceutical Society of Kenya, where CPD points are accumulated, there are no consequences for non-compliance. Professional recognition and advocacy towards establishing clear pharmaceutical cadres other than pharmacists may support a higher rate of match between pharmacy education and scope of practice. Post-registration mentorship may be established, and national pharmaceutical policy recognises the need for specialised training where the Pharmacy and Poisons Board instituted the specialist recognition.

Academic capacity and infrastructure

- Staff to student ratio: 1 staff to 17 students (BPharm only)
- Number of students in undergraduate programme: 24o female, 302 males with total of 542
- Number of students in master's programme: 30 females, 36 males with total of 66
- Number of students in PhD programme: 4 females, 10 males with total of 14
- Number of academic staff are 12 female, 18 male with a total of 30
- Key areas of research expertise and number of staff: pharmaceutical analysis (9), pharmacognosy (6), pharmacology (7), pharmaceutics (4), clinical pharmacy (5)
- Graduate output in 2019: undergraduate (76), postgraduate (29) with a total graduate output of 105
- Distribution of graduates in key practice areas: 48% in hospital practice, 33% in community practice, 2% in industry practice and 17% distributed across academia, management, research and public health)
- Average number of research output yearly: approximately 100 publications in peer reviewed journals, conference presentations and book chapters
- Academic exchange programmes in place: the University of Nairobi School of Pharmacy has not been involved in an academic staff exchange programme nationally or internationally
- There are significant gaps in academic capacity in terms of numbers and expertise, where academic staff numbers are less than required by a shortfall of 40%

4.2.2 Uganda

Education trends, innovation, transformations and current drivers of pharmacy curricula in relation to national health priorities in Uganda

Authors

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Pharmacist training in Uganda started with a four-year Bachelor of Pharmacy (BPharm) undergraduate degree at Makerere University in 1988 with limited space and annual admissions of 10 students.[1,2] This programme produces a generalist pharmacist with competencies cutting across pharmaceutical production, quality assurance, natural products, dispensing practice, and clinical pharmacy. Towards the year 2000, veterinary pharmacy, research proposal, dissertation, hospital and community pharmacy practice electives, and industrial training were brought onboard. In 2003, pharmacoepidemiology and pharmacoeconomics were added and problem-based integrated learning adopted.[3] In this regard, faculty-developed multidisciplinary cases are provided in tutorials to students, who set learning objectives followed by two-day self-directed learning and then report back on the fourth day. Faculty interaction is limited to overview lectures at the start of the module. These are complemented by clinical skills laboratories, clinical case presentations, practical laboratories, clinical clerkships and community service. Makerere University was joined in offering a BPharm by Mbarara University of Science and Technology in 2003 and Kampala International University in 2004.[2]Makerere's BPharm curriculum is revised every five years to address emerging health needs, stakeholder feedback and global trends.[1] Sister universities modelled their BPharm on the Makerere curriculum. In 2010, a new expansive pharmacy building was launched at Makerere University, enabling a rise in annual undergraduate admissions to 60 and the introduction of two master's degrees (in pharmaceuticals/health supplies management and in pharmacognosy).[1] These programmes were responsive to stakeholder engagements that raised the need for graduate level experts in pharmaceutical management and the development of natural medicinal products.[4,5] The pharmaceutical management programme was particularly necessary to develop advanced skills in data generation, critical appraisal, problem solving, and management to address a pervasive problem of large expiries, overstocking, stock-outs, and diversion of medicines in the country.[4–8]

Pharmacy education country case: Uganda

By FIP-UNESCO UNITWIN Centre for Excellence in Africa Member Makerere University, Kampala

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Did you know?

- According to Uganda's Ministry of Health, pharmacy practice in Uganda began in the 1950s/60s, carried out by pharmacists trained outside the country.[9] The Pharmacy Board equally traces its roots to the 1950s, although it was formalised by law in 1970.

- There were 1,210 pharmacists on Uganda's Pharmacy Board register by May 2019, with 1,143 in active practice in Uganda.[9]

- Most pharmacists in Uganda work in community pharmacies, the medicines regulatory agency, pharmaceutical industry (manufacturing), and pharmaceutical distribution in the public, private not-for-profit and private for-profit sectors. Many also serve as researchers in clinical and public health research programmes, and as pharmaceutical experts in donor-funded global health programmes, while a few are in hospital pharmacy practice, academic pharmacy, and drug development institutes.

- Pharmacy curricula in Uganda are responsive to the country's disease burden and health system needs as documented in annual health sector reports, health development plans, pharmaceutical sector plans, and stakeholder consultations. For the past decade, priorities that have influenced pharmacy curricula are severe deficiencies in pharmaceutical management, quality assurance and medicines use, and lack of postgraduate competency in specialist areas of pharmacy.[10]

Pharmacy education in Uganda

General information

Ownership: Public (state-owned)

Duration of studies: 17-week semesters and one 10-week recess, four years in total

Language of instruction: English

In Uganda, there were 1,143 registered pharmacists in 2019. Uganda's population is 40.3 million[11] and there are 0.003 pharmacists per 1,000 population. In 2019, the average number of pharmacy graduates was 170 (in-country) with a total of 200.

Courses and qualifications (including all pharmaceutical support workforce)

- There is a credit system with total units of 192 credits and 2,880 contact hours.
- The undergraduate course is Bachelor of Pharmacy.
- Postgraduate courses include MSc Pharmacognosy and MSc Pharmaceuticals and Health Supplies Management

Admission requirements

Undergraduate admission requirements — This includes the pre-university (entry) qualifications and the entrance examinations. The Pre-university (entry) qualifications:

- Direct entry: Uganda Advanced Certificate of Education (principles in chemistry and biology and minors in mathematics or physics).
- Other entrants: Diploma in Pharmacy or in a health sciences field.
- Mature age entry examinations administered by Makerere University.

The entrance examinations include Uganda Advanced Certificate of Education Direct entry: Uganda National Examinations Board. Other entries are through the Makerere University office of Academic Registrar.

Postgraduate admission requirements — To be admitted to the Master of Science in pharmaceuticals and health supplies management:

- The candidate must fulfil the general university requirements for admission to a master's programme.
- An applicant must be a holder of at least a second-class degree or its equivalent awarded by Makerere University or any other recognised institution.
- In addition, the candidate must be a holder of a good first degree in any of the following bachelor degrees or the equivalent from any recognised institution: Bachelor of Pharmacy, Bachelor of Medicine and Bachelor of Surgery, Bachelor of Dental Surgery, Bachelor of Veterinary Medicine, Bachelor of Nursing Science, or Bachelor of Laboratory Technology. Applicants with a Bachelor of Health Services Management or Bachelor of Business Administration or Bachelor of Science (Chemistry, Biochemistry) with a Diploma in Pharmacy, Medicine, Veterinary Medicine, Dental Surgery or Nursing will also be considered.

Credit transfer and recognition of prior learning

Makerere University has a written policy on transfer of credits for undergraduate and graduate students from other recognised institutions of higher learning that cuts across all its academic programmes in which an applicant is allowed to transfer credits for equivalent courses for up to 60% of the total graduation load of a programme.[12] Critical prerequisites are that the student must satisfy the entry admission requirements for the academic programme applied for and must have obtained a cumulative grade point average of at least 3.0 or its equivalent. Additionally, a student is only allowed to transfer credits for courses in which he or she obtained a grade point with at least 2.0 or its equivalent. Any application for transfer must also be accompanied by recommendations from the institution from which the candidate is transferring.

Main curriculum focus areas

Pharmacoepidemiology**,** public health pharmacy**,** pharmaceutical management**,** therapeutics and pharmaceutical care**,** microbiology and biotechnology.

Key learning objectives of the curriculum:

- The curriculum is tailored and reviewed to meet identified national needs or goals. This is among the key drivers for regular review of the curriculum. The department attempts to lead the practice in pioneering changes that are believed to be essential in meeting nationally set goals.
- From the first year on, a pharmacy student will be taught by a faculty with backgrounds in all medical professions and biomedical qualification. Also, in many programmes, students of pharmacy join medical and nursing students during the course.

Objectives of the ongoing curriculum review process (e.g., transitioning from BPharm to PharmD):

- Current contents to reflect changes in international and local pharmacy practice, as well as changes in policies and regulatory requirements
- Reflecting pharmaceutical needs of the country
- Incorporating feedback from alumni

Core country curriculum

A model country curriculum for the BPharm in Uganda has only recently been developed by the Council of the Pharmaceutical Society of Uganda, the body legally charged with oversight of pharmacy education in the country.[13] Below is a summary of this curriculum.

Year 1	Year 2
Semester 1 Gross human anatomy Community health and epidemiology Local language, in which clinical practice shall take place Pharmacognosy —plant identification and processing Introduction to pharmaceutics Soft skills **Semester 2** Human anatomy: histology and embryology Biochemistry (structure and catalysis) First aid and nursing process Computer applications Human physiology: cell, blood and body fluids, renal, cardiovascular and respiratory Pharmacy practice —evolution of pharmacy, and the healthcare systems in Uganda University unique course	**Semester 1** Applied immunology Biochemistry (metabolism and metabolic regulation) Basic inorganic and physical chemistry Basic microbiology: bacteriology, virology, and mycology Human physiology: endocrine, reproductive, digestive, and nervous systems Pharmacy practice —units of measurements and calculations in pharmacy **Semester 2** Applied microbiology Parasitology Pharmacognosy —secondary plant metabolites Pharmaceutics —technology of unit processes Basic pharmacology Comparative veterinary anatomy and physiology University unique course

Year 3	Year 4
Semester 1 Organic chemistry Pathology Pharmaceutical microbiology —microbicides, decontamination, infection control and applications Systemic pharmacology Pharmacy practice —patient care, settings and devices management Therapeutics — antineoplastics and anti-infectives **Semester 2** Clinical pharmacy —introduction to pharmaceutical care, biopharmaceutics and clinical lab data Pharmaceutical biotechnology Pharmaceutics —dosage form formulations Pharmaceutical microbiology —sterilisation processes and preservation Comparative veterinary pharmacology and biopharmaceutics University unique course	**Semester 1** Clinical pharmacy —management of infectious diseases Pharmaceutical chemistry —organic pharmaceuticals, drug discovery and design Pharmaceutical cosmetology Pharmaceutical analysis —instrumentation and methods Pharmacy industrial field work Research proposal development **Semester 2** Clinical pharmacy —systemic non-infectious diseases Clinical pharmacy —junior pharmacy clinical clerkships General management, and pharmaceutical and health supplies chain management Assessment of quality of biological products Agro-veterinary pharmacy University unique course

Year 5
Semester 1 Clinical pharmacy —non-systemic and non-infectious diseases Pharmaceutics —modified release dosage form technology and nuclear pharmacy Pharmaceutical microbiology —pharmaceutical and food microbiological quality analyses, assurance and auditing Research implementation and report writing Clinical pharmacy —senior pharmacy clinical clerkships **Semester 2** Pharmacognosy —natural products, traditional medicines and complementary systems of medicines Pharmacy professional ethics and law Pharmacoeconomics Pharmaceutical chemistry —limit tests and standardisation of organic and inorganic pharmaceutical compounds Pharmaceutics —quality analysis of dosage forms Toxicology and forensic pharmacy University unique course

Experiential learning

After the BPharm degree or its equivalent, there are 12 months of mandatory experiential learning supervised by the Ugandan Ministry of Health and the Pharmaceutical Society of Uganda. The placement includes nine months

in a hospital and three months in the industry or a regulatory body. Interns are assessed using logbooks and reports from supervisors. Finally, the candidate needs to pass a pre-registration examination set by Pharmaceutical Society of Uganda.

Sometimes, there is shortage for internship placement, especially in hospitals, due to a dearth of hospitals that employ pharmacists who qualify to precept, mentor and supervise intern pharmacists.

Delivery of the curriculum

Several delivery methods are available and for each course, an appropriately determined mix of methods is employed. The methods prescribed in the curriculum are lectures, problem-based learning, case scenarios, tutorials, seminars, practical sessions, group assignments, self-directed learning, clinical exposures and skills training.

Assessment of learning

Each course in the curriculum is assessed in two parts of progressive continuous assessment and summative assessment:

- Progressive (continuous) assessment contributes 40% of overall score. Continuous assessment utilises a variety of methods, including tutorial assessment, observation of skill performance, laboratory practical assessments, clinical case write-ups and presentations, coursework assignments (term papers), multiple choice tests with or without short answer questions, and clinical clerkship logbooks.
- Summative or end of semester examinations contribute a maximum of 60% of the total marks. These utilise various methods, including written examinations (multiple choice questions, modified essay questions, short answer questions), Objectively Structured Clinical Examinations (OSCE), Objectively Structured Practical Examinations (OSPE), project reports, oral research report presentations and *viva voce*.

The specific method used for assessment varies across the different phases of the curriculum, based on the expected competencies for each course. Each course is graded out of a maximum of 100 marks and assigned appropriate letter grades from A+ to F. The pass mark in any course is 50%.

National pharmacist's competency framework

In the model BPharm curriculum developed by the Pharmaceutical Society of Uganda, the following competences are espoused:

- Providing pharmacist-initiated care: to human or animal clients/patients and ensuring the optimal use of pharmaceuticals, health products and devices of medical and veterinary application;
- Dispensing and ensuring optimal use of pharmaceuticals and health products in humans and animals;
- Monitoring pharmacotherapy to human or animal clients/patients as recommended by the prescriber;
- Organising and carrying out the procurement, storage and distribution of pharmaceuticals, health products and health devices;
- Compounding, manufacturing and packaging of pharmaceutical products, nutraceuticals and cosmetics;
- Providing information and education on health care, pharmaceutical products, health products and health devices;
- Promoting community health and providing related information and advice;
- Regulating the practice of pharmacy;
- Quality assessment of pharmaceuticals, health products, herbal products and health devices;
- Forensic pharmaceutical services, namely, forensic investigations, especially pertaining to the unlawful drug trade, possession and use, such as when a pharmaceutical or poison has been used to kill, destroy or hurt any human or animal;

- Managing the pharmacy and pharmaceutical services: policy formulation, implementation, monitoring and evaluation; and
- Carrying out research to promote innovations and optimal use of pharmaceuticals, health products and health devices.

These competencies are ingrained in the structure of the model country curriculum for the BPharm and university curricula. There is no significant difference between the model country curriculum developed by the Pharmaceutical Society of Uganda and the BPharm curriculum for Makerere University. A limitation of this curriculum is that in striving to produce an all-round pharmacist, too much content is pushed into a limited time of four years, which compromises the time allocated to hands-on learning activities, such as clinical pharmacy clerkships, community pharmacy clerkships and industrial training. Among pharmacists in hospital practice, pharmaceutical care provision in clinical teams seems low.

Accreditation and quality assurance

Accreditation is conducted every five years by the Ministry of Education and Pharmaceutical Society of Uganda. Core accredited components are the institution/university, the faculty/school of pharmacy, and the academic programme.

Administration and finance

The student direct tuition fee charged per annum is UGX 2,600,000, payable by individuals or by the government for those on government scholarship.

Pharmacy education at Makerere University, Kampala, Uganda, Department of Pharmacy — Needs-assessment using FIP's global pharmacy education tools

Educational standards assessment	
Result	Makerere University, Kampala, Uganda Department of Pharmacy's education programme has been mapped against FIP Nanjing Statements in order to perform an educational standards assessment. Based on the educational standards mapping against the education programme with FIP Nanjing Statements, Makerere University Department of Pharmacy educational standards have shown high connections with the standards under the clusters of #1 "Shared global vision", #2 "Professional skills mix", #4"Foundation training and leadership", #5 "Experiential education", and #7 "Quality assurance". Cluster #3 "Recruitment of students" indicated moderate situation, requiring improvement in terms of consideration of value of a diverse student body reflecting regional population characteristics. Clusters #6"Resources and academic staff'' and #8 "Continuous professional development" have most of the gaps. These gaps are related to: 1. Insufficient resources to enable effective teaching and research. 2. Lack of support to the pharmacy department to promote the participation of academic staff, preceptors, students and administrators in national and international activities of pharmacy and related experiences.

Curriculum assessment	
Result	From the curriculum assessment and educational outcomes mapping against the FIP Global Competency Framework, pharmaceutical public health competencies and pharmaceutical care competencies were ranked highest priority of delivery in the curriculum. Organisation and management competencies were ranked medium, requiring improvement in the following areas: financial transparency, effective procedures for reimbursement claims, effective stock management and running of service with the dispensary, appropriate time management. Professional/personal competencies were ranked low. To improve this aspect, a lot needs to be done on: identify if expertise is needed outside the scope of knowledge; identifying learning needs; recognising own limitations and acting upon them; demonstrating knowledge in pharmaceutical marketing and sales; ensuring appropriate quality control tests are performed and managed appropriately; ensuring medicines are not counterfeit; and ensuring quality standards.
Workforce development	
Result	Among the 13 FIP Pharmaceutical Workforce Development Goals, items #3 "Quality assurance", #7 "Service provision and workforce education and training", and #8 "Working with others in the health care team" were ranked high. Items #1 "Academic capacity", #2 "Foundation training and early career development", #4 "Advanced and specialist expert development", #9 "Continuing professional development strategies", #11 "Workforce impact and effect on health improvement", and #12 "Workforce intelligence" were labelled medium in terms of performance. Finally, the items that require serious intervention related to workforce development are #5 "Competency development", #6 "Leadership development", #10 "Pharmaceutical workforce (gender and diversity balances)", and #13 "Workforce policy formation". Improvements are needed in ensuring clear and manageable strategies to implement comprehensive needs-based development of the pharmaceutical workforce from initial education and training through to advanced practice.

Academic capacity and infrastructure

- Staff to student ratio: 1 staff to 15 students (BPharm only).
- Number of students: For the undergraduate programme, there are 269 students with 61 females and 208 males. For the master's programme, there are 28 students with 11 females and 17 males.
- Number of academic staff: 20 academic staff with 2 females and 18 males.
- Key areas of research expertise and number of staff: Pharmaceuticals and health supplies management (15), clinical pharmacy and pharmaceutical care (8), natural products and pharmacognosy (4), public health (8), pharmaceutical sciences (5), and pharmaceutical regulation and bioethics (6).
- Distribution of graduates in key practice areas: 80% in community practice, 5% in hospital practice, 5% in industry practice, 3% in academia and 7% in other areas.

- Average number of research outputs yearly: Makerere University is a research-led institution. As such, every unit of the university and every academic faculty is obliged to conduct research, publish their findings in peer-reviewed journals and maintain a vibrant grant funding pipeline. Last year the department produced 11 peer-reviewed journal articles and brought in six grants to the tune of UGX 1,083,799,410 (USD 293,000).[14] Our grant funders include both external agencies such as USAID, the UK Fleming Fund (Department of Health and Human Services), Management Sciences for Health and the Uganda National Drug Authority, and internal university grant funding mechanisms such as the Makerere University Research and Innovations Fund. Our research cuts across diverse areas of pharmacy and public health. Some of the research grants won last year were targeted to the following:

    - Formulating and evaluating a herbal acaricide containing bioactive extracts of *Albizia coriaria* on acaricide resistant *Rhipicephalus* ticks
    - Studying pharmaceuticals in the environment in Uganda
    - Developing HPLC fingerprints and densitograms for phytochemical standardisation of herbal medicines manufactured in Uganda
    - Upscaling the usefulness of Ugandan *Moringa oleifera* and *Aloe barbadensis* through formulation and clinical development of novel cosmetics and pharmaceutical products
    - Evaluating the clinical use of ceftriaxone in selected health facilities in Uganda
    - Conducting pharmaceutical supply chain management supervision and financial management systems strengthening
    - Assessing adulterants in anti-diabetic herbal products sold in Kampala, Uganda

  Our department research activities are also financed by various junior staff research fellowships. Last year, four staff held junior staff research fellowships under the NIH-funded, D43 NURTURE programme at the College of Health Sciences, Makerere University; one staff member held a Carnegie funded postdoctoral fellowship under the NERLP (Nurturing Emerging Research Leaders Programme) at the Directorate of Research and Graduate Training, Makerere University. Additionally, doctoral research for two staff is funded by the PHARMBIOTRAC World Bank Centres of Excellence II at Mbarara University of Science and Technology, and one staff's doctoral research is supported by a Bioethics scholarship funded by the US National Institutes of Health.
- Academic exchange programmes in place**:** The Department of Pharmacy at Makerere University is engaged in both local and international staff and student exchange. Locally, we have staff exchange with Mbarara University of Science and Technology (MUST). Staff exchanges, in which our staff support pharmacy training at MUST and vice versa, have been ongoing since 2003. Most recently, our staff have been supporting doctoral and master's degree training in pharmaceutical biotechnology and natural medicines at MUST since 2018. At an international level, we have had reciprocal staff exchanges in pharmaceutical care and pharmaceutical research at Wilkes University in Pennsylvania, Binghamton University in New York and the University of Minnesota, USA. Our students host foreign students under the International Pharmacy Students Federation exchange programme. Finally, our staff partake in the US Fulbright exchange visitor scholarly programmes.
- Most significant gaps in academic capacity in terms of numbers and expertise: The academic staff levels are below national requirements. Whereas Uganda's National Council for Higher Education recommends one faculty member to six students, ours is one to 15 students.
- Anticipated academic capacity workforce (academic capacity aspirational goals**):** We currently have 17 full-time and four part time staff. Based on the teaching load from existing academic programmes and the number of students, at least 40 academic faculty staff are needed to perform effectively in all our three mandates of teaching, research and service to the population.[15] Currently, there are ongoing discussions within the university to raise the staff establishment for the department and to upgrade it to a school with at least five departments.

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4.2.3 Nigeria

Education trends, innovation, transformations and current drivers of the pharmacy curriculum in Nigeria

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Pharmacy was introduced into Nigeria in 1887 and the Dispenser's Certificate from Yaba Higher College in 1922 is the first evidence of formal pharmacy education. The regulation of the Bachelor of Pharmacy (BPharm) degree started in 1964 by the Pharmacy Board of Nigeria (now the Pharmacists Council of Nigeria) and in 1974 by the National Universities Commission. Subsequently, regulation of pharmacy education by these two agencies of government, with other stakeholders, population health needs and professional development have been the main

drivers of the pharmacy curriculum in Nigeria. Perhaps this partly explains why it took a while to introduce the degree of Doctor of Pharmacy (PharmD) into the Nigerian university system. The pinnacle shift to a patient-oriented axis requires that education of pharmacists should be geared to accommodate increasing changing tasks.

There are about 20 accredited faculties of pharmacy in Nigeria and at least six new faculties of pharmacy are awaiting accreditation. These faculties are either funded privately or by federal/state government. The accreditation by regulatory agencies, tardy pursuance of PharmD by schools of pharmacy, suitable academic personnel, contention in the healthcare team, and appropriate salary for PharmD holders are areas of difficulty encountered in Nigeria.

The pharmacy curriculum is constantly revised to acquire the competency needed to allow the change in service axis, thereby improving in essential clinical skills of graduates to identify and resolve patients' medication needs.

External and internal factors drive innovation in pharmacy education and are aimed at producing well-trained, skilled and qualified health workers to achieve universal health coverage, which is essential as 70 per cent of total health expenditure is paid out of pocket by patients.[1–3]

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Pharmacy education country case: Nigeria

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Did you know?

- The pharmaceutical workforce in Nigeria comprises pharmacists, patent medicine vendors, pharmacy technicians, pharmacy attendants and dispensers.
- The scope of practice includes academia, administrative, community (retail), industry and hospital.
- The priorities of Nigeria that are driving the pharmacy education curriculum include drug distribution, a mandatory continuous development programme and the establishment of new schools of pharmacy.

Pharmacy education in Nigeria

General information

Pharmacy practice in Nigeria is regulated by Pharmacists Council of Nigeria (PCN). It is a Federal Government parastatal body established by Act 91 of 1992 (Cap P17 LFN 2004) and is charged with the responsibility for regulating and controlling pharmacy education, practice and training in all aspects and ramifications.

Pursuant to this, the PCN is responsible for registration and licensure of all pharmacists, pharmaceutical premises (manufacturing, importation, distribution, wholesale, retail, hospital pharmacies) as well as issuance of permits to pharmacy technicians and registration and licensure of patent and proprietary medicine vendors.

Ownership: The University of Benin is publicly owned institution with a standalone Faculty of Pharmacy
Duration of studies: six years
Language of Instruction: English
Country population: 218 million
Number of pharmacists per population: 0.062–0.083 per 10,000 population

Courses and qualifications (including all pharmaceutical support workforce)

- The credit system has 238 credits
- The undergraduate course is Doctor of Pharmacy (PharmD).
- Postgraduate courses and qualifications include:
  - MSc & PhD in Pharmaceutical Chemistry (Medicinal Chemistry and Pharmaceutical Analysis
  - MSc, MPhil & PhD in Pharmaceutics and Pharmaceutical Technology
  - MSc & PhD in Pharmacology & Toxicology
  - MSc, MPhil & PhD in Clinical Pharmacy & Pharmacy Practice (including Management and Public Health Pharmacy as well as Pharmacoeconomics)
  - MSc, MPhil & PhD in Pharmacognosy and Herbal Medicine
  - MSc, MPhil & PhD in Pharmaceutical Microbiology

Admission requirements

- Undergraduate admission requirements: Candidate must pass English language, mathematics, chemistry, physics and biology at credit level in the West African School Certificate (WASC) or Senior Secondary School Certificate Examination (SSCE). Candidate must also pass the Joint Admission Matriculation Board examination.

- Postgraduate admission requirements: Candidates seeking admission to the MSc, MPhil in any course in pharmacy must have at least second-class honours degree in pharmacy or related course(s), while for a PhD, the candidate must have an average of 60% of the course work at the master's level.

Credit transfer and recognition of prior learning

This is possible after due consideration of the relevance of such credits to the pharmacy education.

Main curriculum focus areas

Pharmaceutical sciences, clinical pharmacy and pharmaceutical care

Key learning objectives of the curriculum

- To instill in students a sense of appreciation of the pharmacy profession and to involve them in an intellectually stimulating and satisfying experience of learning and study.
- To provide students with a broad and balanced foundation in all the areas of pharmaceutical knowledge.
- To develop in students the ability to apply pharmaceutical knowledge in health care delivery systems.
- To provide students with pharmaceutical knowledge and professional skills to identify and solve drug (both human and veterinary) and drug-related problems.
- To instill in students the dynamic values of the profession, which make life-long learning a necessity.
- To provide students with adequate knowledge and an appropriate skills base from which they can proceed for further studies in specialised areas of pharmacy.

Objectives of the ongoing curriculum review process

The University of Benin is already running an established PharmD curriculum. However other pharmacy schools in Nigeria are undergoing transition from a five-year BPharm programme to six-year PharmD curriculum to adequately prepare pharmacy graduates in the clinical and patient care competencies for public health safety.

Core country curriculum

A student shall normally in any academic year (of two semesters) be allowed to register for and take a minimum of 30 credits and a maximum of 50 credits. The distribution of credit load is shown below. A student who is not eligible to continue to the next semester may register for the courses they failed.

Distribution of credit load for Faculty of Pharmacy, University of Benin

Level	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*	*Year 6*	*Total credit*
Subsidiary mathematics	-	4	-	-	-	-	4
Physiology	-	9	-	-	-	-	9
Biochemistry	-	6	-	-	-	-	6
Pharmaceutical chemistry	-	5	8	4	6	-	23
Clinical pharmacy/ pharmacy practice	-	-	3	12	12	34	61
Pharmacology	-	-	10	6	5	2	23
Pharmacognosy	-	3	4	4	3	-	14
Pharmaceutical microbiology	-	3	4	3	7	-	17
Pharmaceutics & pharmaceutical technology/ industrial training	-	3	7	8	6	-	24
Anatomy	-	3	-	-	-	-	3
Entrepreneurship			2				2
Project	-	-	-	-	-	4	4
Physics	12	-	-	-	-	-	12
Chemistry	12	-	-	-	-	-	12
Botany	6	-	-	-	-	-	6
Zoology	8	-	-	-	-	-	8
General studies	10	-	-	-	-	-	10
Total	**48**	**37**	**35**	**37**	**39**	**40**	**238**

Experiential learning

Experiential learning is the integral part of the curriculum pre- and post-graduation from pharmacy school. The placement sites for experiential learning post-graduation include hospital, community pharmacy and industry over 12 months' duration. The Pharmacists Council of Nigeria is the regulatory body that supervises this internship. The assessment tools used during this period are log books and reports. However, there is a shortage of placement sites, with an underlying reason of poor remuneration of interns in other practice areas apart from the hospitals.

Delivery of the curriculum

The faculty is administered by the dean who chairs the Faculty Board of Studies and ensures that expected outcomes from the delivery of lectures and practical reflect what the curriculum requires.

Assessment of learning

The suitability of students to progress from one year of the programme to the next, and to graduation, will be determined by a satisfactory standard of course work and examinations. All decisions concerning the progress of a student shall be subject to the approval of the senate on the recommendation of the Board of Studies of the Faculty of Pharmacy.

National pharmacist's competency framework

Competencies within the "pharmaceutical care" and "pharmaceutical public health" clusters are high compared with the research-related competencies. There are gaps in the collaboration between academia and industries.

Accreditation and quality assurance

There is a five-year accreditation system from the Pharmacists Council of Nigeria and the National University Commission. The accreditation covers accreditation of the university, the faculty of pharmacy and the academic programme. There is also an internal quality assurance mechanism led by the faculty.

Administration and finance

The student direct tuition fee charged per annum is averagely NGN 15,000, usually paid by individuals or a few scholarships. The different categories for sponsorship include government sponsorship, self-sponsorship and international sponsorship.

Pharmacy education at the University of Benin School of Pharmacy — Needs-assessment using FIP's global pharmacy education tools

Educational standards assessment	
Result	The University of Benin Faculty of Pharmacy's education programme has been mapped against the FIP Nanjing Statements in order to perform an educational standards assessment. Based on the educational standards mapping against the education programme with FIP Nanjing Statements, University of Benin educational standards have shown high priority with the all 67 Nanjing Statements. However, several gaps were identified in all clusters of the Nanjing Statements, especially #6 "Resources and academic staff" and #7 "Experiential education". Some areas of improvement for the educational standards based on this include: social and administrative sciences; inter-professional education and collaboration; public health and social skills; leadership training; career development of academic staff and resources; quality improvement processes; and continuous professional development promotion.

Curriculum assessment	
Result	The PharmD curriculum of the University of Benin covers basic sciences (11.7%), clinical sciences (23.4%), pharmacy/health care courses (21.9%), clinical experiential courses (37.8%) and electives (5.2%). Based on the curriculum assessment and educational outcomes mapping against the FIP Global Competency Framework, the pharmaceutical public health competencies, pharmaceutical care competencies, organisation and management competencies and professional and personal competencies are of high priority in the curriculum. However, learning outcomes of the curriculum were not completely matched with some competencies in budget and reimbursement (#3.1), Human resources management (#3.2), improvement of services (#3.3), and continuous professional development (#4.2).
Workforce development	
Result	All 13 FIP Pharmaceutical Workforce Development Goals (PWDGs) are of high priority. The Pharmacists Council of Nigeria has readjusted its policy to improve and encourage post-registration training focusing on the PWDGs on foundation training and early career development. The council and the Nigerian Universities Commission also ensure compliance with pharmaceutical workforce gender and diversity balances. However, many of the PWDGs are not covered by local strategies and policies. There seems to exist a lack of policies around the PWDGs for the professional development and systems cluster. This seems to create a gap between education and scope of practice while also leading to a lack of support and recognition at the high level.

Academic capacity and infrastructure

- Staff to student ratio: 1 staff to 11 students
- Number of students: for undergraduates, there are 356 female and 298 males with total of 654 students. For master's, there are 35 female and 20 male students with a total of 55. For PhD, there are 15 female students, 23 male students with total of 38.
- Number of academic staff: 70, with 20 female and 50 males.
- Key areas of research expertise and number of staff: Cardiovascular pharmacology and toxicology (2), auto-pharmacology and toxicology (3), medicinal plant research, natural products (3), pharmacoepidemiology and clinical pharmacokinetics (7), pharmaceutics (4), antimicrobial agents, radiation and sterilisation (3), and medicinal and analytical chemistry (3).
- Graduate output in 2019: 124 undergraduates and 16 postgraduates.
- Distribution of graduates in key practice areas: A database through the alumni group is currently being built. We have over 54% in community practice, 12% in hospital practice, 10% in administrative and regulatory pharmacy, 5% in academia, 10% in the industry and the rest in non-pharmacy-related activities like telecommunications, politics, journalism and banking.
- Average number of research outputs yearly: About 12 in various areas of specialisation in pharmaceutical sciences in the departments.
- Academic exchange programmes in place: The University of Benin Faculty of Pharmacy is involved in academic staff exchange programmes nationally and internationally by hosting one staff member and sending out eight staff members in the past three years.

- Most significant gaps in academic capacity in terms of numbers and expertise: The academic capacity and staffing meets the need in some departments, but not in pharmacognosy and pharmaceutical microbiology, which do not have adequate numbers of staff. Also, older members of the workforce are retiring without corresponding replacements. Some junior faculty members are not satisfied with the remuneration and there is a consequent brain drain.

4.2.4 Ghana

Education trends, innovation, transformation, and current drivers of the curriculum in Ghana related to national strategy/health priorities

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Currently, there are seven pharmacy schools in Ghana running the six-year Doctor of Pharmacy (PharmD) programme, a shift from the four-year BPharm programme. Ghana is the only country in the West Africa sub-region that has fully embraced the PharmD programme. Kwame Nkrumah University of Science and Technology (KNUST), the premier pharmacy school in Ghana, was the first to start the programme and has since graduated two batches of students. The government of Ghana has given the programme the needed recognition by putting housemen on the same salary scale as newly graduated medical officers.

The PharmD curriculum is more oriented towards advanced pharmacy practice experience (APPE). This provides a good basis for specialisation in pharmacy practice. The Ghana College of Pharmacists, which has the same mandate as colleges of physicians and surgeons worldwide, offers fellowship opportunities for pharmacists. The other postgraduate college in the sub-region is the West Africa College of Pharmacists, headquartered in Nigeria. Fellowship from any of these colleges is considered highest degree and allows hospital pharmacists to apply for specialist and consultant positions in Ghana's Ministry of Health. In the university, the college is pushing for fellows to be employed as lecturers in the Department of Pharmacy Practice. In community practice the APPE has improved practice, allowing for the inclusion of services that were hitherto seen in the USA and European countries.

A recent curriculum review of the PharmD curricula at the Faculty of Pharmacy and Pharmaceutical Sciences, KNUST, factored in inputs from stakeholders in industry, the Ministry of Health, the Pharmacy Council (the pharmacy regulatory and advisory body for government) and the Pharmaceutical Society of Ghana.

Limited internship places for hospital practice due to a small number of teaching hospitals is the immediate challenge to the PharmD training. It is unfortunate and worrying that the increase in schools of pharmacy is not in line with demand as the number of tertiary and secondary health facilities remain the same. This means that in a few years' time the availability of training sites will become a serious challenge.

The Faculty of Pharmacy, KNUST, has is an experienced faculty with expertise in almost all the relevant areas of pharmacy practice and adequate infrastructure for effective teaching and learning, and therefore serves as a mentor to the other pharmacy schools in Ghana. KNUST has also employed over 30 preceptors in the various teaching sites as part-time lecturers. At a few of the teaching sites physicians and surgical specialists are involved in the training. The faculty in 2017 began a two-year top-up programme for practising pharmacists. The aim was to give BPharm holders the opportunity to develop clinical skills and competencies in current trends in pharmacy practice. The first batch graduated in 2019 and is helping in the training of PharmD students at the various teaching hospitals.

In the sub-region, it is believed that pharmacy should not give up the production of extemporaneous preparations and students are meant to take the dispensing course seriously. To encourage students to do that, the faculty has established a vibrant production unit. In the face of the COVID-19 pandemic the unit stepped up the production of quality and affordable hand sanitisers, which became a news item in the prominent media houses in the country. This was a plus for the faculty and the university.

Pharmacy training in the sub-region is advancing at a faster pace but if care is not taken there will soon be a glut of pharmacists, which will not be in the interest of the profession. This development, though unfortunate, is a clear indication that directives from the West Africa Health Organization have not been adhered to by most member states.

Pharmacy education country case: Ghana

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Did you know?

- The pharmaceutical workforce in Ghana comprises pharmacists, pharmacy technicians, dispensing assistants, and medicines counter assistants.
- The scope of practice includes community, industry, hospital, regulation, academia, research and medical representation.
- In Ghana, the pharmacy education curriculum is largely determined by faculty's perception of the country's needs although the government believes that pharmaceutical industries are a potential source of wealth creation for the country. Thus, most pharmacy schools in Ghana during their review of curricula, consult these institutions for input in order to improve the quality of pharmacists produced.

Pharmacy education in Ghana

General information

Ownership: Public and stand-alone
Duration of studies: August–June/ year, six years in total
Language of instruction: English
Average number of pharmacy graduates per year, 2019 data: 500
Number of registered pharmacists in 2019: female 1,786; male 2,880
Country population: 30,417,856
Number of pharmacists per population: 1.53/10,000

Courses and qualifications (including all pharmaceutical support workforce)

- Credit systems: There are 224 credits — 38 in year 1, 40 in year 2, 42 in year 3, 39 in year 4, 35 in year 5 and 42 in year 6. Their distribution is shown below.

Module title	T	P	Credits
Analytical pharmaceutical chemistry	3	3	4
Pharmaceutical technology I	3	3	4
Pharmaceutical biotechnology and molecular biology	3	3	4
Natural drug production and evaluation	2	3	3
Introductory pharmacology	3	3	4
French for communication purposes I	2	0	2
Total	**16**	**15**	**21**

T = Theory contact hours/week [1 hour = 1 credit hour]
P = Practicals contact hours/week [3 hours = 1credit hour]

- Undergraduate courses: Doctor of Pharmacy (PharmD)
- Postgraduate courses and qualifications include:
    - Masters: MSc and MPhil
        - MPhil Pharmacology
        - MSc Clinical Pharmacology
        - MSc Pharmaceutical Analysis and Quality Control
        - MPhil Pharmacognosy
        - MSc Clinical Pharmacy
        - MPhil Clinical Pharmacy
        - MPhil Pharmaceutical Technology
        - MPhil Pharmaceutics
    - PhD
        - PhD Pharmacology
        - PhD Pharmaceutics
        - PhD Pharmacognosy
        - PhD Pharmaceutical Chemistry
        - PhD Pharmaceutical microbiology
        - PhD Pharmacy Practice

Admission requirements

- Undergraduate admission requirements: All applicants irrespective of their category must have passes in English, mathematics, biology, chemistry and physics
- Postgraduate admission requirements:
    - Doctor of Pharmacy (pass)
    - BSc Herbal medicine (2nd class and above)
    - BSc Biological Sciences
    - BSc Chemistry
    - BSc Nursing
    - BSc Med Lab

Credit transfer and recognition of prior learning

This is applicable at undergraduate level. Course exemptions are given if there is proof that the student has credits in the course registered.

Main curriculum focus areas

The PharmD graduates would be value-added pharmacists in the existing care structure, as health care providers actively involved in patient care in the hospital and community practice settings, as well as serving in the pharmaceutical industry, drug regulatory bodies, and academic and research institutions.

Key learning objectives of the curriculum

- Provide students with core knowledge in relevant basic sciences and research methods.
- Train students in the preparation, distribution and administration of medicines.
- Train students to develop skills, abilities, attitudes and values including communication skills, analytical skills, critical thinking, social interaction, and informed decision-making.
- Serve as a route to provide the needed manpower for the pharmaceutical industries and other sectors.
- Provide an option for higher degree academic and research training in pharmaceutical sciences.
- Provide a channel for the introduction of a graduate entry module/scheme, probably on sandwich bases, to offer an opportunity for graduates in relevant and related disciplines to train as professional pharmacists.
- Train students in the PharmD programme to develop skills, abilities, attitudes and values, including communication skills, analytical skills, critical thinking, social interaction, decision-making, professionalism and ethics, that are necessary for the provision of sound pharmaceutical care.
- Train students in the rational use of medicines for individualised care as well as patient populations.
- Provide an opportunity for students to select courses and professional experiences in keeping with their particular interests and goals.
- Emphasise the need for life-long learning as an integral part of the curriculum.

Core country curriculum

KNUST is the premier school of pharmacy in Ghana. The core country curriculum for pharmacy is based on that of KNUST.

Experiential learning

Experiential learning is an integral part of the curriculum before and after graduation. The post-graduation internship placement period covers 12 months placements in the hospital, community pharmacy or industry. The Ministry of Health and the Pharmacy Council of Ghana are responsible for supervision of the interns and reports and logbooks are the main tools for assessment. There is a shortage of placement sites, especially as there are not enough teaching hospitals. The Government is responsible for paying the interns and there is a mandatory post-internship examination before full registration as a pharmacist.

Delivery of the curriculum

Laboratory work, didactic teaching, problem-based learning, and experiential training under supervision of preceptor.

Assessment of learning

Each module is assessed by class exercises, assignments and written mid-semester and end-of-semester examinations. The end-of-semester examination comprises a minimum of a two-hour paper making up to 70% of the total semester mark and a continuous assessment made up of mid-semester examinations comprising quizzes/assignments and oral examinations (30%). The pass mark is 50% for core courses and 40% for general university courses.

The APPE module is assessed by students' oral presentations to preceptors, patient profile reports and an end-of-year examination. The students' oral presentations and patient profile reports (three reports from each rotation) make up 10% and 30% of the total mark, respectively. The end of year exam makes up 60%.

Seminars are assessed by students' oral presentations and a term paper. The oral presentations make up 40% and the term paper constitutes 60% of the total mark.

Assessment requirements: A pass mark of 50% is required for all core courses. However, a pass mark of 40% is required for general university courses including communication skills, post-SSS (senior secondary school) mathematics, statistics, etc. Assessment is based on a combination of continuous assessment (e.g., reports, course work, and mid-semester examinations) and end-of-semester examinations.

National pharmacist's competency framework:

The Pharmaceutical Society of Ghana (PSG) is the professional association of pharmacists in Ghana and leads advocacy and engagement with the Ministry of Health and the Ghana Health Service, as well as the regulators of pharmacy education and scope of pharmacy practice. The PSG was instrumental in the accreditation of the PharmD programme in KNUST and subsequently in all other pharmacy training schools.

The PSG's continuous engagement with the Ministry of Health has led to review of guidelines on pharmacy practice and other pharmacy-related documents. The current (2nd) edition of the "Standards and practice guidelines for pharmaceutical services 2018",which defines standards, roles, activities, responsibilities and procedures in providing pharmaceutical services in Ghana, was largely due to the effort and support of the PSG. This document, which was first published in 2002, now incorporates guidelines, standard operating procedures, and job descriptions for the various grades of pharmacists on various aspects of pharmaceutical services, which was hitherto in separate documents. This document will thus serve as the basis for the development of a competency framework by all pharmacy training institutions, including the Ghana College of Pharmacists, which is established by law to offer postgraduate specialisation and advanced training for practising pharmacists.

The PSG conducts periodic needs assessment among practising pharmacists and the outcome of this is used to engage in advocacy to drive the needed change in the training and practice of pharmacy for both undergraduate and practising pharmacists.

Accreditation and quality assurance

The faculty undergoes periodic accreditation every three years led by the Ministry of Health and the Pharmaceutical Society of Ghana. The focus of the accreditation process includes the educational institution, the school of pharmacy and the academic programme. In addition to this there is an internal accreditation system where the university has a quality assurance unit that assesses teaching and research in the various faculties and departments.

Administration and finance

There are three categories of students based on financing — government-sponsored, self-sponsored and international. The student direct tuition fee charged per annum ranges from GHS 3,000 to GHS 10,000 for nationals and USD 5,000 for international students. These fees are paid by the government or individuals depending on the student category.

Pharmacy education at the KNUST School of Pharmacy — Needs-assessment using FIP's global pharmacy education tools

Educational standards assessment	
Result	KNUST School of Pharmacy's education programme has been mapped against FIP's Nanjing Statements in order to perform an educational standards assessment. Based on the educational standards mapping of the education programme against the 67 FIP Nanjing Statements, KNUST school of pharmacy educational standards have showed strong links with the standards under all the clusters of the Nanjing Statements. However, there seems to be some gaps identified including the existence and use of quality metrics in the quality assurance (cluster #7) process of the programme. There is also room for improvement in the teaching and training of students in professional skills mix (cluster #2) especially the documentation, lifelong learning skills. The resources and academic staff cluster (#6) showed that high student numbers have rendered equipment and consumables inadequate; action is being taken to procure additional equipment. Generally, stakeholder involvement in the curricula development due to new needs and future trends in health care delivery, advancement in the profession, the pharmaceutical industry and education is recommended to ensure alignment of educational curriculum with needs of the society.
Curriculum assessment	
Result	Curriculum overview shows that the first year is focused on basic sciences with lots of diverse courses. While more focus on pharmacy and health care is identified in the fourth and fifth years, there is even distribution between clinical sciences, pharmacy and health care, experiential learning identified in the fifth year. In the sixth year, there is much focus on experiential learning. Based on the curriculum assessment and educational outcomes mapping against the FIP Global Competency Framework, the pharmaceutical public health competencies, pharmaceutical care competencies, and professional and personal competencies attained highest priority of importance to be delivered by the curriculum. There is a need to strengthen organisation and management competencies of the curriculum.

Workforce development	
Result	All 13 of the FIP Pharmaceutical Workforce Development Goals (PWDGs) are assigned high priority. Ghana has local strategies/policies in place in for the PWDGs 1, 3, 4 and 10 (academic capacity, quality assurance, advanced and specialist expert development, and pharmaceutical workforce gender and diversity balances, respectively). There is need for stakeholder involvement in the curriculum through quality assurance and accreditation to ensure alignment with all PWDGs as measuring pharmaceutical workforce impact with data and evidence may support decision-making processes at the government level. This would go hand in hand with workforce policy formation and intelligence PWDGs.

Academic capacity and infrastructure

- Staff to student ratio: 1 staff to 40 students (PharmD only)
- Number of students: For the undergraduate programme, a total of 1,891 students with 825 females and 1,066 males. For the master's programme, there are 111 in total with 35 females and 76 males. For PhD programmes, there are 35 students with 10 females and 25 males.
- Number of academic staff: 48 in total with 11 females and 37 males.
- Key areas of research expertise and number of staff: Social pharmacy (2), clinical pharmacy (4), natural product pharmacology (10), toxicology (2), phytochemistry (8), medicinal chemistry (4), quality assurance (3), synthetic chemistry(1), pharmaceutical microbiology (5), pharmaceutics (5), and pharmaceutical technology (2).
- Graduate output in 2019: There was a total of 239 with 196 undergraduates and 43 postgraduates.
- Distribution of graduates in key practice areas: 30% in hospital practice, 60% in community practice, 3% in manufacturing/industry, and 7% in other areas.
- Average number of research outputs yearly: Researchers at KNUST Faculty of Pharmacy and Pharmaceutical Sciences are engaged in many ongoing research projects across various disciplines and areas of expertise. There is an average of at least 100 publications in peer-reviewed journals annually from the faculty. In addition to these, practising pharmacists also conduct research in their various fields and such research is communicated during scientific sessions of annual general meetings of the Pharmaceutical Society of Ghana. Many of the faculty's academic staff as well as those from other pharmacy schools have won research grants which are being used in their various projects to improve drug delivery, pharmaceutical care and so on.
- Academic exchange programmes in place: KNUST School of Pharmacy has been involved in an academic staff exchange programme nationally and internationally by hosting two staff and sending out four staff in the past three years.
- Most significant gaps in academic capacity in terms of numbers and expertise: Not reported

4.2.5 Namibia

Education trends, innovation, transformations and current drivers of the pharmacy curriculum in Namibia

Author
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The key drivers of the pharmacy curriculum in Namibia are: improving the nation's health outcomes, particularly in the public sector that serves 90% of the population with a limited health workforce; industry needs; health issues, particularly HIV and other infectious diseases; and the need to have national capacity for health workforce and it being sustainable.

Namibia must have been one of the last countries in the world to start pharmacy education at higher education (degree) level, but it was a deliberate decision with government funding and strong local pharmacy societal support. Until 2011, only pharmacists' assistants had been trained to enable a reliable supply of antiretroviral medicines in response to the HIV epidemic that had impacted greatly on Namibia. However, a heavy reliance on foreign-trained pharmacists presented challenges such as a common level of competence, or familiarity with health issues or structure of relevance to Namibia. There was recognition that Namibia needed to train its own pharmacists.

Thereafter, once the undergraduate (Bachelor of Pharmacy) degree was established, the University of Namibia (UNAM) School of Pharmacy took a pragmatic approach to commencing further training programmes; this first focused on the creation of the Diploma in Pharmacy that sought to train pharmaceutical technicians, the final cadre defined by law that had not previously been seen in Namibia. This also provided an up-skilling opportunity for pharmacists' assistants to develop in their careers but also to improve competence in the workforce to impact on patient and population health outcomes. As public sector pharmacists in Namibia mostly practise in either hospitals or isolated clinics, and may have trained decades ago or in a plethora of different settings, the next prioritised training introduced was a postgraduate Master in Clinical Pharmacy that sought to raise the competence of pharmacists in practice (including the private sector) to a common level, and provide an opportunity for structured continuing education, a mechanism for competence-based career progression and a stepping stone to specialisation. The final programme that was introduced to date was a pharmacy internship (pre-registration) training that supported newly graduated pharmacist interns in their transition to practice and their year-long training before full registration (licensing). In this way we provide joined-up training for school-leavers or pharmacists 'assistants right up to specialisation in the hope to improve population outcomes, strengthen industry, and build capacity and sustainability not just in the healthcare sectors but also in academia.

Pharmacy education country case: Namibia

Authors

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Did you know?

- The pharmaceutical workforce in Namibia comprises pharmacists' assistants, pharmaceutical technicians, pharmacist interns (pre-registration) and pharmacists.
- The scope of pharmacy practice includes community pharmacy, hospital pharmacy, academic pharmacy, and industrial and regulatory pharmacy.

- The priorities of Namibia that are driving pharmacy education are prompted by two major governmental policies: the Pharmacy Act 2004 and the Medicines & Related Substances Control Act 2003, as well as Vision 2030, which aims to build local industry run by its citizens. The key drivers of the pharmacy curriculum in Namibia are: improving the nation's health outcomes, particularly in the public sector that serves 90% of the population and has fewest health workers; industry; health issues, particularly HIV and other infectious diseases; and the need to have national capacity for health workforce and it being sustainable.

Pharmacy education in Namibia

General information

Ownership: Public (state owned enterprise) School within Faculty of Health Sciences
Duration of studies: January to December, four years in total
Language of instruction: English
Average number of pharmacy graduates per year, 2019 data: 35 Bachelor of Pharmacy (Hons), 25 Diploma in Pharmacy and recently 1 postgraduate student
Number of registered pharmacists in 2019: 400
Country population: 2.3 million
Number of pharmacists per population: 1 pharmacist to ~6,000 (access in rural settings is ~0)

Courses and qualifications (including all pharmaceutical support workforce)

- Credit systems: The curriculum for the BPharm consists of four years of learning spread over eight semesters, each of 16 weeks of lectures and two weeks of examinations, resulting in an 18-week semester. A full module carries 16 credits and is offered at three contact hours plus two hours of tutorial (or three hours of practical) per week for 16 weeks while a half-module carries eight credits and is offered at two contact hours plus one hour of tutorial (or two hours of practical) per week for 16 weeks, unless specified otherwise in the module. In addition, the curriculum includes 16 weeks of experiential learning in the form of field attachment at the end of years 2 and 3. The total number of credits for the degree is 792.
- Undergraduate courses and qualifications: Diploma in Pharmacy and Bachelor of Pharmacy (BPharm).
- List of postgraduate courses and qualifications
    - Master of Pharmacy in Clinical Pharmacy
    - Master of Pharmacy by Research
    - PhD in Pharmaceutical Chemistry
    - PhD in Pharmacology
    - PhD in Pharmacy Practice

Admission requirements

- Undergraduate admission requirements: In order to be admitted to the programme, candidates must satisfy at least one of the following requirements:

    - To apply for the BPharm degree, a candidate must be enrolled in Grade 12 studying towards a NSSC certificate or in possession of a NSSC certificate or any other equivalent qualification with at least: (a) 30 points on the UNAM scale with a grade B or better in ordinary level English, or 32 points on the UNAM scale with a grade C or better in ordinary level English; (b) A score of 2 or better on higher level in mathematics and physical sciences (or a 2 in mathematics and a 3 in physical sciences) (or a 2 in physical sciences and a 3 in mathematics) or a grade B or better in ordinary level mathematics and physical sciences;(c) Grade B or better in ordinary level biology/life sciences.
    - To apply for the BPharm degree, a candidate must have successfully completed the entire first year science curriculum and must have passed chemistry, biology and mathematics/ physics modules with an aggregate of at least 55%.

- To apply for the BPharm degree, a candidate must have successfully completed a science degree from a recognised university with passes in sciences including chemistry and biology,
- Candidates aspiring for admission to UNAM's BPharm degree through the Mature Age Entry Scheme must satisfy the following conditions: (a) they should be at least 25 years old on the first day of the academic year in which admission is sought; (b) they should have successfully completed senior secondary education; (c) they should have proof of at least five years of pharmacy relevant work experience (as determined by the school); and (d) they should pass all papers of the prescribed Mature Age Entry Tests with an overall average of 55%.

Candidates who, in the opinion of the faculty, merit further consideration, may be called for an oral interview before the final selection is made

Meeting the above student admission criteria does not necessarily ensure admission. Admission is awarded on merit based on places available on the programme and any other conditions that may be determined from time to time.

The faculty reserves the right to administer special written entry tests and interviews before admission. The admissions process will not be reopened, and a waiting list will be kept to choose from in the case of admitted student not turning up for registrations the following year.

- Postgraduate admission requirements: BPharm (Hons) qualification or its equivalent, registration for professional programmes and two years' work experience

Credit transfer and recognition of prior learning

There is no system for transfer credits, given that most of the postgraduate programmes are either work integrated, or research based.

Main curriculum focus areas

Pharmaceutical chemistry, clinical pharmacy and pharmaceutical care, public and global health.

Key learning objectives of the curriculum

- Produce locally trained pharmacists to fulfil the needs of the public and private sector
- Strengthen pharmaceutical care services in public hospitals
- Optimise expenditure on medicines in public health care
- Improve on the rational use of medicines in public health care

Objectives of the ongoing curriculum review process: (e.g., transitioning from BPharm to PharmD)

- Due to the dynamic nature of the health field like any science field, keep up-to-date with recent changes
- Meet current and future trends in pharmaceutical care and industry
- Adequately respond to local and global trends in pharmaceutical care and services

Core country curriculum

There is no core pharmacy curriculum in place in Namibia. However, there is a credit based system mandated by the law.

Experiential learning

BPharm students complete the following field attachments as part of their experiential learning:

2nd year

- Community pharmacy: 35 hours
- Rural attachment: 35 hours

3rd year

- Hospital pharmacy: 35 hours
- Industrial/manufacturing facility: 35 hours

Pre-registration

- A one-year internship is mandatory after completion of the course to be registered with the Pharmacy Council of Namibia. Students are expected to pass council exams before they are registered as pharmacists and are allowed to practise independently. Internship can only be carried out at Pharmacy Council registered sites. There is a shortage of internship places both in hospitals, community pharmacies and manufacturing industry.
- Each intern is assigned a supervisor who must be registered pharmacist with at least three years' experience and should be registered with council as a supervisor.
- Students perform certain activities as stipulated in the workbook provided by the council. They sit two exams, one on law and ethics and another to test their competency.
- The government pays for the interns in government institutions while private employers pay for the interns at their intuitions.

Delivery of the curriculum

This is a work-based programme supported by pharmacists. UNAM supports internship with an online programme. The interns follow a detailed workbook on key competencies such as pharmaceutical care, supply chain, extemporaneous preparation, stock management and professionalism.

Assessment of learning

There are workbook-based assessments conducted by the tutor, online exercises, OSCE and a written exam.

National pharmacist's competency framework

A competency framework is available to highlight up to eight competence domains.

Accreditation and quality assurance

There is an accreditation mechanism in place which takes place every full cycle of the programmes based on the total duration in years. The accreditation covers accreditation of the educational institution/ university, school of pharmacy and the academic programme. There are three levels of external accreditation. The Health Professions Council of Namibia (HPCNA) is the professional accreditor under the Ministry of Health, and the National Council

for Higher Education is under the Ministry of Education. The Pharmacy Council of Namibia operates under the HPCNA for accreditation. The Namibia Qualifications Authority is another governmental agency that is among the key stakeholders of the accreditation bodies. There is an internal quality assurance mechanism within UNAM which is conducted by the Centre for Quality Assurance and Management.

Administration and finance

The student direct tuition fees are as follows:

- Namibian students —NAD 6,400 per year
- South African Development Community (SADC) students—NAD 9,600 per year
- Non-SADC students — NAD 25,600 per year

The Namibia Students' Financial Assistance Fund supports the government-sponsored students. Some individuals self-sponsor the fees. There are a few students on local and international scholarships.

Pharmacy education at the University of Namibia School of Pharmacy — Needs-assessment using FIP's global pharmacy education tools

Educational standards assessment	
Result	The University of Namibia School of Pharmacy's education programme has been mapped against FIP's Nanjing Statements in order to perform an educational standards assessment. Based on the educational standards mapping against the education programme with FIP Nanjing Statements, the University of Namibia School of Pharmacy has given high priority to all the statements. All FIP Nanjing Statements are being delivered through university policies and procedures, accreditation activities (professional/ educational regulatory and inspection), the university quality assurance unit, national governing structures (e.g., enacted through relevant laws and juristic bodies), and the prospectus (e.g., admissions policy/procedure). The University of Namibia School of Pharmacy's educational standards showed strong alignment with the global envisioned state of pharmacy education set by FIP Nanjing Statements.
Curriculum assessment	
Result	Based on the curriculum assessment and educational outcomes mapping against the FIP Global Competency Framework, all competencies have been given high to medium priority. All learning outcomes of the educational programme have been linked to competencies and behaviours in the FIP Global Competency Framework, with a clear link to relevant courses in the curriculum. The University of Namibia School of Pharmacy would like to transform and improve its curriculum to involve inter-professional learning and practice, align the pharmaceutical competencies with the evolving industrialisation of Namibia, as well as expand the clinical roles of pharmacists.

<table>
<tr><th colspan="2">Workforce development</th></tr>
<tr><td>Result</td><td>All FIP Pharmaceutical Workforce Development Goals (PWDGs) attained high to medium priority, except PWDG #13 “Workforce policy formation”.

Namibia has local strategies and policies in place for the PWDGs, which are described below:

<table>
<tr><th></th><th>FIP PWDG</th><th>Local strategy/policy actions</th></tr>
<tr><td rowspan="3">Academy
Focus on the schools, universities and education providers</td><td>Academic capacity</td><td>Among the first priorities in the local strategies</td></tr>
<tr><td>Foundation training and early career development</td><td>Among the first priorities in the local strategies</td></tr>
<tr><td>Quality assurance</td><td>University-centred QA processes in place</td></tr>
<tr><td rowspan="5">Professional development
Focus on the pharmaceutical workforce</td><td>Advanced and specialist expert development</td><td>Advanced and specialist expert development starts with clinical postgraduate programmes and focuses on research thereafter.</td></tr>
<tr><td>Competency development</td><td>Revision of the law to include and define scopes of practice</td></tr>
<tr><td>Leadership development</td><td>Affirmative action policy in place</td></tr>
<tr><td>Service provision and workforce education and training</td><td>University seeing a role in service delivery through infrastru focus</td></tr>
<tr><td>Working with others in the healthcare team</td><td>Interprofessional focus, e.g., funded activities</td></tr>
<tr><td rowspan="5">Systems
Focus on policy development, governmental strategy and planning, and monitoring systems</td><td>Continuing professional development strategies</td><td>As part of professional registration (law); accreditation requirement is in place</td></tr>
<tr><td>Gender and diversity balances</td><td>Affirmative action policy in place</td></tr>
<tr><td>Workforce impact and effect on health improvement</td><td>EngiMed — a national government project</td></tr>
<tr><td>Workforce intelligence</td><td>No action — most of these activities led by non-governmen organisations</td></tr>
<tr><td>Workforce policy formation</td><td>Restructuring of establishment and include training aspects</td></tr>
</table>

The key challenges faced in the health sector and for the pharmaceutical workforce are: small market; legislative challenges; small population/vast area; lack of industrialisation; funding challenges; imbalance between need and capacity; limited staff, particularly research and technical staff; infrastructure challenges; and limited opportunities to practise pharmacy in the country.</td></tr>
</table>

Academic capacity and infrastructure

- Staff to student ratio: 1 staff to 8 students
- Number of students: For undergraduate programmes, there are 167 females, 79 males with a total of 256. For postgraduate students, there are 16 females and 9 males with total of 25.
- Number of academic staff: 14 females, 16 males with total of 30 (UNAM has a policy for gender equity policy in place for students’ admission and staff recruitment. Approximately 70% of the students enrolled in all pharmacy programmes are female.)
- Key areas of research expertise and number of staff: Pharmacy practice (10), pharmacokinetics (2), Infectious diseases (7)
- Graduate output in 2019: 36 undergraduates and 1 postgraduate.
- Distribution of graduates in key practice areas: 40% hospital practice, 50% community practice, industry 5%, academia 5%.

- Average number of research outputs yearly: In 2019: 30 peer reviewed articles, three research grants and 15 conference abstracts. Unpublished manuscripts from undergraduate projects (BPharm=36 and DipPharm=25).
- Academic exchange programmes in place: UNAM School of Pharmacy has been engaged in academic staff exchange programmes nationally and internationally. Academic staff have been sent to external institutions while the school has hosted visiting academics.
- Most significant gaps in academic capacity in terms of numbers and expertise: Academic staff numbers are less than required by a shortfall of 50%, particularly in the research and technical areas.

4.2.6 Malawi

Education trends, innovation, transformations and current drivers of pharmacy curriculum in Malawi

Author
Baxter Kachingwe PhD, Department of Pharmacy, University of Malawi

Education trends

Pharmaceutical services in Malawi have been affected by a shortage of pharmacists due to there being no school of pharmacy in the country. The sector depended on few pharmacists who graduated outside the country. However, there was a training institution for pharmacy assistants and pharmacy technicians who, after graduation, assumed the roles of pharmacists in public institutions. In 2006, the University of Malawi (UNIMA) started the Bachelor of Pharmacy (Hons) degree programme. The aim was to improve pharmaceutical services in Malawi, especially managing drugs for priority diseases like HIV, TB and malaria.

Innovation

The UNIMA department of pharmacy has been involved in some projects in collaboration with other institutions like creating a comprehensive programme for internship and a quality drug management project at hospital ward level. In June 2013, the pharmacy department became a member of the FIP-UNESCO UNITWIN Centre for Excellence in Africa. The department has seen significant benefits from being a member of the network, some of which are the Lab-Box pilot project, access to My Dispense software, assistance on curriculum review and external examiners to mention a few.

Transformation

The department has grown and achieved some transformations in the process. It started with eight students and one full-time professor and progressed to an average of 50 students per intake with 18 permanent members of staff. The department is also introducing postgraduate programmes and CPD programmes for practising pharmacists. It has also successfully managed to set up a national pharmacovigilance centre together with the regulatory authority. The centre is sited at the College of Medicine, under the pharmacy department. The pharmacovigilance project started in 2015 and, by March 2019, Malawi became a full member of the WHO International Drug Safety Monitoring Programme after meeting the minimum requirements.

Current drivers of curriculum related to national strategy/health priority

- Inclusion of pharmacovigilance as a standalone module for pharmacy students and taught under pharmacology across other courses at the College of Medicine in response to the need for drug safety monitoring.

- Introduction of an MSc in Herbal Medicine and conducting more practical sessions in pharmacognosy for undergraduate students in response to the increasing role of herbal remedies and public health.
- Embracing new trends in practice towards patient care. Cannabis has now been passed by parliament to be used for medicinal purposes, and the department is responding to this through inclusion of cannabis in pharmacology, pharmacognosy and pharmaceutical analysis.
- Clinical trials and drug development, as more trials are now being conducted in Malawi. The curriculum will have to be reviewed and include important aspects of clinical research, including formulation studies.

Conclusion

The pharmacy department has shown significant growth and is continuing to expand in order to meet local needs and the ever-changing role of the pharmacist through constant improvement of pharmacy education.

Pharmacy education country case: Malawi

By FIP-UNESCO UNITWIN Centre for Excellence in Africa Member University of Malawi, Department of Pharmacy, Malawi

Authors
Dr Baxter Kachingwe, Department of Pharmacy, College of Medicine, University of Malawi
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Did you know?

- The pharmaceutical workforce in Malawi includes pharmacists, pharmacy technicians, pharmacy assistants, nurses and health surveillance assistants.
- The scope of practice in Malawi includes regulatory, supply chain, community, hospital, industrial, research, academia and management.
- The priorities of the Malawi government that are driving the pharmacy education curriculum include patient centred clinical practice, supply chain, pharmacovigilance and herbal medicine.

Pharmacy education in Malawi

General information:

Ownership: Public and not stand alone
Duration of studies: 10 months/year, five years in total
Language of Instruction: English
Average number of pharmacy graduates per year, 2019 data: 35
Number of registered pharmacists in 2019: not reported
Country population: 17,563,749
Number of registered pharmacists per population: 335

Courses and qualifications (including all pharmaceutical support workforce)

- Credit systems: 51 units, 684 credits, 6,840 contact hours
- Undergraduate courses and qualifications: Bachelor of Pharmacy (BPharm)

- Postgraduate courses and qualifications: Master's (awaiting curriculum approval by University of Malawi senate and in the final process of starting these postgraduate programmes.) MSc Herbal Medicine and MPharm. PhD is not available

Admission requirements

- Undergraduate admission requirements: Applicant must have six O-Level passes or three A-level passes or six Malawi School Certificate credit passes in English, mathematics, physics, chemistry and biology.
- Postgraduate admission requirements: BSc in Pharmacy, Pharmacology, Medicine, Surgery, Laboratory Sciences, Biological Sciences, Chemistry or any other relevant scientific discipline

Credit transfer and recognition of prior learning

Credit transfer: Done as per university rules
Prior learning: Diploma in Pharmacy (Pharmacy Technicians), Bachelor of Science degree (Biology or Chemistry) or any other qualification (e.g., Diploma in Nursing, etc)

Main curriculum focus areas

Pharmaceutical sciences, patient care and medicines use, clinical sciences, pharmacy and health care

Key learning objectives of the curriculum

- To equip students with knowledge on efficient supply chain and rational drug use
- To equip students with knowledge in pharmacovigilance for drug safety monitoring which facilitates rational drug use
- To equip students with the knowledge of clinical pharmacy to facilitate more involvement of pharmacists in patient care

Objectives of the ongoing curriculum review process: (e.g. transitioning from BPharm to PharmD)

No ongoing curriculum review.

Core country curriculum

The core country curriculum is set out below.

Year 1

Semester 1	Semester 2
Introduction to pharmacy Anatomy Physiology Biochemistry Community health Microbiology	Pharmaceutical calculations Anatomy Physiology Biochemistry Pathology Microbiology Principles of biostatistics

Year 2

Semester 1	Semester 2
Pharmaceutics I Pharmaceutical chemistry I Pharmacology I Pharmacognosy	Pharmaceutics I Pharmaceutical chemistry I Pharmacology I Pharmacognosy

Year 3

Semester 1	Semester 2
Pharmaceutics II Pharmaceutical chemistry II Pharmacology II Pharmacy practice I Pharmacy law I Medicine and medical supplies management I Research in practice: theory.	Pharmaceutics II Pharmaceutical chemistry II Pharmacology II Pharmacy practice II Pharmacy law II Medicine and medical supplies management II Clinical pharmacy II Pharmacovigilance I

Year 4

Semester 1	Semester 2
Biopharmaceutics Clinical pharmacy II Pharmacology III Pharmacy practice II Medicine and medical supplies management II Medicinal chemistry Pharmaceutical toxicology Pharmacovigilance II Research in practice: project	Pharmacokinetics Clinical pharmacy II Medicine and medical supplies management II Medicinal chemistry Pharmaceutical toxicology Pharmacovigilance II

Experiential learning

Internship is supervised by the National Regulatory Authority and is not an integral part of the BPharm curriculum. It requires 12 months or the equivalent of 2,000 hours with the following rotations:

- Hospital: six months (mandatory)
- Community pharmacy: one month (mandatory)
- Industrial pharmacy: one month (mandatory)
- Distributors: one month (mandatory)

Interns are then expected to write a report (competency standards) after the above rotations. Preceptors are also required to assess interns and write a report. The rest of the months can be completed anywhere (intern's choice) with an exam after completion of 12 months.

Delivery of the curriculum

The mode of delivery shall be full time through lectures, laboratory sessions, seminars/presentations, tutorials and group work, and practical assignments. The following teaching and learning methods are used: lectures and online supporting materials, tutorials and workshops, practical classes, problem-based learning sessions, laboratory work, seminars and presentations, and community, hospital and industrial pharmacy attachments.

Assessment of learning

The College of Medicine uses continuous and end-of-semester assessments. Continuous assessment comprises laboratory work, mid-semester examinations, workshops, presentations, projects etc. These constitute 40% of the final mark. End-of-semester assessments and examinations constitute 60% of the final mark. Written papers consist of any or all of the following: multiple choice questions, extended matching questions, and short and long essay questions, OSCE (Objective Structured Clinical Examination) etc. Viva voce is reserved for students who fall into borderline fail (≥49% but less than 50%) and borderline distinction (≥74% but less than 75%) categories.

National pharmacists competency framework

The national competency framework is comprised of the following overarching themes: drug supply management, patient care and pharmaceutical care, rational drug use, professional practice and personal development.

Challenges and gaps faced include minimum exposure to manufacturing and Good Manufacturing Practice because of a low number of manufacturing units in Malawi. Drug shortage is another area which affects the supply chain management. The regulatory authority is yet to start compulsory CPD. On the clinical side, there is need to involve pharmacists in the hospital wards and improve on interprofessional work. Pharmacovigilance is also a fairly new discipline in Malawi. On personal development, the biggest challenge is the absence of local institutions that offer postgraduate programmes apart from the College of Medicine. Most of the programmes have to be joined outside the country, which requires sponsorship.

Accreditation and quality assurance

Accreditation is carried by the National Council for Higher Education every three years. To ensure quality assurance, there is availability of up-to-date learning materials, including prescribed and recommended reading as well as teaching IT aids such as computers. The programme ensures that well-qualified staff are assigned to teach in their areas of specialisation. There is also engagement of reputable external examiners, who will be appraised at departmental and faculty levels and approved by relevant university authorities.

Additional methods for evaluating standards and improvement of quality include: staff appraisal by students; stakeholder feedback, for example, graduates and employers; regular curriculum review; and staff refresher courses (summer schools and workshops).

Administration and finance

The student direct tuition fee charged per annum is USD 500, and USD 1,688 for mature students. The tuition fees are covered by the government, through scholarships or individually by the student.

Pharmacy education at the University of Malawi Department of Pharmacy — Needs-assessment using FIP's global pharmacy education tools

Educational standards assessment	
Result	The University of Malawi Department of Pharmacy's education programme has been mapped against FIP's Nanjing Statements in order to perform an educational standards assessment. Based on the educational standards mapping against the education programme with the 67 FIP Nanjing Statements, the University of Malawi department of pharmacy educational standards have shown strong links with all the clusters of the Nanjing Statements. The resources and academic staff cluster (#6) seems to show not much implementation due to financial constraints. However, collaboration with partnering institutions has ensured remarkable progress. The continuous professional development cluster (#8) activities exist but are not properly regulated. The department focuses on the training of students to become pharmacists only and not pharmaceutical scientists.
Curriculum assessment	
Result	The BPharm curriculum consists of the following course categories: pharmaceutical and basic sciences courses (11.7%), clinical pharmacy courses (23.4%), pharmacy and health care (21.9%), experiential courses (37.8%) and other courses (5.7%). Based on the curriculum assessment and educational outcomes mapping against the FIP Global Competency Framework, the pharmaceutical public health competencies, pharmaceutical care competencies, organisation and management competencies and professional and personal competencies are assigned highest priority of importance to be delivered by the curriculum. The CPD competencies all have high priority in the department but there are no learning outcomes linked with this. They are also not compulsory or regulated.
Workforce development	
Result	All 13 of the FIP Pharmaceutical Workforce Development Goals (PWDGs) are assigned high priority. Malawi has local strategies/policies in place for academic capacity, quality assurance of pharmacy education, foundation training for pre-registration pharmacists, and pharmaceutical workforce gender and diversity balances. Some of the PWDGs are not covered by local strategies/policies in Malawi, particularly those under professional development and systems. Specialist recognition and professional development (e.g., competency, leadership, CPD) are identified as gaps in the national strategies around the PWDGs. There is no regulatory pathway for achieving these goals, however the Ministry of Health, the college and the National Regulatory Authority are working on new pathways. The Ministry of Health is in the process of setting a needs-based career progression strategy.

Academic capacity and infrastructure

- Staff to student ratio: 1 staff to 11 students
- Number of students in 2019: For undergraduates there are 90 females and 115 making a total of 205**.**
- Number of academic staff: 7 female and 11 males (pharmaceutical sciences modules are taught by staff within the department while other modules are taught by staff from other departments within the College of Medicine, e.g., physiology, anatomy, biochemistry, research methods etc).
- Key areas of research expertise and number of staff: pharmaceutical chemistry: natural products and phytochemistry (3); supply chain management: quality of medicines (1); pharmaceutics: pharmacokinetics (1); pharmaceutics: formulation studies (1); clinical pharmacy (1); pharmacology (2); pharmacovigilance: drug safety monitoring systems (3).
- Graduate output in 2019: 35 undergraduates.
- Distribution of graduates in key practice areas: not reported.
- Average number of research output yearly: 20. The scope: pharmacovigilance, pharmacy practice, herbal medicine, medicines quality, medication compliance, medication safety, medicine supply.
- Academic exchange programmes in place: the University of Malawi department of pharmacy has been involved in an academic staff exchange programmes nationally and internationally by hosting two staff and sending out two staff in the past three years.
- Most significant gaps in academic capacity are in terms of numbers and expertise: the current staff establishment is not sufficient to meet the needs of our department, especially in research.

4.2.7 Zambia

Education trends, innovation, transformations, and current drivers of pharmacy curricula in relation to national health priorities in Zambia

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Localised training of pharmacists in Zambia began in 2001 at the University of Zambia (UNZA), the country's oldest and largest public university. The training programme was necessitated by the identified contextual need for pharmacists in the health sector and supported by the Zambia National Drug Policy of 1999.[1] That policy stated that, as a matter of urgency, local training of pharmacists needed government support to ensure production of suitably qualified pharmacists in the country. The urgent need for pharmacists in Zambia at the time led to the development of the first curriculum for the Bachelor of Pharmacy (BPharm) degree programme,[2] and creation of Department of Pharmacy at UNZA to offer the programme. Since its introduction, the undergraduate BPharm curriculum has been reviewed and updated twice, as well as adapted to establish other similar training programmes at private universities in the country. Presently, a growing number of other public and private universities are intending to introduce pharmacy training programmes at both diploma and degree levels. This chapter describe trends in pharmacy education, innovations, transformations, and current drivers of pharmacy training curricula related to the national health strategies in Zambia. It further informs how pharmacy education, in the Zambian context, has been responding and contributing to addressing the global health workforce agenda in relation to attainment of pharmaceutical workforce needs and sustainable development goals. We conducted a desk audit of education trends pertaining to how pharmacists were trained locally, and provide expert insights and perspectives on the trends, transformations and drivers of curriculum used for training pharmacists in Zambia.

Although records show that local training of pharmaceutical personnel (that is, pharmacy dispensers and pharmacy technologists) began in the 1960s in Zambia, the pharmacy profession is relatively young. When training of pharmacists began in Zambia, the national government's desire was to attain a critical mass of pharmacist workforce capable of performing what can be referred to as the "traditional roles" of a pharmacist, namely, pharmaceutical supply chain management at hospital and national levels. A critical need for Zambia at the time, pharmacists were key to the effective management of the pharmaceutical supply chain and pharmaceutical care services required to anchor the scaling up of HIV/AIDS, tuberculosis and malaria programmes, including stimulating local manufacturing of medicines in the country. These contextual needs of the time were what the initial BPharm curriculum was premised to respond to in 2001. The objectives and outcomes of learning of the first version of the BPharm degree programme curriculum introduced in Zambia was to produce pharmacists who would have the following attributes and skills on entry to practice:[2]

- Organise and control the manufacturing, compounding and packaging of pharmaceutical products;
- Know about pharmaceutical supplies management;
- Dispense and ensure the optimal use of medicines prescribed for patients;
- Provide pharmacist-initiated care to patients and ensure optimum medicines use;
- Provide information and education in health care and medicine;
- Provide and promote community health and related information and advice; and
- Have the knowledge, confidence, attitudes and skills to read, listen and speak in an effective manner.

Despite global trends and shifts in models of pharmaceutical education at the time tilting towards the Master of Pharmacy (MPharm) degree offered at universities in the United Kingdom and Europe on the one hand[4] and the Doctor of Pharmacy (PharmD) degree offered in the United States of America, parts of Asia and a number of other low- to middle-income countries (LMICs) on the other,[5] Zambia's basis of adopting the BPharm model was arguably based on two key fundamentals as argued by Kalungia and colleagues.[3] First, the in-country context of needs at the time were more adapted to producing a pharmacist suitably grounded in the traditional pharmaceutical and clinical sciences. Secondly, it was argued that the prevailing qualification level descriptors of higher education in Zambia were at variance with the nomenclature of master and doctorate at undergraduate level. In Zambia, the master and doctorate are preserves of postgraduate level education qualifications.

In 2012, the private sector came on board to supplement the training of pharmacists in Zambia. Lusaka Apex Medical University adapted he UNZA BPharm curriculum and became the second university in Zambia to offer undergraduate degree training in pharmacy. By then approximately 400 pharmacists had graduated from UNZA and were serving in different portfolios in government and private institutions, as well as in non-governmental organisations.[6]

In 2013, UNZA Department of Pharmacy, in consultation with various stakeholders, embarked on reviewing the BPharm curriculum. This process was an effort to make the curriculum more responsive to the emerging trends and pharmaceutical care needs in the local context. The revised 2013 version curriculum[6] was implemented in 2013 and became the second version of the BPharm curriculum in Zambia. The major motivation for curriculum revision was the feedback from stakeholders, which mainly centred on the need for pharmacists with improved skills sets to effectively provide pharmaceutical care services. Most stakeholders made an observation that the earlier graduates were doing extremely well with regard to the pharmaceutical knowledge base but struggled to perform in certain areas of practice due to undeveloped skills. This observation necessitated the shift from the traditional approach to training to an eclectic (hybrid) approach that involved 60% traditional teaching (discipline-based) and 40% experiential learning in clinical practice settings.[3]

UNZA, in 2017, embarked on a consultative process with relevant stakeholders to review the 2013 version of the BPharm curriculum. The stakeholders particularly indicated the need to reinforce knowledge and skills in the extended roles of a pharmacist, including widening the scope of practice to strengthen areas such as veterinary and industrial pharmacy, pharmaceutical public health, pharmaceutical supply chain management, and leadership and management. Moreover, the national need and call for increasing active participation of the private sector players

in fostering national development necessitated the inclusion of entrepreneurship courses in the BPharm curriculum. The process also saw the introduction of information and communication technology and behavioural sciences into the BPharm curriculum, while maintaining the common core pharmaceutical sciences. Further reinforcements were also made to enhance skills in pharmacoeconomics, making the revised 2017 version of the BPharm curriculum[7] have wider scope, depth and content coverage to produce pharmacists with requisite competence to meet contemporary practice demands. The 2017 BPharm curriculum has since been implemented at UNZA. The first graduates are expected in 2021.

The Zambian landscape of pharmacy education continues to witness steady growth. In 2018, another private university, Texila American University (TAU), also started training pharmacists at degree level. TAU in collaboration with the Pharmaceutical Society of Zambia (PSZ) and other stakeholders developed a BPharm curriculum based on the Zambian pharmaceutical sector needs and in line with the FIP pharmacist competency framework.[8] Following the UNZA BPharm curriculum, the TAU BPharm curriculum[9] became the second BPharm curriculum locally developed in Zambia. It is expected that by the end of 2020, at least two more universities, Eden University (private) and Mulungushi University (public), that were in the pipeline of introducing training of pharmacists will have also commenced their training programmes. This will bring the total number of institutions training pharmacy personnel to five, including Evelyn Hone College, which trains pharmacy technologists.

At its 2019 annual general meeting held in Livingstone, the PSZ passed a resolution to remodel and transition local training of pharmacists from the BPharm degree programme to the PharmD model. The motivation for this decision stemmed from the increasing need for pharmacists in Zambia to provide specialised pharmacy services, including value-addition to patient care by introducing novel practice domains such as pharmacist-independent prescribing in community pharmacy practice, medicines reconciliation, home-based care, vaccine administration and related services. To establish whether this is a perceived or actual need for the country, the PSZ through its education committee has since conducted a situational analysis and needs assessment among relevant stakeholders to inform the process of developing, transitioning and remodelling to the PharmD model of training pharmacists in Zambia. At the time of writing, the findings of the needs assessment were in the process of dissemination. The next steps in the process will involve stakeholder engagement to get consensus and development of a context-specific, needs-driven PharmD curriculum for Zambia. This process is expected to be completed before the end of 2020 and will be reported on in the future. Moreover, remodelling pharmacist training to PharmD is premised to transform the trajectory, practice and contribution of pharmacists to the national health agenda and drive towards attainment of universal health coverage.

Innovation

Kalungia and colleagues[3] earlier argued that like many other LMICs, Zambia continues to experience challenges to delivering quality pharmaceutical education such as limited infrastructure, limited access to teaching resources, and inadequate academic staff development and research capacity. Further, there is a call to address these challenges in order to improve pharmacy education in Zambia. In order to counter the challenge of inadequate academic staff, the UNZA Department of Pharmacy has over the years taken advantage of the local faculty development policy, which has led to an increase in the number of full-time academic staff from an initial four full-time lecturers in 2004 to 17 full-time lecturers in 2020. Similarly, in terms of level of qualification, academic staff with PhDs increased from one to five within that time frame, with two more lecturers expected to complete their PhD studies before the end of 2020, and a further five currently enrolled for their PhD studies.

To meet the increasing demand for advanced level (postgraduate) pharmaceutical education and pharmaceutical workforce gaps in terms of specialist pharmacists, UNZA introduced postgraduate programmes in clinical pharmacy (taught) in 2010 and other core pharmaceutical sciences (by research) in 2017. It is expected that graduates from these postgraduate programmes will contribute to overcoming the shortfall of specialist pharmacists in the country.

Zambia's pharmacy training institutions continue to collaborate with and work together with other international universities. For instance, UNZA Department of Pharmacy has been participating actively on the FIP-UNESCO UNITWIN initiative that established linkages and collaboration between pharmacy schools for resource sharing,

capacity-building and research in the region. Moreover, at institutional level, local universities have also gone on to enter into memoranda of understanding with other overseas universities to work together to improve pharmacy education, assist with postgraduate student supervision, and enhance academic experiences of students. Currently, there are also ongoing discussions among local pharmacy programme administrators and faculties in the different approved institutions to establish an association of pharmacy training institutions which will enable access to academic human resource and infrastructure among member institutions. There are also ongoing linkages, partnerships and cooperation with the pharmaceutical industry, and national pharmaceutical regulatory and supply agencies to support the training of pharmacists in the country. For instance, in order to address the challenge of limited infrastructure and laboratory equipment, UNZA has entered into memoranda with the Zambia Medicines Regulatory Authority to utilise some of its advanced equipment at the National Drug Quality Control Laboratory to support skills training of undergraduate and postgraduate pharmacy students. Similar memoranda have been entered into with a number of local pharmaceutical manufacturing companies to provide space for experiential learning of pharmacy students, a trend that is encouraged and followed by other local pharmacy training institutions. Internal capacity has also been enhanced to develop or acquire purposeful scientific equipment to enhance training aspects. For instance, at UNZA, the Department of Pharmacy in 2016 acquired scientific laboratory equipment from Seeding Labs — a charity organisation based in the USA — which has been used to set up a pharmaceutical research laboratory at UNZA.

With increases in the faculty and opportunities to do research, the number of research outputs, projects and collaborative studies have also improved in Zambia. Particularly at UNZA, a number of research lines with scholarly outputs are being pursued in areas such as in the pharmaceutical sciences, pharmacy education, medicine utilisation studies, indigenous knowledge systems, drug development, pharmaceutical formulation and pharmaceutical public health research. The quality of scholarly outputs from local faculty researchers has been remarkable and papers have been published in international peer-reviewed journals. Locally, pharmacy students and pharmacists are also able to publish their scholarly works in the *Pharmaceutical Journal of Zambia*, an indexed publication of the PSZ.

Alignment to national health strategy

The Zambia National Health Strategic Plan 2017–2021[10] notes that there is lack of suitably qualified pharmaceutical personnel both at service delivery points and central medical stores and emphasised the need to rectify this problem. In response to this, the BPharm curriculum has seen significant efforts to strengthen the pharmaceutical supply chain management component. The strategic plan further targets to improve pharmaceutical care and standards of pharmacy practice in both clinic and public health specialties. This strategy influenced the decision to incorporate a component of pharmaceutical public health in the curriculum, as well as the introduction of a Master of Clinical Pharmacy that allows students to specialise in different areas of clinical practice. The eHealth strategy 2017–2021[11] highlighted the role of information and communications technology in improving health services and outcomes. This influenced the decision to incorporate an ICT component in the BPharm curriculum in order to emphasise the role of such technology in the provision of pharmacy and health services. The need to strengthen the capacity of the Zambia Medicines Regulatory Authority, as mandated by the Zambia Medicines and Allied Substances Act,[12] in the regulation of medicines and allied substances has necessitated the need to introduce a Master of Industrial Pharmacy degree, which will have a strong component of regulatory pharmacy. It is clear that changes that are implemented in pharmacy education are aligned to the national priorities and strategies.

In conclusion, it is worth noting that Zambia, through the UNZA Department of Pharmacy, has been recognised as providing a reputable pharmacy training programme that has international recognition by FIP, something of which the Pharmaceutical Society of Zambia is very proud. This is because the Department of Pharmacy has matured over the past 20 years going by its achievements. It not only has viable academic potential but also has huge potential to stir up industrial and economic development of the country through support of and innovation in the pharmaceutical sectors. However, in order to effectively continue executing this international mandate to train quality pharmacy graduates and to realise the vision to become the leading provider of quality pharmacy training and pharmaceutical research in the region by 2030, the UNZA Department of Pharmacy should become a School of Pharmacy.

Pharmacy education country case: Zambia

by FIP-UNESCO UNITWIN Centre for Excellence in Africa Member University of Zambia, Department of Pharmacy, Lusaka, Zambia

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Did you know?

- Local training of pharmacy dispensers and pharmacy technologists began in the 1960s in Zambia.
- The pharmacy workforce in Zambia comprises registered pharmacists, pharmacy technicians, dispensers, and nurses as dispensers in some settings.
- The scope of pharmacy practice includes hospital pharmacy, community pharmacy, industrial pharmacy, public health pharmacy, veterinary pharmacy, academic pharmacy, logistics pharmacy, regulatory pharmacy, clinical pharmacy, locum pharmacy in private health trading institutions or companies, pharmacovigilance, and drugs kit distribution.
- Priorities that are influencing pharmacy curricula in Zambia are exemplified in hospital pharmacy practice through an increase in the clinical pharmacist workforce to buffer the shortage of pharmacists in hospital settings.

Pharmacy education in Zambia

General information

Ownership: Public
Duration of studies: 12 months/year, four years in total
Language of instruction: English
Average number of pharmacy graduates per year, 2019 data: 60
Number of registered pharmacists in 2019: female 548; male 683

Courses and qualifications (including all pharmaceutical support workforce)

- Credit systems: 104 credit units
- Undergraduate courses and qualifications: Bachelor of Pharmacy (BPharm)
- List of postgraduate courses and qualifications
    - Master of Clinical Pharmacy (Taught)
    - Master of Science by Research in Pharmaceutics
    - Master of Science by Research in Pharmacy Practice
    - Master of Science by Research in Pharmacognosy and
    - Master of Science by Research in Clinical Pharmacology and Nutrition
    - PhD in Pharmacy

Admission requirements

Undergraduate admission requirements: Candidates must pass with credit (C6 or better) the pre-university (entry) qualifications (O-levels) in chemistry, biology, mathematics, physics and English.

Postgraduate admission requirements:

Master of Clinical Pharmacy (MClinPharm) The applicant must meet the following admission requirements: A BPharm or BSc in Pharmacology from the University of Zambia or an equivalent qualification from a recognised university with a minimum of merit or better. A minimum of two years' professional work experience in pharmacy or clinical pharmacy is advantageous. Full registration with the Health Professions Council of Zambia. A relevant supporting reference from the employer (for in-service applicants).

Master of Science in Pharmacognosy/Master of Science in Pharmaceutical Chemistry The applicant must meet the following admission requirements: A bachelor's degree in pharmacy, botany, phytochemistry, agricultural sciences, chemistry, pharmaceutical sciences/pharmaceutical technology, or any natural product sciences degree from the University of Zambia or an equivalent qualification from a recognised university with a credit or better.

Master of Science in Pharmaceutics/Master of Science in Pharmacy Practice/Master of Science in Clinical Pharmacology and Nutrition The applicant must meet the following admission requirements: A BPharm or BSc in Pharmacology from the University of Zambia or an equivalent qualification from a recognised university with a minimum of merit or better. A minimum of two years' professional work experience in pharmacy will be advantageous. Full registration at the Health Professions Council of Zambia. Relevant supporting reference from the employer (for in-service applicants).

Credit transfer and recognition of prior learning

The UNZA Department of Pharmacy recognises prior learning, as evidenced by exemptions given to holders of a diploma in pharmacy from recognised training institution, who are admitted to the second year of the programme. Credit transfer from other universities offering a BPharm is also accepted and is considered on an individual basis taking into consideration the curricula structure of universities of origin.

Main curriculum focus areas

Hospital pharmacy and pharmaceutical care, industrial pharmacy and manufacturing, agricultural and veterinary pharmacy

Key learning objectives of the curriculum

- Employment of hospital pharmacists by raising the number of clinically oriented pharmacists.
- Boosting local production of pharmaceuticals through collaboration with pharmaceutical industries in training pharmacists.
- Increasing public-private partnerships in public health service provision as part of the practice-based learning curriculum design.
- Raising the level of pharmaceutical services in agriculture and veterinary fields of work as part of the practice-based learning curriculum design.

Objectives of the ongoing curriculum review process: (e.g., transitioning from BPharm to PharmD)

- Patient-centred care approach in the provision of pharmaceutical care
- Public-private partnership in the provision of pharmaceutical care to the public community
- Progressive development of local industrialised and commercial pharmaceutical production

Core country curriculum

The core country curriculum is given below.

Year of study	Foundation	
1st year (A-level)	*'O' level* **Qualifications**	Five 'O' level minimum credit (grade 6 and better) passes or any relevant high school core points, including English, mathematics, pure or combined sciences (biology, chemistry, physics, veterinary sciences, agricultural sciences) and
	'A' level or equivalents	Four 'A' level passes, including pure or combined sciences and mathematics; or From UNZA, main campus, after one year of study in the School of Natural Sciences; or For holders of diploma certificate in pharmacy technology from a recognised institution; or From any other recommended training institution, nationally, regionally or globally.
	BPharm training	
2nd year (year1)	Physical pharmaceutics General and metabolic biochemistry General pharmaceutical chemistry Comparative anatomy and disorders Physiology and pathophysiology Information technology and behavioural sciences	
3rd year (year2)	Pharmaceutical systems and technology Pharmaceutical chemistry and analysis General pharmacology General pharmacognosy Pathology and microbiology Pharmacy practice foundation	
4th year (year3)	Biopharmacy Clinical pharmacology, toxicology and pharmacovigilance Medicinal chemistry Pharmacy practice intermediate and supply chain management Dosage form design and manufacturing Clinical pharmacognosy and nutraceutics Research methods, epidemiology and biostatistics	
5th year (year4)	Industrial and veterinary pharmacy Clinical pharmacy and pharmacotherapeutics Professional pharmacy practice and public health Leadership, management and governance Business, entrepreneurship and pharmacoeconomic Research project	

Experiential learning

The BPharm graduates take experiential learning through 12 months internship placement in hospital practice (nine months), community practice (one month) and industrial practice (two months).

The Pharmaceutical Society of Zambia is responsible for the supervision of interns, and they are assessed at the end by post-internship examination. There is sufficient placement available for the interns and they are paid by the Zambian government.

Full registration to practise as a pharmacist requires that the candidate holds a BPharm degree and passes post-internship examinations.

Delivery of the curriculum

The BPharm is a full-time degree programme delivered over a period of four years. The programme is delivered in primarily two phases: preclinical and clinical phases. The preclinical phase (years 1 and 2) involves preliminary grounding of students in basic health sciences and pharmaceutical science disciplines that are requisite to the clinical phase (years 4 and 5) where students undertake structured applied, clinical and experiential learning in pharmacy. Overall, the courses offered in the programme are intended to equip the graduate with essential pharmaceutical knowledge, skills, attitude and professionalism, which are fundamental and essential competencies for pharmaceutical care delivery as a pharmacist. This has been done through delivery of lectures in-person, virtual sessions (Moodle online platform), laboratory sessions, problem solving of case studies and clinical setting practicals.

Assessment of learning

In general terms, BPharm students at UNZA are assessed through continuous assessments and final examination as follows:

- **Continuous assessment:** **40%**
  - Tests: 20%
  - Assignments: 10%
  - Seminar presentations: 5%
  - Lab practical reports: 5%
- **Final examination:** **60%**
  - Written examination 50%
    - Paper I —Multiple choice questions
    - Paper II —Short answer and essay type questions
  - Practical examination 5%
  - Viva voce 5%

National pharmacists competency framework

The Pharmaceutical Society of Zambia in collaboration with the Health Professions Council of Zambia developed the Zambia Pharmacist competency framework (see below), which is predominantly adapted from the FIP pharmacist competency framework.

Zambia pharmacist competency framework

Objective:	Learning outcomes:
1. Design active pharmaceutical ingredients	• The graduate: • Describes the principles and applications of chemical thermodynamics, reaction kinetics, electrolyte conductance, laws of electrolysis and the concept of photochemistry • Conducts qualitative and quantitative chemical analysis of inorganic compounds • Illustrates the importance of quality concepts such as accuracy, precision • Obtains and interprets analytical assay data to the approved standards in the country • Describes the synthetic pathways for various chemical/drug substances and proposes reasonable mechanisms for the reaction • Describes the general methods of preparations for both biological and pharmaceutical applications • Explains the principles of the discovery, design and development of active pharmaceutical ingredients • Utilises structure-activity relationships in drug optimisation and selection for representative disease management and patient care • Explains the principles and applications of recombinant-DNA technology and monoclonal antibodies
2. Manufacture, compound and manage the manufacturing and compounding of pharmaceutical products	The graduate: • Applies the physical properties of matter and relates them to drug preparations • Explains the pharmaceutical unit processes according to pharmaceutical manufacturing • Solves pharmaceutical-based calculations in the process of pharmaceutical care delivery services • Performs the processes of solubility assessment, solubilisation, micellisation • Appreciates various pharmaceutical dosage forms that are available on the market and their fundamental manufacturing processes and principles • Analyses radiopharmaceutical substances and dosage forms that are available on the market and their applications • Assesses the quality of pharmaceutical dosage forms available on the market • Understands the important principles in pharmaceutical biotechnology and its applications in medicine and pharmacy

3. Design optimal drug dosage regimens and conduct therapeutic drug monitoring	The graduate: • Characterises and quantifies the time-course of processes of drug liberation, absorption, distribution, metabolism and elimination • Applies the principles of biopharmaceutics and pharmacokinetics to optimal drug design • Utilises biopharmaceutical principles and data in the assessment and selection of medicines, drug delivery systems and routes of administration • Applies basic and clinical pharmacokinetic principles to the optimisation of medication regimens for individual patients • Utilises suitable methods to carry out analysis of drugs in body fluids
4. Provide information and education on drugs and medicines (human and veterinary), including toxicity issues	The graduate: • Understands and explains molecular mechanisms of drug action • Characterises the mechanisms of action, uses and side effects of drugs in various systems of the human body • Applies the principles of drug action and handling of drugs by the body in normal individuals, in special populations and disease states • Applies knowledge of pharmacokinetics and pharmacodynamics to manage clinical manifestations of disease • Evaluates evidence and recommends quality, cost-effective pharmacological interventions through well designed treatment strategies • Understands mechanisms of toxicity and toxicity testing • Effectively manages a poisoned patient • Practises and promotes medication safety • Demonstrates understanding of drug development, evaluation and regulation • Participates in drug development and clinical trials and adopts innovative approaches in pharmacology • Conducts therapeutic drug monitoring • Detects, manages and analyses adverse drug reactions, and reports them via the appropriate channels • Demonstrates understanding of drugs used in veterinary medicine

5. Provide information and education on natural sources of drugs and the practice of alternative medicine	The graduate: • Identifies medicinal plants and isolates active components of pharmaceutical significance • Describes the pharmacological activities of drugs of natural origin • Analyses the macroscopic and microscopic structures of different groups of pharmaceutically active ingredients • Explains the clinical application of drugs derived from plants and other natural sources in the management of infections and chronic conditions • Describes the toxicological effects of pesticides and toxic agents from plants • Explains the role of complementary and alternative medicine in modern medicine in various cultures • Undertakes quality assessment of alternative medicines • Evaluates the plants used in African traditional medicine • Utilises principles of rational drug use to make informed drug management decisions that are patient-focused, evidence-based, cost-effective and clinically sound
6. Provide pharmaceutical care and initiate pharmacotherapy as part of multi-disciplinary team as well as diagnose and treat minor ailments	The graduate: • Demonstrates critical reasoning skills in solving clinical patient cases as part of a multidisciplinary team • Solves real-life cases seen in the practice of pharmacy, and practises solving clinical pharmaceutical problems • Adopts, designs and implements the pharmaceutical care process and plan in collaboration with other health care members in the provision of health care services • Applies critical reasoning skills in solving patient cases as part of a multidisciplinary team • Undertakes patient medication histories, assessments and evaluations • Interprets clinical laboratory data and applies them to the design of dosage and therapeutic regimens • Applies principles of biomedical sciences and pharmacology/pharmacotherapy to respond to symptoms of minor ailments by diagnosing and initiating treatment in the community, and refer appropriately (major ailments)

7. Effectively manage the dispensing process, pharmacy business, the pharmaceutical supply chain and provide professional guidance/service in different settings of practice	The graduate: • Appreciates the scope of pharmacy as a profession, its history and evolution, its responsibility to society and its role in the health system • Understands the Zambian healthcare system • Explains the basic elements of effective communication in the practice of pharmacy • Applies the fundamental principles of dispensing medicines and related substances as a professional process • Appreciates the importance and hierarchy of compliance, adherence and concordance • Understands the fundamental concepts of professional ethics and their application to pharmacy practice • Describes the fundamental principles of dispensing medicines and related substances as a professional process • Explains the principles of pharmacy law and ethics • Undertakes extemporaneous compounding of medicines • Manages the pharmaceutical supply chain of medicines • Applies the concepts and principles of standards of practice and good professional practices in various settings of pharmacy practice, including in professional development and interactions • Manages the manufacture of pharmaceutical products • Participates in the planning and implementation of clinical trials • Adopts an integrated approach to quality assurance of pharmaceutical products • Manages the community pharmacy, hospital pharmacy, industrial pharmacy and veterinary pharmacy professionally • Serves as a member of policy-making bodies (including pharmacy and therapeutics committees) • Participates in national immunisation programmes/activities
8. Undertake pharmaceutical and integrated health research	The graduate: • Develops an organised approach to identifying a pharmacy/integrated health topic of interest for independent as well as collaborative study • Effectively utilises various sources to gather literature for a research paper • Demonstrates knowledge and ability to critically evaluate and critique relevant literature

8. Undertake pharmaceutical and integrated health research [continued]	The graduate: • Demonstrates abilities to organise ideas and summarise data for research • Formulates research questions to be studied • Develops research proposal based on research ethics committee proposal recommendations • Conducts data collection efficiently and ethically • Analyses data using simple statistical tests. • Applies scientific writing skills to develop a final written report of research study • Communicates effectively project details and final conclusions • Advocates for research
9. Promote public health	The graduate: • Assesses the primary healthcare needs (considering the cultural and social setting of the patient and communities) • Advises on health promotion, disease prevention and control, and healthy lifestyle • Implements relevant national health policy and public health interventions • Actively participates in formulation of pharmaceutical policy
10. Exhibit professional and ethical conduct and demonstrate life-long learning	The graduate • Demonstrates awareness and adherence to local, regional and international standards of pharmaceutical practice • Formulates standard operating procedures, occupational safety rules and regulations for pharmaceutical personnel and support staff Promotes health and medication safety for all • Behaves according to ethical and legal frameworks governing the practice of pharmacists • Is polite, considerate, trustworthy and honest, and acts with integrity, maintains confidentiality, respects patients' dignity and privacy and understands the role of informed consent • Respects colleagues and others irrespective of age, gender, socio-economic status, political affiliation, race, religion or creed • Does no harm to patients either by intention or negligence in the course of duty • Takes personal responsibility for his/her learning, developing a foundation for subsequent continuing professional development • Can communicate effectively, orally and In writing with patients, colleagues, peers and other healthcare professionals

The following are some of the required skills from different disciplines for pharmacy graduates to be competent practitioners graduating from UNZA:

- Possess a comprehensive skills and knowledge base of drug chemicals in terms of the chemical composition, structure and properties of substances and of the chemical processes and transformations that they undergo to preserve end-product quality
- Possess skills in pharmaceutical manufacturing and compounding of medicines from raw materials into production process, dosage form design, etc.
- Possess comprehensive scientific skills to undertake and understand medicines being procured, manufactured and stored just before their respective therapeutic usages as per individual and patients' needs
- Possess skills and knowledge in procurement, manufacturing storage, warehousing and distributive supplying procedures of drugs taking into consideration the good practice protocols available
- Possess skills and knowledge about quality standards assurance principles of pharmaceutical products being procured, manufactured, stored and distributed in terms of processed quantities, expiry dates etc.
- Possess skills and knowledge about quality control and analytical procedures to be able to evaluate and monitor the quality of products, storage spaces and the performance of equipment
- Possess skills and knowledge to forecast and quantify medicines for national needs requirements
- Possess skills and knowledge to manage pharmaceutical systems at institutional and national levels in accordance with expectations of government, partners and stakeholders
- Possess knowledge about quality standards of pharmaceutical products to match them appropriately with the prevailing storage or warehousing conditions
- Possess knowledge related to adhering to pharmaceutical-related professional observation of standard operating procedures
- Undertake pharmaceutical and integrated health research
- Promote public health
- Exhibit professional and ethical conduct and demonstrate desire for life-long learning

Accreditation and quality assurance

There is accreditation every five years by the Health Professions Council of Zambia. It accredits the educational institution/university, the faculty/school of pharmacy and the academic programme.

Moreover, there is an internal policy guided quality assurance system that continually monitors and evaluates the pharmacy curricula hosted by tertiary institutions. However, in most cases, the review period, as guided by the policy, is not adhered to.

Administration and finance

There are self-sponsored and government-sponsored students, and each student pays a direct tuition fee of USD 2,800 per annum, payable through government loans, by individuals and through scholarships.

Pharmacy education at the University of Zambia Department of Pharmacy — Needs-assessment using FIP's global pharmacy education tools

Educational standards assessment	
Result	The University of Zambia Department of Pharmacy's education programme has been mapped against FIP's Nanjing Statements in order to perform an educational standards assessment. According to the educational standards mapping against the education programme with FIP Nanjing Statements, University of Zambia Department of Pharmacy educational standards have showed high links with the standards under the clusters of #1 "Shared global vision", #2 "Professional skills mix", #3 "Recruitment of students", #4 "Foundation training and leadership", #5 "Experiential education", #7 "Quality assurance" and #8 "Continuous professional development", thanks to the Health Professions Council of Zambia in conjunction with the Pharmaceutical Society of Zambia. Cluster #6 "Resources and academic staff" has most of the gaps in terms of resources and academic staff capacity. These gaps are related to: insufficient highly trained faculty members; low status of the school operating as a department; insufficient equipped infrastructures such as classrooms, laboratories and office space; and insufficient libraries with up-to-date reading materials.
Curriculum assessment	
Result	Based on the curriculum assessment and educational outcomes mapping against the FIP Global Competency Framework, the pharmaceutical care competencies and professional and personal competencies attained highest priority of delivery in the curriculum. Nevertheless, specific behavioural improvement towards handling aspects of pharmacovigilance and inquisitiveness skills are needed. Pharmaceutical public health competencies and organisation and management competencies were ranked low. Specific priority competencies need to be geared up in the following: supply chain and management, workplace management, legal and regulatory practice, CPD, quality assurance, research in workplace and self-management. The UNZA Department of Pharmacy is striving to rationalise its pharmacy curriculum to address the pharmaceutical needs of the country in specific core areas of: patient-centred care approach in the provision of pharmaceutical care; public-private partnerships in the provision of pharmaceutical care; and progressive development of local industrialised and commercial pharmaceutical production.

Workforce development	
Result	All 13 of the FIP Pharmaceutical workforce Development goals attained high priority; in addition, they are adopting high levels in adjunct training and parallel trainings as well. Furthermore, several governmental parastatal bodies, policies and regulations exist that define the scope of pharmacy practice in Zambia, such as: • The Zambia Medicines Regulatory Authority, for control of drug registration and use; • The Health Professions Council of Zambia, for control of professional registration and practice; • The Drug Enforcement Commission, for control of drugs misuse and trading; and • The Food and Drugs Commission of Zambia, for complimentary control of use of food nutrients and drugs through quality assertiveness. These agencies in collaboration the Zambian Ministry of Health, the Pharmaceutical Society of Zambia and the National Institute for Scientific and Industrial Research are continually making concerted efforts in addressing the pharmaceutical workforce needs of the country.

Academic capacity and infrastructure

- Staff to student ratio: 1 staff to 18 students
- Number of students: for undergraduates, 142 females, 220 males with a total of 362. For masters, 12 females, 8 males, for PhD, 1 male.
- Number of academic staff: 5 females and 15 males.
- Key areas of research expertise and number of staff: pharmaceutics (2), botanist with pharmacognosy (1), pharmacology (1), clinical pharmacists (2), biopharmacy (1), pathology (1).
- Graduate output in 2019: 60 undergraduates and 4 postgraduates.
- Distribution of graduates in key practice areas: hospital practice 85%, industry 1%, community 13%, academia 1%.
- Average number of research outputs yearly: Approximately 10 publications per year.
- Academic exchange programmes in place: The University of Zambia Department of Pharmacy has been involved in both national and international collaborations in the training of pharmacist staff at postgraduate level. Internationally, successful partnerships include training of PhD and Master of Clinical Pharmacy faculty members in collaboration with Vanderbilt University of Nashville, Tennessee, USA, and McWorter School of Pharmacy, Birmingham, Alabama, USA, respectively. At the national level, the department has collaborated with the UNZA School of Medicine Department of Medical Education to train PhD candidates. The department hosts on average five PharmD students from the University of North Carolina, USA, and plans are underway to have UNZA students and academic staff visit that university. There are several signed memoranda of understanding in-country, within the region and abroad pending operationalisation.
- Most significant gaps in academic capacity in terms of numbers and expertise: academic staff numbers are less than required by a shortfall of 40%.

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4.3 Best practices

4.3.1The Kenya-Nottingham Partnership: 2016 to 2019

Authors

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Jalpa Ruparelia, Education Developer, School of Education, University of Nottingham, United Kingdom *[picture unavailable]*

The Kenya-Nottingham Partnership was a multi-stakeholder project that aimed to transform pharmacy and chemistry education in Kenya. The UKAid-funded project has finished. However, in this chapter we would like to share the aspirations and achievements throughout the project.

The partners on this project were the University of Nottingham, the University of Nairobi, Kenyatta University, Jomo-Kenyatta University, Maseno University, Masai Mara University, FIP, the Pharmaceutical Society of Kenya (PSK) and the Kenyan Association of Manufacturers (KAM). The project's broad aims were to enhance pedagogic, technical and entrepreneurial skills and mentor junior and women academics, who were still underrepresented, especially at senior levels. The Kenya-Nottingham Partnership was initially funded by the University of Nottingham and then by the UKAid-funded Strategic Partnerships for Higher Education Innovation and Reform (SPHEIR) programme (2017 to end of 2019). The partnership started in 2016, when senior representatives and academics from the five university partners on this project visited the University of Nottingham for a two-day exploratory workshop. The other partner — FIP, the PSK and the KAM — joined the project in 2017. FIP embarked on this partnership project through its extensive experience in the African context of pharmacy education built over the past years through FIP-UNESCO UNITWIN Centre for Excellence in Africa and its global pharmacy education and workforce transformation vision.

The key to our success was building trusting relationships right across the partnership. This has been facilitated in a number of ways. Having strong leadership, a strong vision and purpose with clear objectives has helped us to focus on the transformation of education. In order to do the work, it has been necessary to engage and work with a number of stakeholders and gatekeepers. This has been facilitated by regular visits to Kenya as well as telephone conferences, WhatsApp messaging and emails. We developed a very good relationship with our partner PSK, which has acted as an essential advisor to the Nottingham team by sharing expectations around Kenyan business practices, acting as an intermediary between the Nottingham team and pharmacy partners in Kenya, informing on new healthcare initiatives and working with the team to identify new areas of work within the project. Spending time together was key, especially at meetings when we moved everyone involved outside Nairobi to meet in a conference centre in the countryside. When no one was distracted by work or home they were able to better focus on the project activities. Relationships were built because we were having breakfast, lunch and dinner together, so we got to know, understand and trust each other.

Our education developers have greatly contributed to the success of the project; as well as representing the two disciplines, we also had education experts. They all built up really good individual, more discipline-specific relationships with our Kenyan partners. One of the education developers was based in Kenya for three months and not only built up really good relationships with the partners, but also with wider stakeholders, for example, the

British High Commission, the Commission for University Education and the Royal Society of Chemistry. FIP and the PSK have been invaluable members of the project and FIP has been able to leverage this partnership to implement its FIP Education tools and resources to strategically support Kenyan developing needs-based education, national workforce development strategies, workforce planning and actions.

From the perspective of delivery, the Kenyan partners provided the substantive direction for the project. The University of Nottingham's contributions can be viewed as facilitation, guidance and support to deliver on the aspirations of the programme. In this way, the co-creation of solutions to deliver transformation of the Kenyan curricula is key. Such co-creation is evidenced through the University of Nottingham's involvement in curriculum reviews, new course construction and delivery of handbooks and frameworks. From an administrative perspective, the University of Nottingham devolves as much responsibility for decision making as possible to our partners, while remaining in compliance with funder and local rules. During the period of UKAid funding, the University of Nottingham provided the administrative and financial support to drive the plans to fruition.

However, this process, while desirable from a project perspective, was always inhibited by the legal and financial obligations shouldered by the UK lead on behalf of the partnership; these are matters which could have impacted the University of Nottingham from a legal, financial or reputational angle and always needed to be considered ahead of any desire to afford greater flexibility of action to our Kenyan partners. FIP is communicating and disseminating the country level impact and outcomes to its wider regional and global network as the partnership model will demonstrate a proof of concept to establish a needs-based pharmacy education system, with an ultimate goal of improving health outcomes and well-being. Even though the UKAid funding has finished, the level of commitment and trust that has been built up over the years has enabled the work to continue, as the Kenyan universities begin to develop and roll out their transformed curricula and we develop a competency framework for pharmacy in Kenya.

4.3.2Lab Box Malawi: Results of the pilot project

Author

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Most schools of pharmacy in developing countries do not have adequate equipment to enable them to conduct laboratory-based experiments, which are an important part of learning. This has resulted in students graduating with limited knowledge of laboratory work to complement what they learn from structured lectures. Malawi is one of the countries with limited capacity to equip teaching and learning institutions with state-of-the-art equipment for graduating students to be locally competent and internationally relevant.

The pharmacy programme in Malawi started in 2006 under the University of Malawi (UNIMA) College of Medicine as a response to shortage of pharmacists in the country and how it impacted on the effective delivery of pharmaceutical services. Malawi was experiencing several challenges in the pharmaceutical sector, one of them being increased incidences of substandard and falsified medicines in the market as a result of drug shortages in government institutions. To address the drug shortages, the international community through the global fund assisted in the procurement of some essential medicines, especially for HIV/AIDS, tuberculosis and malaria. However, there was an urgent need for well-trained pharmacy personnel to manage these drugs. One of the important areas of practice which pharmacists need to acquire during their training is practical, which includes laboratory work. This knowledge will make them competent to conduct quality checks and other relevant tests to ensure that the drugs meet international standards.

The FIP-UNESCO UNITWIN Centre for Excellence in Africa recognised the challenges faced by pharmacy schools from developing countries with regard to their capacity to conduct laboratory-based experiments, hence the initiative to pilot the lab boxes. The main goal of the project was to improve science teaching and outcomes through the provision of laboratory classes. The lab box concept is to have suitable lab equipment for one student in a box which will enable the student to conduct basic laboratory exercises. The project expected an improved educational outcome for pharmacy students in resource limited countries. The pharmacy department at the College of Medicine was chosen for the pilot, which took place in 2014.

The initial work was to identify what kind of equipment should be in the box, identifying a supplier, what the delivery time will be, how much it will cost, shipping and the possibility of including the concept in the curriculum. The department provided a list of equipment to be included in the lab box, and 50 boxes were shipped and arrived in good condition in Malawi on 11 November 2014.

Once the boxes arrived, students did some experiments under supervision. The need for equipment other than the utensils in the boxes was still a challenge, so students were taken to Chancellor College (a sister college under UNIMA) which was larger. There, they were able to make acetyl salicylic acid powder and from that manufacture aspirin. Overall, the boxes were found to be very useful for laboratory training. Students were able to conduct simple preparations for pharmaceuticals and conduct pharmaceutical analysis.

Lessons learned

The pilot allowed the department of pharmacy to evaluate its practicality and come up with some recommendations which include:

- Improvement on the logistics from procurement, shipping and appropriate documentation for shipping to developing countries, including documents for donation if the case applies
- The recipient institution must identify one person who will be responsible for all the logistics involving the lab boxes
- Timely communication of shipping and arrival dates to allow smooth clearing of the boxes

Recommendations and conclusion

We recommend developing a system of reviewing the list of equipment to be included in the boxes. Also, there is an issue around how the project can be sustained; only one cohort of students had the opportunity to use the lab boxes.

In conclusion, the lab box pilot project was successful and both students and staff appreciated the need for having regular experiential learning in line with what is in the curriculum. The experiential learning which students managed to do with the lab boxes bridged the knowledge gap when compared with theory-based learning only. It is our hope that this project will be revived on a long-term basis so that students can benefit from it. Our appreciation goes to FIP for considering our department for the pilot and we hope that the experience gained will be used to roll out this important project to other schools of pharmacy from developing countries.[1,2]

4.3.3 Innovative ways of developing a new pharmacy programme from scratch to excellence

Author

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Namibia is an upper-middle-income country in sub-Saharan Africa with good infrastructure (electricity, internet), political stability but some of the highest income inequalities globally (as with South Africa, this is a legacy of apartheid). These income inequalities translate to health inequalities with the large majority of what is spent on health (>80%) serving less than 20% of the population. A major constraint in dealing with this challenge — as well as the health burden typical of sub-Saharan African countries in terms of HIV/AIDS, tuberculosis and malaria — is the human resources in health and expertise to provide universal health coverage; in its short history Namibia has relied heavily on expatriate healthcare workers and foreign-trained Namibians to provide a health workforce. However, a more sustainable approach considered in-country training primarily through the School of Medicine project (started in 2009) from which the School of Pharmacy emerged. Strategically, in-country training would not only provide a regular and more sustainable supply of healthcare workers but could also provide broader technical and specialist training, as well as conduct research to answer the pertinent health questions for Namibia.

The School of Pharmacy at the University of Namibia, the only pharmacy school in the country, started training in 2011.[3] Given the responsibility of equipping the pharmaceutical workforce of Namibia, including pharmaceutical technicians, pharmacists and clinical pharmacists, with the skills, competencies and knowledge to deliver pharmaceutical services to the population of about 2.4 million, there was a need to develop innovative ways in education and teaching. One such innovation was through interprofessional education to empower multidisciplinary working in health graduates. The interprofessional training offered between the School of Pharmacy and School of Medicine worked on multiple levels including at the community-centred curriculum which addresses the social and health needs within the country while also considering the impact of the learning environment on the learning experience of students.[4] This has made the programme of greater impact to the nation as the health needs and priorities of the country serve as the basis of the education, a great example of needs-based education. In addition, this has led to developing “7-star pharmacists” who are practice-ready with an in-built culture of interprofessional collaboration.

Another innovative approach in education was the use of technology in the school to improve the training and learning experience of students. The pharmacy internship programme was one of the areas where technology, through an online learning platform (Moodle) was used to support graduates and practice-based tutors in their educational experience.[5] The purpose was to ensure that interns practising all over the country —even those in isolated and rural areas —participate and still receive the necessary and mandatory content of the internship programme. This is, therefore, delivered in a systematic way covering 10 general themes across important areas of pharmacy practice and pharmaceutical care. The online learning was complemented by a hard copy manual containing much of what was uploaded online, and a face-to-face fortnightly contact session with the programme coordinator.

The use of a short pre-lab learning resource to improve organic chemistry training of first-year pharmacy students and bridge the gap between high-school leavers and university requirements has led to a better understanding and acceptance of organic chemistry, which improves overall educational experience.[6] Other technologies used include Zip Grade for improving the quality, efficiency and robustness of assessment, Epicollect for improving remote data collection in research projects and clinical audits,[7] the first uptake of the Monash University MyDispense suite on

the African continent, and virtual pharmacology labs offered by Strathclyde University. All this use of technology has given an over improvement in the educational experience of students while also supporting the academic capacity of the school of pharmacy.

4.3.4 Partnership with FIP and WHO in a key healthcare topic — Developing a curriculum on substandard and falsified medicines at Makerere University, Kampala, Uganda

Authors

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Zuzana Kusynová, FIP Lead for Policy, Practice and Compliance (The Netherlands)

Substandard and falsified (SF) medicines are a critically urgent and acute threat to public health, especially in low- to middle-income countries, where one in 10 medicines was SF in 2017.[8] It is a pervasiveness worryingly extending to medicines essential for management of HIV/AIDS, malaria and tuberculosis where significant progress has been achieved in lowering the mortality associated with these diseases. That progress is edging towards reversal. An estimated 122,350 deaths (4%) of children under five years in Africa were attributed to use of SF antimalarials. Other consequences are economic and reputational loss to the health system and a rise in antimicrobial resistance.[9] The WHO recognises the crisis and upon that realises that its aspirational targets of universal health coverage and the triple billion objective, which is an ambitious initiative by WHO to improve the health of billions of people by 2023, demand access for all to safe, effective, high quality and affordable medicines.[9] The WHO has adopted a holistic remedial strategy of prevention, detection and response to ensure quality is built into all levels of the supply chain.[8] This requires the involvement of all healthcare workers, especially pharmacists who work closest to medical products and patients. However, pharmacists lack the dexterity to detect SF medicines as only a few receive formal instruction on SF medicines during pre- or in-service training. There is therefore a need for standardised formal training to be incorporated into curricula. FIP in collaboration with several partners has been leading works on SF medicines, including educational interventions. The WHO invited FIP to collaborate on a project in partnership with universities in Francophone and Anglophone African countries to develop generic, adaptable, bilingual modules to be incorporated into university curricula. Makerere University Kampala (MUK) was selected as one of five pilot universities on this project. This report is a brief summary of our experiences and prospects on this project.

MUK in the thick of it

MUK offers a BPharm programme in which some SF medicine topics are handled, albeit without requisite depth. It is fitting therefore that since inception, a faculty member sits on the project's Informal Technical Advisory Group (ITAG) ensuring the needs and priorities of our university are met in the SF medicines project. In February 2019, MUK was invited and informally agreed to be a pilot university on the project. We completed a needs-based assessment survey in which we mapped the scope, dedication and coverage of SF medicines and shared SF medicines resources vital in the development of the curricula. In June, three MUK representatives attended a

workshop organised within the FIP-UNESCO UNITWIN Centre for Excellence in Africa annual meeting in Mombasa, Kenya, and with participants from 11 pharmacy training and professional institutions in Africa drafted a key competencies framework, learning outcomes, components and dedication for a SF medicines curriculum. The ITAG working individually and collectively used the drafts to develop a comprehensive SF medicines curriculum outline with the full complement of components of a standardised curriculum. At the time, MUK elected to roll out the completed curriculum in August 2020 as part of a course on pharmacoepidemiology and pharmacoeconomics. On 21 November, MUK College of Health Sciences representatives entered a memorandum of association with FIP to officially partner on this project. Currently, MUK's representative on the ITAG, like the other members, is working on developing a module on SF medicines. MUK has also identified three pharmacy faculty members who will instruct on the SF medicines curriculum and who will attend a training of trainers before the pilot.

Prospects

The WHO calls for the development of strong and sustainable international partnerships as critical in fostering a targeted and coordinated response in the global threat of SF medicines. MUK welcomes the opportunity to partake in and implement the SF medicines curricular project as it fulfils the WHO's call. Our experiences from this project shall guide our efforts in other public health issues such as antibiotic resistance, emergency medicine pharmacy practice and pandemics.

4.3.5 Needs-based education strategy for pharmacy workforce development in Nigeria

Author

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The Nigerian pharmacy education context is one that focuses on global comparability of the undergraduate programme often to the detriment of local relevance. Nigerian trained pharmacists have been ranked among the top performers in conversion examinations globally,[10] yet local employers complain that pharmacists are often unable to make meaningful contributions to the national health status due mainly to a curricular disconnect from the practice context.[11] This may lend credence to the narrative that describes the curriculum in low- to middle-income countries as a tool for international employability[12] rather than national development.

In an effort to keep up with global trends around patient-focused practice, the Pharmaceutical Council of Nigeria (PCN) and the National Universities Commission (NUC), which are both regulatory bodies for pharmacy education, approved a programme change from the five-year BPharm to a six-year, clinically focused PharmD programme in 2016. To ensure local relevance of this new programme, while in the early implementation phase, the FIP needs-based education framework[13] was employed to locally determine needs in sequential exploratory mixed methods study.[14]This study was carried out in 2018 in collaboration with FIP and the PCN and involved key stakeholder engagement to determine major domains for needs-based pharmacy education, while taking into account existent and potential barriers to its implementation in the Nigerian context. Concurrently conducted individual and group interviews (n=78) were thematically analysed and yielded items for a subsequent online survey (n=3,740) of a stratified sample of Nigerian registered pharmacists (n=13,457) to determine if qualitative responses were nationally perceived. A 34% response rate (n=1,291) was recorded and three major needs-based education domains were identified — namely, education capacity, professional relevance and systems efficiency — with several descriptors within each domain (Figure 21).

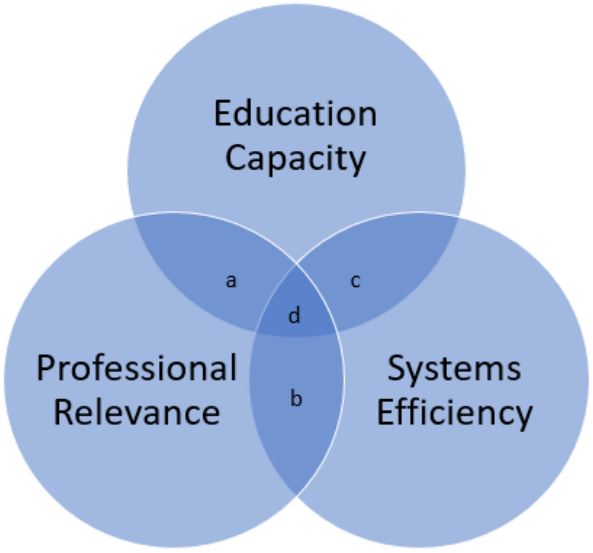

Figure showing interrelationship among three needs-based education domains

a- Continuing Professional Development
b- Fitness to Practice
c- Quality Assurance
d- Needs- Based Workforce Development

Figure 21. Interrelationship among three needs-based education domains

Education capacity was mainly defined in terms of institutional capability (programme, curriculum), human competence (staff training, student engagement and employability), and infrastructural adequacy (learning environment, up-to-date facilities and equipment).

Professional relevance descriptors included practice environment (professional identity, work ethic and other social factors), and policy issues (government policies and how they influence workforce development).

Systems efficiency was described in this study as the extent to which workforce goals and outcomes could be maximised given available resources and already existing conditions. Specific descriptors within each domain highlighted needs or gaps that had to be addressed for the attainment of needs-based education in the Nigerian context (Table 3).

Having locally determined the priority needs, the services and competencies required to meet the needs could be collaboratively agreed in order to develop or adapt education accordingly. Subsequently, documentary analysis of the basic minimum academic standards for Nigerian pharmacy programmes was carried out in light of identified key domains as well as a composite of global standards from three FIP documents (Global Competency Framework, Nanjing Statements and Pharmaceutical Workforce Development Goals). This lent credibility to stakeholder-determined needs gaps in the pharmacy programme. A 72% match (36 out of 50 codes) between the BMAS standards and this composite and an 86% match (24 out of 28 codes) between curricular components and recommended components showed that the likely challenge with the pharmacy programmes was implementation and not availability of quality standards. However, it was also observed that the standards set by the BMAS may need to be more specific. Required competencies may need to be set out in form of a national competency framework.

Table 3: Specific descriptors of the major needs-based education domain

Educational needs	Professional needs	System needs
Patient-focused curriculum	Role specificity	Conducive and inspiring learning environment
Course-appropriate pedagogies	Clear professional standards	Up-to-date infrastructure and equipment
Adequate number of qualified teachers	CPD support	Admission management
Timely and relevant assessment	Interprofessional cohesion	Uniform curriculum for standardised graduate competence
Sufficient experiential learning component	Clear specialisation pathways	Employ teacher practitioners
Student support and mentoring	Professional recognition	Rural retention through incentives
Succinct, patient focused, relevant and locally applicable curriculum		Student evaluation of teaching
Experiential learning		Evidence-based decision making
Updated teaching materials		Sanitised drug distribution
Employing ICT in education		Independent academic calendar
Integrated teaching		Cross disciplinary education
Increased clinical training		Leadership diversity
		National equity

This study illustrates how the needs-based education strategy, which is the global standard for pharmacy workforce development, was appropriated in the Nigerian context. The context-specific domains for needs-based education identified are useful for evidence-based decision making and policy considerations in a resource-constrained setting. They highlight priority areas of focus for the improvement of education, thereby ensuring efficient resource allocation in a way that outcomes and output could be maximised.

Such country-specific studies are useful for translating theoretical interventions into practical applications; they illustrate how complex processes can be broken down in a local context. Singly or in aggregation they can also inform global development efforts.[15]

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5. Pharmacy education in sub-Saharan Africa: Special focus areas

This chapter discusses the following special focus areas:

- Quality assurance in pharmacy education;
- Young pharmacists and pharmacy students;
- Women in pharmaceutical science and pharmacy education; and
- COVID-19 and pharmacy education.

5.1 Quality assurance of pharmacy education

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Summary

- Quality assurance (QA) in pharmacy education systems of the FIP-UNESCO UNITWIN Centre for Excellence in Africa (CfEA) member institutions has been analysed, and members highlighted that internal and external QA systems exist at their institutions. The internal systems involve inter-departmental examination, supervisions through inter and intra-university undergraduate and postgraduate examinations. The accreditation exercises are mainly conducted by the ministries of education and/or health and national pharmaceutical councils or organisations depending on the country's regulations.
- There is a need for continuous curriculum upgrades through continuous lecturer assessment, practising needs-based learning and the introduction of problem-based learning.

- Reflection on problems and possible solutions in these countries shows opportunities to improve pharmacy education so that they become closer to best international quality assurance programmes and practices. Some other recommendations include:

    - FIP to form educational partnerships and provide critical training and resources to support quality education and accreditation standards;
    - Changes in new teaching methods and innovative training models;
    - Curriculum review and increase in academic pharmacy staff capacity to provide pharmacy practice experiences and quantitative reasoning skills that offer opportunities for interprofessional/multidisciplinary training; and
    - Development of collaborative relationships and partnerships with stakeholders.

Globally, pharmacy education is currently undergoing enormous changes. This is a result of many factors, including, but not limited to, emerging scientific breakthroughs, technological advancements, evolving needs of patients, as well as the specialised skills that pharmacists require to meet the increasing demands of the world. Curricula have advanced in tandem with the transformation of content-based curricula into competency-based curricula.[1]

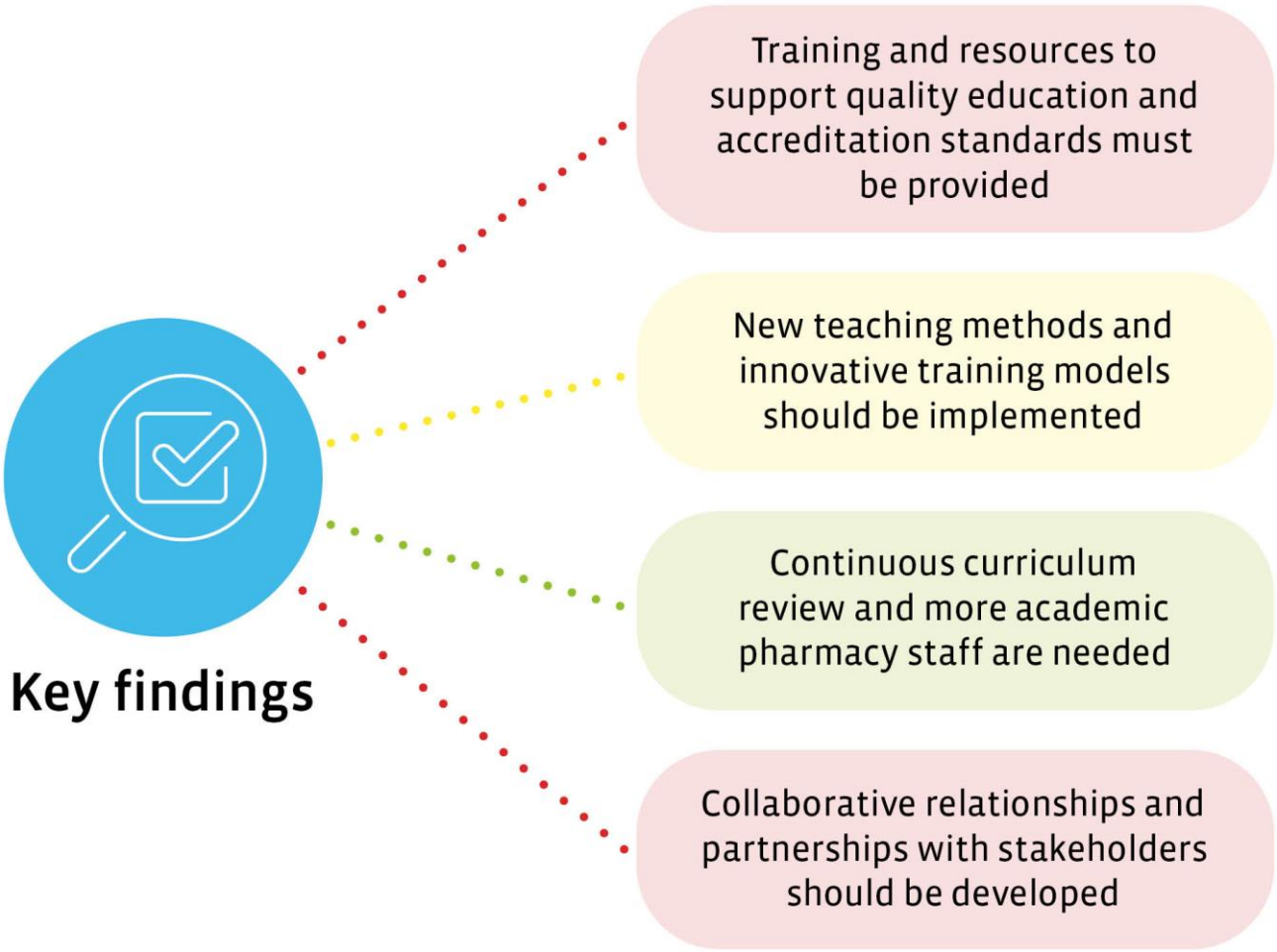

Figure 22. Key findings from the "Quality assurance of pharmacy education'' chapter

While the basic level of competence has improved, several setbacks and critical shortages in the pharmacy workforce have been witnessed in many countries in the course of making significant contributions to their health systems[2] and countries in sub-Saharan Africa are not an exception. For instance, in Cameroon, Ghana, Kenya, Nigeria, Tanzania, Uganda and Zambia[3] the lack of infrastructural frameworks, access to teaching resources, development of academic capacity and staff, and quality research[3,4] have been documented as some of the challenges facing the delivery of pharmacy education, with a potential impact on the quality of health care delivered during future practice.

There is a crucial need to assure the development of an adequately trained healthcare workforce in order to deliver the required competency-based education and training. FIP has developed a framework to support quality assurance in pharmacy education through the FIP*Ed* initiative. That said, it is also necessary for national governments, regulatory agencies and quality assurance agencies to create or strengthen quality assurance systems for pharmacy education based on quality requirements or parameters, and policies and procedures which have been established with wide participation of stakeholders. Additionally, this system should include mechanisms for continuing the engagement of stakeholders, including the public.

Below is a summary report of a pharmacy education survey in seven African countries from FIP-UNESCO UNITWIN CfEA institutions. African countries included in the survey report are Ghana, Kenya, Malawi, Namibia, Nigeria, Uganda and Zambia. The key survey components are quality assurance, accreditation system and curriculum review of the pharmacy degree programme.

5.1.1 Ghana

- **Quality assurance:** In addition to the accreditation process, there is an internal quality assurance mechanism by the University Academic Quality Assurance Unit that that assess teaching and research in the various faculties and departments.
- **Accreditation system:** External accreditation is granted by the National Accreditation Board and the Pharmacy Council. The accreditation process, which involves the academic programme and the school of pharmacy, takes place every five years. The accrediting bodies in Ghana include the Ministry of Health, the Ministry of Education and the national professional organisations.
- **Curriculum review of the pharmacy degree programme:** The college of pharmacy has an operational curriculum review process that takes place every four to five years. Inputs are collected from stakeholders, which include faculty, students, alumni, social stakeholders, governmental agencies and communities through surveys and interviews. The key drivers for curriculum review are societal demands and conformation with world trends.
- **Interprofessional education:** Currently, the curriculum does not offer opportunities for interprofessional/multidisciplinary training.

5.1.2 Kenya

All the BPharm programmes offered by the six universities are accredited by the Commission for University Education (CUE) and the Pharmacy and Poisons Board (PPB). The regulation of pharmacy education is a shared responsibility of the CUE and the PPB.[5]

- **Quality assurance:** The accreditation system ensures the quality of the school of pharmacy and the academic programmes. Other evidence of QA involves appointment of external examiners to moderate examinations and master's programmes, PhD theses and dissertations, as well as ISO certification. ISO 9001:2015 Quality Management Systems structures provide for QA systems with respect to delivery and to ensure the availability of documented evidence of adequate delivery and student evaluation.

- **Accreditation system:** An internal accreditation system is led by the CUE and the PPB. These regulatory authorities provide guidelines and carry out periodic audits of the training institutions. The accreditation and reaccreditation processes take place every five years with periodic audits taking place to monitor compliance with standards.
- **Curriculum review of the pharmacy degree programme:** Curriculum review is not done at regular intervals due to shortage of resources to facilitate the process. However, when conducted the school develops a draft curriculum, which is then reviewed at a stakeholders' workshop for their input. The stakeholders' input is incorporated before the curriculum is submitted for approval through the university system. The main drivers for curriculum review are changes in the education system within the country, curriculum delivery challenges (e.g., rationalisation of semester dates), and market needs represented by pharmacy practice dynamics.
- **Interprofessional education:** Currently, the curriculum does not offer opportunities for interprofessional/multidisciplinary training.

5.1.3 Malawi

- **Quality assurance:** Malawi has an accreditation system for pharmacy education. It is relevant and it adds value to the education programmes. In addition, Malawi has an internal quality assurance system for continuous monitoring and evaluations.
- **Accreditation system:** The facilities and schools in Malawi are subjected to accreditation every three years. The universities, schools, facilities and academic programmes are accredited by the Ministry of Health and Ministry of Education. The higher education institutions utilise various quality assurance processes. Examples of these mechanisms include: ensuring access to up-to-date educational materials; having teaching aids (i.e., computers, LCD); ensuring the quality of faculty and instructors; analysing students' evaluations; conducting alumni surveys; performing curriculum reviews and offering refresher courses and workshops to the staff.
- **Curriculum review of the pharmacy degree programme:** The curriculum review is implemented by the department of education through the House of Delegates.[6] The school of pharmacy has an operational curriculum review policy. The curriculum is reviewed every five years. Inputs are gathered from the stakeholders during meetings on advancement of the pharmacy profession. The key practice area that is emphasised is the shift from product to patient care. In addition, the curriculum addresses national goals based on the public health needs.

5.1.4 Namibia

- **Quality assurance and accreditation mechanisms:** The faculties/schools in Namibia are subjected to periodic accreditation in every full cycle of the programme. The accreditation process includes the educational institutions and universities, the faculty of schools of pharmacy and the academic programmes. The accrediting bodies include the Ministry of Health, the National Council for Higher Education, the Pharmacy Council of Namibia and the Namibia Qualifications Authority. Civil society and private accreditation bodies are not part of the accreditation process. Other internal or external QA mechanisms or processes used by higher education institutions are available within the University of Namibia. For example, external QA is offered at three levels: Pharmacy Council of Namibia; Namibia Qualifications Authority; and National Council for Higher Education. An example of an internal QA mechanism is offered via a university body represented by the Centre for Quality Assurance and Management.
- **Curriculum review of the pharmacy degree programme:** The school has an operational curriculum review policy every five years**.** The input is gathered for curriculum review through stakeholder meetings and research**.** The dynamic nature of health field, like any science field, is the key driver for curriculum change and to keep up to date with recent changes**.** The key practice areas of clinical, industry and community pharmacy drive the curriculum and training. The curriculum addresses national needs and goals through producing locally trained pharmacists to fulfil the needs of the public as well as the private sector.

- **Interprofessional education:** The curriculum offers opportunities for interprofessional and multidisciplinary training, integrated teaching and learning among schools including pharmacy. For basic sciences during the first two years of the pharmacy degree, there is also inter-professional collaboration between schools for teaching. For example, pharmacology is taught by School of Pharmacy staff to medicine and nursing students.

5.1.5 Nigeria

- **Quality assurance and accreditation mechanisms:** The facilities/schools are subject to periodic accreditation every four years. The accreditation process includes the educational institution/ university, faculty/school of pharmacy, and the academic programme. The accrediting bodies include The Ministry of Education and the national professional organisations. In addition, each department (unit) has an internal quality assurance committee. Additional QA mechanisms include having a visiting external assessor. The accreditation system includes the professional regulatory body and the National University Commission. The system is relevant, but the respondents strongly believe that the two accreditation bodies should be merged. There is an internal QA system that varies from university to university and external examiners also assist in evaluating the QA system. This mechanism is not optimal and could be strengthened.
- **Curriculum review of the pharmacy degree programme:** The National Universities Commission and the Pharmacists' Council of Nigeria conduct a curriculum review every four years.[7] The key driver for the curriculum revisions are changes in the clinical practices areas. The key areas in training include academia, clinical, industry, hospital, community and administration to keep students up to date with current global best practices. The curriculum is reviewed as needs arise. Inputs and suggestions are collected from various stakeholders. The key drivers for curriculum changes include stakeholders, population health needs and professional development.

5.1.6 Uganda

The Council of the Pharmaceutical Society of Uganda is mandated to supervise and regulate the engagement, training and transfer of pharmacy students and to make provision for the registration of students. As such, the Pharmaceutical Society of Uganda directly and through collaborations carries out these roles at the three universities offering graduate and postgraduate pharmacy training in Uganda, namely, Kampala International University (KIU), Mbarara University of Science and Technology (MUST) and Makerere University (MAK).

- **Quality assurance and accreditation mechanisms:** Faculties and schools are subject to periodic accreditation process by an external body every five years. The accreditation process includes educational institutions/universities, faculty/school of pharmacy and the associated academic programmes. The accrediting bodies consist of the Ministry of Education and the national professional organisations. There are no other QA mechanisms or processes like internal or external QA mechanisms or processes used by higher education institutions. Also, there is no internal QA offered by the universities.
- **Curriculum review of the pharmacy degree programme:** The school has an operational curriculum review policy and the curriculum is reviewed every four to five years. The key drivers for curriculum changes include curriculum content, changes in international and local practice, change in policies and regulatory requirements, needs of the country and feedback from alumni. The key practice area is clinical pharmacy, which drives the curriculum and the training. From inception of the programme, it was envisioned that a pharmacy graduate must be well trained to offer clinical/pharmaceutical care services in multidisciplinary teams in standard clinical settings and manage the supply chain of medicines. Traditionally these courses have greater emphasis when considered from credit units they account for on the total load. Over time and curricular reviews, the curriculum is tailored and reviewed to meet identified national needs or goals. This is among the key drivers for regular review of the curriculum. The department attempts to lead the practice in pioneering changes that we believe are essential in meeting national set goals.

- **Interprofessional education:** The curriculum offers opportunities for interprofessional and multidisciplinary training. From the first year on, a pharmacy student will be taught by faculty members with backgrounds in all medical professions and biomedical qualifications. Also, in many courses, students of pharmacy join medical and nursing students while the course is being offered.[8]

5.1.7 Zambia

- **Quality assurance:** An internal quality assurance system exists. Continuous monitoring and evaluation of each curriculum hosted by tertiary institutions in Zambia is policy guided and established, although each institution that hosts a training programme is responsible. However, the review period and pharmacy curriculum implementation are mostly not adhered to by some institutions, as guided by the policy. There are internal or external mechanisms or processes used by higher education institutions. For example, the university has a Department of Quality Assurance that prescribes quality standards to be followed, and recently launched a QA framework to assure quality in all processes ranging through admission, teaching, assessments and research. An internal QA system is implemented by the Health Professions Council of Zambia and the Higher Education Authority**.**
- **Accreditation mechanisms:** Zambia has an accreditation system for pharmacy education, and it is relevant to the pharmacy education system in Zambia. However, its value is questionable due to the status of the hosting tertiary institutions. In Zambia, there are faculties/schools subjected to periodic accreditation or similar process by an external body. The accreditation is conducted every five years. The accreditation programme includes the educational institution/university, the faculty/school of pharmacy and the academic programme. The accrediting bodies are national professional and government entities, namely, the Health Professions Council of Zambia and the Higher Education Authority.
- **Curriculum review of the pharmacy degree programme:** There is an operational curriculum review policy, and review of the curriculum is offered every five years. During curriculum review, input is collected from various stakeholders such as students, alumni and the Ministry of Education. Stakeholders are engaged in meetings to discuss the contents of the curriculum. Country and profession needs are the key drivers for curriculum changes. Clinical pharmacy is the key practice area that drives curriculum and training because the country has shortage of pharmacists to work in hospital settings and community pharmacy. Continuous monitoring and evaluation of each curriculum hosted by the tertiary institution in Zambia is policy guided and established. In most cases, the review period, as guided by the policy, is not adhered by some institutions and pharmacy.
- **Interprofessional education:** Interprofessional education does not exist at undergraduate level; it is offered after graduation during pharmacy practice in hospitals.

5.1.8 Envisioned state of quality assurance in initial pharmacy education

The survey summarised the current state of quality assurance in pharmacy education, accreditation systems and curriculum review of the pharmacy degree programme. The surveyed sub-Saharan African region countries (Ghana, Kenya, Malawi, Namibia, Nigeria, Uganda and Zambia) showed numerous quality assurance and pharmacy education challenges that require immediate intervention by stakeholders to maximise the quality of pharmacy education and practice.

Surveyed African countries are fertile with pharmacy education opportunities in terms of growth and innovation. Additional opportunities include expansion of pharmacy degree programmes, development of more extensive fellowship and residency training programmes, and clinical opportunities for pharmacists at health facilities such as primary clinics and hospitals. Employing the best process is essential for the efficient and sustained operation, management, evaluation and continuous development of schools, their education programmes and other mission-related activities.

From the results of the survey, it appears that there are several accreditation bodies to ensure the quality of pharmacy education. It will be beneficial to merge these various agencies to increase compliance with a set of standards and enhance competencies among pharmacy students.

The survey also reveals that pharmacy schools have operational curriculum review policies and curricula are reviewed every three to five years. There is a need for continuous curriculum upgrades such as continuous teacher assessment, practising needs-based learning and the introduction of problem-based learning.

Reflection on these problems and possible solutions in the countries surveyed shows opportunities to move pharmacy education closer to best international quality assurance programmes and practices. Some other recommendations include:

- That FIP should form educational partnerships and provide critical training and resources to support quality education and accreditation standards;
- That changes in new teaching methods and innovative training models are necessary;
- That curriculum review should provide pharmacy practice experiences and quantitative reasoning skills that offer opportunities for interprofessional/multidisciplinary training; and
- That collaborative relationships and partnerships should be developed with stakeholders to support and advance each other's mission and goals.

In short, FIP should continue to provide support for advancing pharmacy education in the sub-Saharan African region.

5.2 Pharmacy education in Africa—Youth and pharmacy students make a difference

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Summary

- Continuing professional development (CPD) is an integral part of the pharmacy profession, particularly for academics because they provide resources and, in most cases, the training itself. However, the quality of CPD in the region is an area of development and can be boosted through using e-learning platforms and contents for CPD courses, such as webinars, online workshops and online certificate courses.

- Young pharmacists' groups are champions of continuous education initiatives in the region and they support establishing self-directed behaviours for lifelong learning during the early years of their professional career.

- Pharmacy students' associations play a critical role in pharmacy education in the region. They organise regional and local conferences, webinars and workshops to showcase pharmacy education and other practice areas in the region and how these groups can be key-in achieving the desired goals for pharmacy education. Early career pharmacists and pharmacy students need support from their seniors in the profession and prefer mentoring.

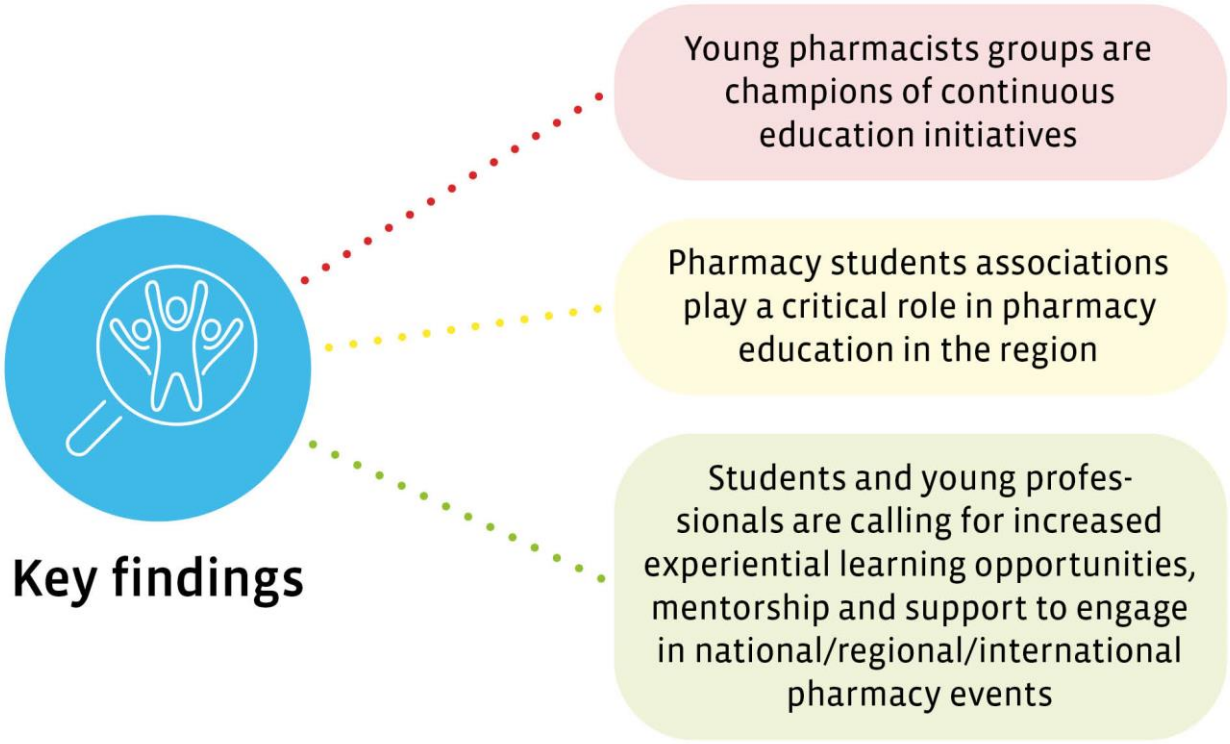

Figure 23. Key findings from the "Pharmacy education in Africa —Youth and pharmacy students make a difference" chapter

- Pharmacy students represented by the International Pharmaceutical Students' Federation (IPSF) African Regional Office are advocating for transformations in pharmacy education through research and evidence generation.

- Recent research conducted among pharmacy students by the IPSF using FIP's Nanjing Statements revealed that students perceive a lack of sufficient research training and experiential learning content in the curriculum, inadequate preceptor-guided student placement opportunities, a lack of support for peer support systems and mentorship opportunities, and a lack of adequate encouragement and support from faculty members to engage in national and international pharmacy events and other extracurricular activities that contribute to the learning experience.

- Getting involved in the FIP Young Pharmacists' Group (YPG), the IPSF and other African or national young professionals and pharmacy students' organisations key to being at the forefront of improving their education and becoming better pharmacists in the future.

5.2.1 Young pharmacists and pharmacy education in sub-Saharan Africa

In its effort to make the profession more attractive for the future and for the young generation pharmacists, FIP has been creating a youth-specific agenda for the professional development of young pharmacists. This will align the potential of vibrant young pharmacists with the constant innovations in the profession using new and emerging technologies in drug discovery and product development.

Moreover, it will ensure their active engagement in emerging fields, such as artificial intelligence, robotics, genomics, proteomics, pharmacogenomics, integration of digital pharmacies, automated drug dispensing, telemedicine, digital surveillance on counterfeit medicines and electronic medical record software systems.[10] Furthermore, the FIP YPG in collaboration with FIP continues to support pharmacy education through the FIP Foundation for Education and Research by sponsoring young pharmacist academics on various programmes, including:

- The Ton Hoek Scholarship for Young Leaders;
- The Young Pharmacists/Pharmaceutical Scientists Grant for Professional Innovation;
- The Mike How Travel Award; and
- The FIP Congress Travel Scholarship.

The goal is to promote innovation in the profession of pharmacy and pharmaceutical sciences through innovative projects by young pharmacists and pharmaceutical scientists to improve the practice of pharmacy or to advance pharmaceutical sciences. The grants support innovative ideas that provide insights in local or global health issues with potential resolutions, creative methods in providing healthcare services, promotions of the pharmaceutical professions and development of pharmaceutical sciences and technologies.[11] Moreover, the FIP Congress Travel Scholarship is targeted toward young pharmacists who live and work or study in a country with an income level classified as low, lower-middle or upper-middle by the World Bank in the latest available classification. The objective of the scholarship is to permit young pharmacists to develop their skills and knowledge, and to contribute towards improving pharmaceutical practice, pharmaceutical sciences and/or pharmaceutical education in their home countries.[11]

Many regional young pharmacist groups have embraced similar trends of activities set by the FIP YPG, including those in sub-Saharan countries. There is an ongoing proposal to establish the African Young Pharmacists Group soon. Indeed, all initial preparations are in place. For instance, the Pharmaceutical Society of Nigeria Young Pharmacists Group (PSN YPG) has been active in sponsoring young pharmacist academics to attend FIP Congresses. Moreover, from 2019, the PSN YPG has amplified its activity and visibility in Nigeria by organising an annual national conference, where cutting edge areas, including pharmacy education, are discussed.[12] The PSN YPG is actively engaged in career guidance activities, public health campaigns and continuing education for its members.

There is a similar trend ongoing with the Cameroon Young Pharmacists Group, which was initiated in 2017. It recently organised a maiden exhibition on pharmaceutical education with the support of the faculties of pharmacy in Cameroon under the theme “Issues and challenges of pharmaceutical studies in a rapidly changing profession”.[13] The objectives were to define new perspectives for the pharmacy profession, which has undergone many changes to better support pharmacy students and young pharmacists through global and contextual solutions. At the end of the exhibition, it was recommended that the Ministry of Higher Education set up postgraduate training (especially in hospital pharmacy) and set up platforms for collaboration between various higher educational structures. It was also recommended that the National Order of Pharmacists in Cameroon set up CPD programmes so as to keep its members up to date with contemporary knowledge in their practice areas.

The South African Young Pharmacists Group is also championing initiatives to develop young pharmacists who can act as agents of positive change at local, national and international levels, both in the pharmacy profession and in society at large.[14] Other young pharmacist groups across sub-Saharan countries are using FIP YPG initiatives as a template to develop programmes that are beneficial to their individual members and to society as a whole are those from Ghana, Kenya, Rwanda, Uganda, and Zimbabwe, to mention a few.

5.2.2 Pharmacy students and pharmacy education in sub-Saharan Africa

Pharmacy students in the International Pharmaceutical Students Federation (IPSF) African region have portrayed a great passion for their education quality, experience and transformation, which is evident through their activities in the past years. They organise training of pharmacy students in core professional skills such as clinical skills, patient counselling skills, drug compounding skills, industrial skills and professional soft skills. They also host African

regional symposia annually to provide educational contents relevant to the current and trending health care needs of the region.

In 2018, during a symposium at Lagos, Nigeria, they were exposed to the concept of the FIP Nanjing Statements, the FIP Pharmaceutical Workforce Development Goals and the FIP global vision for pharmacy education; these led to active advocacy and a shift in position from being passive recipients of their educational and academic activities to being active primary receptors of these components. Taking ownership of their education and its transformation, they have assessed their educational experience through a survey developed from the FIP Nanjing Statements in 2019. This survey showed that there is a fair knowledge about the FIP Nanjing Statements with room for improvements such as the approach to interprofessional education and collaboration and the quality assurance in the context of the evaluation of academic expertise and learning experience of students.

A similar survey in 2020 showed that more feedback from undergraduate and graduate students is necessary for refining pharmacy curricula. Despite different regional backgrounds and systems of practice, pharmacy education worldwide should be harmonious in order to produce competent pharmacists globally. This series of surveys led to a week-long regional pharmacy education campaign for the purpose of creating awareness of good pharmacy education practices. The students also engage in pieces of training to improve soft skills while actively engaging in research initiatives to improve research skills. All these activities are educational activities focused on professional development and knowledge to ensure that students become adequately trained pharmacy practitioners.

Implementation of good pharmacy education practices will contribute to students' personal development and will also benefit society. This will bear fruit in terms of the quality of the graduates themselves as well as the quality of the lives they lead. Pharmacy education should offer opportunities for students to develop the entire range of skillsets required to be a flexible and adaptable healthcare professional. Students should see the value of their education process in the local context while also aiming and adapting for a global vision. Academics and faculty members should rethink educational practices to ensure adequate preparation of a competent, flexible and adaptable pharmacy workforce.

Globally, youth plays an active role in the transformation of any agenda or systems, for example, the UN sustainable development goals. Students have the potential to transform their educational experience by ensuring adequate knowledge of global standards of education and advocating for changes in their schools, while also adapting the activities of student-led associations to further ensure the all-round development of pharmacy students in their pharmaceutical education competencies. Faculties and academics should commit and engage students in their educational initiatives through an open channel of communication.

5.2.3 Barriers to and facilitators of pharmacy education in sub-Saharan Africa: Perspectives of pharmacy students

In a recent focus group discussion organised among some universities in Africa, issues arose that students believed, if addressed, could promote a better learning experience. The discussions were conducted in nine universities across sub-Saharan Africa (Ghana, Kenya, Malawi, Nigeria, Rwanda and Sierra Leone) between January and June 2019. The interview protocol which was adapted from the FIP Nanjing Statements on Pharmacy and Pharmaceutical Sciences Education was designed to elicit responses from participants on what they believed to be the barriers that impede pharmaceutical education in their universities, using the FIP Nanjing Statements as a framework. Additionally, participants were requested to suggest some opportunities that could facilitate the implementation of some of the ideas of the FIP Nanjing Statements in their universities. This was one of the first interventions that aimed to involve pharmacy students from the International Pharmaceutical Students Federation (IPSF) African region on strategies to improve pharmacy education after the Nanjing conference.

One of the important barriers in achieving the goals of the FIP Nanjing Statements was identified as a lack of research training featuring predominantly in the curriculum. Participants noted that research training topics are usually incorporated in the final years of education (fourth or fifth years), and as such did not provide a strong foundation on which to build after graduation. This challenge is further compounded by a scarcity of research tutors and mentors in some universities.

Another barrier identified by participants was a lack of adequate experiential training content in the curriculum. This challenge reflects clearly the extent to which the curriculum is incapable of providing needs-based education, especially in the context of changing pharmaceutical needs of society. Furthermore, inadequate preceptor-guided student placement opportunities, where real-life experiences could be gained, was cited as another limiting factor in achieving the goals of the FIP Nanjing Statements.

Minimal interest by faculty members in establishing or strengthening peer support systems and mentorship opportunities was another barrier cited. Participants also cited a lack of adequate encouragement and support by faculty members to engage in national and international pharmacy events and other extracurricular activities that contribute to the learning experience. In most countries, the design of the curriculum does not provide room for students' engagement in other non-academic activities, which are beneficial for their education.

A number of opportunities to guide educational reform in Africa were cited by participants. The initiation of a curriculum review process that will reflect needs-based education; an increase in experiential, research, social and emotional skills training, and a promotion of the participation of students in extracurricular activities were identified as significant opportunities to improve pharmacy education. Furthermore, increased faculty members' involvement in peer support and mentorship for students, adoption of volunteer preceptors and research mentors beyond academia and the development of a knowledge generation and sharing system between tutors and learners were advocated as tools to guide the process of educational reform in the region. Most importantly, students want to be fully involved in and contribute significantly to any process that would improve their education.

Generally, pharmacy students in the African region have been at the forefront of improving their education. For instance, students in Ghana have recently undertaken sensitisation and advocacy visits to the deans of the University of Ghana and the Kwame Nkrumah University of Science and Technology on the need to ensure greater faculty support in Ghanaian students' participation in local, regional and international pharmacy events. In Sierra Leone, pharmacy students have advocated for a greater inclusion of inputs from students in the curriculum-designing process and other activities developed to promote pharmacy education in the country.

On a broader level, the level of awareness on the role of students in improving pharmacy education in the region has been elevated in recent times. Through the IPSF African Regional Office, capacity-building activities aiming to provide knowledge and skills for a greater involvement of students in pharmacy education advocacy at the highest level have been initiated. This demonstrates the desire of students to take a front seat in designing the kind of future that they desire, especially as they are the future of the profession. Therefore, it is essential that they are provided with adequate support in their quest to improve their education and become better pharmacists in the future.

5.3 FIP-WiSE: Empowering women in pharmaceutical sciences and pharmacy education in sub-Saharan Africa

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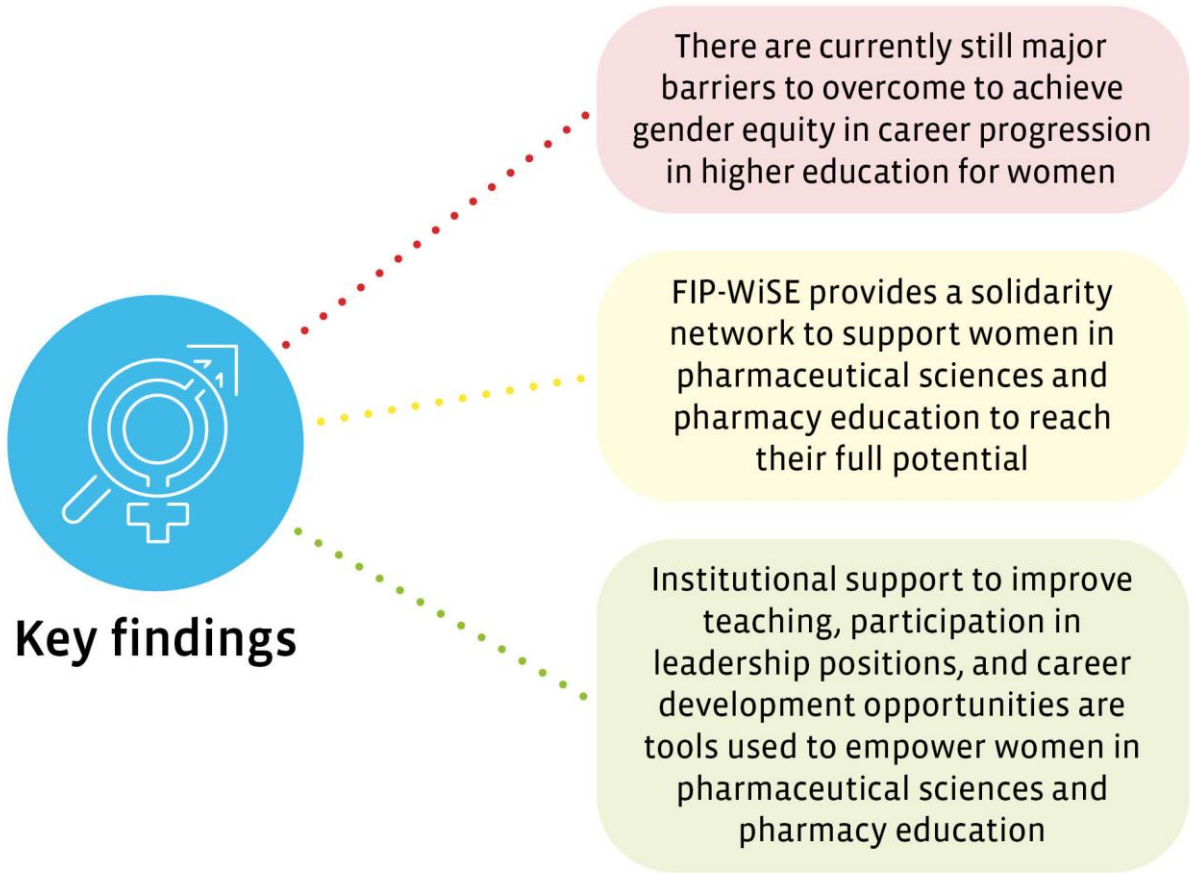

Figure 24. Key findings from the "FIP-WiSE: Empowering women in pharmaceutical sciences and pharmacy education in sub-Saharan Africa" chapter

Summary

- Science, technology and education provide unprecedented opportunities, yet trends indicate a growing gender divide and women are under-represented in these areas, as in many other fields and sectors around the world.

- There are currently still major barriers to overcome to achieve gender equity in career progression in higher education for women.

- The FIP-WiSE (Women in Science and Education) initiative helps achieve gender equity by building a solidarity network to support women in these fields, by sharing best practices to empower women in science and education to achieve their full potential, and by attracting female students and young professionals into the fields of science and education.

- In Ghana, large class sizes and under-representation of women in pharmacy education present challenges around women's empowerment. To address such disparities, programmes involving mentorship, institutional support to improve teaching and increase participation of women on committees and in administrative and leadership positions, and opportunities for knowledge generation have been among the tools used to ensure women in pharmacy education and pharmaceutical sciences achieve their full potential.

A global overview on gender equity and women in science and education

Science, technology and education provide unprecedented opportunities, yet trends indicate a growing gender divide and women are under-represented in these areas, as in many other fields and sectors around the world. The jobs of the future will be driven by technology and innovation, and if the gender divide is not bridged soon, the overall gender gap is likely to widen.

Numerous studies have found that women in science fields publish less, are paid less for their research and do not progress as far as men in their careers. The issue about science's lack of women continues to be raised, but one contributory factor could be because they are leaving. Researchers with family commitments should be supported when the pressure to continually publish, teach and mentor students, and run a laboratory require large time commitments.

In order to achieve the United Nations Sustainable Development Goals, we need to ensure full and equal access to, and participation and representation in science and education for women and girls. Long-standing biases and gender stereotypes are steering girls and women away from science- and education-related fields.

There are currently still major barriers to overcome to achieve gender equity in career progression in higher education for women. Although women are well represented in entry- and mid-level positions, they have made surprisingly little progress in advancing to decision-making roles anywhere, including in higher education. For example, 80% of university vice chancellors in the UK are male.

Improving recruitment, retention and promotion policies, as well as continuous learning and up-skilling for women can go a long way towards closing the gender gap pharmaceutical sciences and education.

FIP Women in Science and Education: FIP-WiSE

The FIP-WiSE initiative was launched on 11 February 2020 on the International Day of Women and Girls in Science to help achieve gender equity by building a solidarity network, to help identify priorities through research and share best practices, to empower women in the fields of education and science to achieve their full potential, and to attract students and young female professionals.

FIP-WiSE calls for:

- Higher education institutions to set strategic, institution-wide objectives on gender equity to remove all barriers that hold women back;
- Science employers and university department heads to ensure that the contributions of women in pharmaceutical sciences to life-saving research and development are fully acknowledged;
- Employers to offer an increased number of formal mentoring and leadership development opportunities for women to gain confidence in their unique personal and professional competencies;
- Employers to improve career options for women in pharmaceutical sciences and establish a more family-friendly work environment; and
- Mentorship, scholarships and awards for students and young professionals to engage in and pursue roles in pharmaceutical education and sciences.

Dr Mariam El Boakye Gyasi, of Ghana, promotes gender equity and empowers women in pharmaceutical science and pharmacy education across the African region as a FIP-WiSE Member.

Challenges that women in pharmaceutical sciences and pharmacy education face in sub-Saharan Africa

Large class sizes can be a problem. Some pharmacy schools run a shift system of lectures in order to have much smaller class sizes that allow for better student interactions and improve student participation in laboratory sessions. However, this means spending twice the contact time with each class than would be ordinarily required if the classes were not split. This limits time for research and community engagements. Research and community engagement together with teaching are the three key areas for lecturer assessment and promotion. For most women in sub-Saharan Africa, this is a challenge since they are the principal providers of care for children, the elderly, the physically challenged and, indeed, whole families. Limited time is therefore available to them for research and community engagement, which are key for career advancement.

Although there are increasing numbers of women coming into pharmacy overall, there are few women in pharmacy education. It is therefore challenging for female undergraduates to find female mentors in the fields of pharmaceutical science and pharmacy education. Early career academics may also not be able to find mentors to guide them, while at the same time they themselves are required to be mentors for female students. In Ghana, there is an increase in the proportion of women in pharmacy schools who require mentors.

Good practices from Ghana

Avenues for mentorship exist in Ghana. The Lady Pharmacists' Association of Ghana within the Pharmaceutical Society of Ghana helps early career pharmacists in different institutions to have mentors in institutions other than their own. Some of these collaborations go beyond areas of practice: someone in academia can have interaction with someone in industry, and so on. This also provides a support system in terms of enhancing the wellbeing of women in pharmacy and promoting their welfare.

Institutional support is available. For example:

- Support to improve teaching — Universities have made available avenues for having virtual classes, especially since the start of the COVID-19 pandemic. Two examples are the Kwame Nkrumah University of Science and Technology (KNUST) V class V Portal, and the UG Sakai Portal for two public universities in Ghana.

- Knowledge generation and communication of knowledge — At KNUST, the Faculty of Pharmacy and Pharmaceutical Sciences encourages multiple lecturers teaching a course, so when one has other engagements, fellow lecturers are able to cover. This provides flexibility, especially for women in pharmacy education who have additional family roles.

- Improved participation of women — The increased participation of women in committees, and in leadership and administrative positions at institutional and national levels, supported many women to acquire experiences in leadership and administrative duties. This has encouraged and inspired women who are willing to compete in previously uncharted territories. A case in point: in 2016, the KNUST Faculty of Pharmacy and Pharmaceutical Sciences elected its first female dean, Professor Rita Akosua Dickson. Professor Dickson went on to be elected the first female pro vice chancellor of KNUST in 2018 and, ultimately, in 2020 she was appointed the first female vice chancellor of KNUST, almost seven decades after the establishment of the institution.

FIP-WiSE provides women in pharmaceutical science and pharmacy education with a support system of other women whom they can relate to and who can help them to overcome any challenge through diverse ways. Together with FIP-WiSE, women can achieve both their individual and collective goals. The FIP-WiSE movement unites and empowers women in pharmaceutical science and pharmacy education. Visit https://www.fip.org/activities-priorityareas-equityrx for more information. To join FIP-WiSE, contact education@fip.org.

5.4 The COVID-19 pandemic and pharmacy education: Status of sub-Saharan African schools

Authors

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Summary

- The COVID-19 pandemic has further exposed the already existing inequities in pharmacy education.
- Pharmacy education has been heavily disrupted by COVID-19 in sub-Saharan Africa, as in all regions of the world, in the context of continuation of education and delivery of education.
- Adapting to remote learning initiatives in resource-limited settings has been challenging. However, there has been a deliberate provision of support to students and faculty members by the universities.
- FIP commits to provide support by providing avenues for academic knowledge, resource, experience and good practice sharing during these times in order to ensure that the best possible needs-based education is provided, even although there has been severe disruption in education.

The COVID-19 pandemic has greatly disrupted different aspects of people's lives, including education and its systems. Now, more than ever, there is a dire need to put to the test diverse innovative educational approaches to adapting education and training in the wake of disruptions and recovery periods from COVID-19 across all regions of the world, including sub-Saharan Africa (SSA).

The first case of COVID-19 in the SSA region was recorded in Nigeria. Now cases have spread across most countries in the region, resulting in stringent measures, including the closures of schools, to prevent the rapid transmission of the virus to the population. Amid these closures, several schools of pharmacy in the region have had different experiences with regard to the state of their education, the continuation of academic terms, the delivery approach and the support available to students and faculty members.

Through a brief consultation with the institutions who had been a member of the FIP-UNESCO UNITWIN CfEA in the SSA, FIP has gathered their experiences and approaches to tackle the disrupted state of pharmacy education in the light of the pandemic, while using this consultation to provide support to members of the CfEA network and beyond.

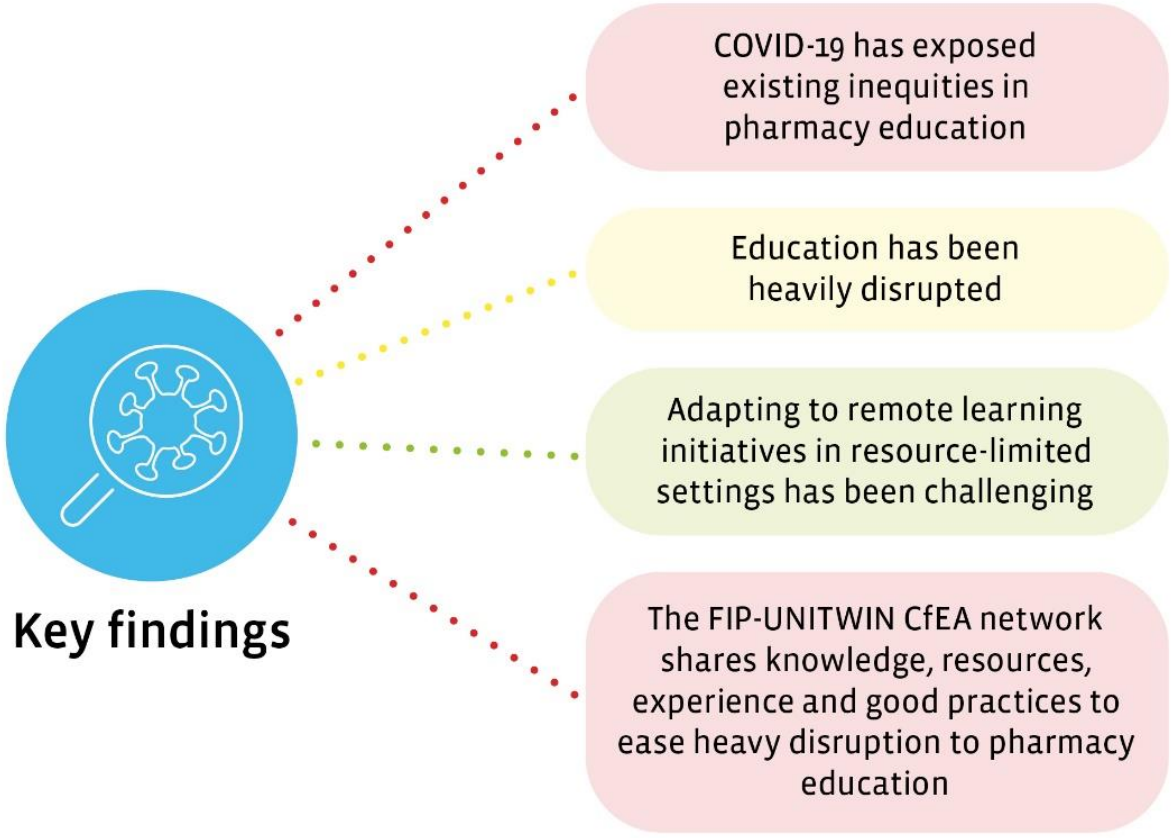

Figure 25. Key findings from the "The COVID-19 pandemic and pharmacy education: Status of sub-Saharan African schools" chapter

Continuation of education

The academic term of all the member schools has been continued virtually across the network except for Nigeria, where studies were suspended with no report of ongoing virtual learning at the University of Benin, Nigeria. The intensity and content of the learning process greatly vary across all schools but with similar challenges. Ghana, Namibia and Zambia have shown great progress in the remote learning process with almost completion of the academic term. Malawi is just adapting to an emergency online learning using a platform called Compass after a brief period of academic term suspension. The major challenge for adapting to the remote learning process included the availability, accessibility and affordability of internet connectivity for students and faculty members.

Delivery of education

There has been a blend of synchronous and asynchronous remote education approaches with more preferences for the asynchronous approach in order to minimise the effects of internet connectivity issues on the learning process. Namibia and Zambia use the Moodle platform for the learning process and the Zoom platform when there is a necessity for live interactions with students. The University of Ghana uses Sakai, a software developed and owned by the university for the asynchronous learning process. Kenya uses Zoom with postgraduate students because their numbers are small, and Google platforms for undergraduates. Attendance, however, for undergraduates has been below 60%.

There has been much progress in some parts of the curriculum, especially theoretical modules, while the laboratory practical work and experiential learning, including clinical, industrial and community attachments, has been greatly affected. On the assessment of students, Namibia has converted final examinations to bits of continuous assessments, assignments and tasks all through the academic term.

Supporting faculty members and students

Adapting to remote learning initiatives in resource-limited settings has been challenging. However, there has been a deliberate provision of support to students and faculty members by the university to ease this process. In Ghana, Kenya, Namibia and Zambia, the universities have made provision for internet bundles in partnership with local telecommunications providers, although the extent and efficiency of this vary because internet access is reduced in remote areas where some students live. There has been training of students and faculty members on the use of the different platforms.

Conclusion

Acknowledging that the adaptation of the education process to virtual settings is enormously challenging, especially in resource-limited settings, FIP commits to provide support by providing avenues for academic knowledge, resource, experience and good practice sharing during these times in order to ensure that the best possible needs-based education is provided, even although there has been severe disruption in education. Understanding that the magnitude of change in these times depends on the political willingness and resources available to all academic institutions, FIP commits to stand in solidarity with all members of the network.

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6.The way forward, and recommendations

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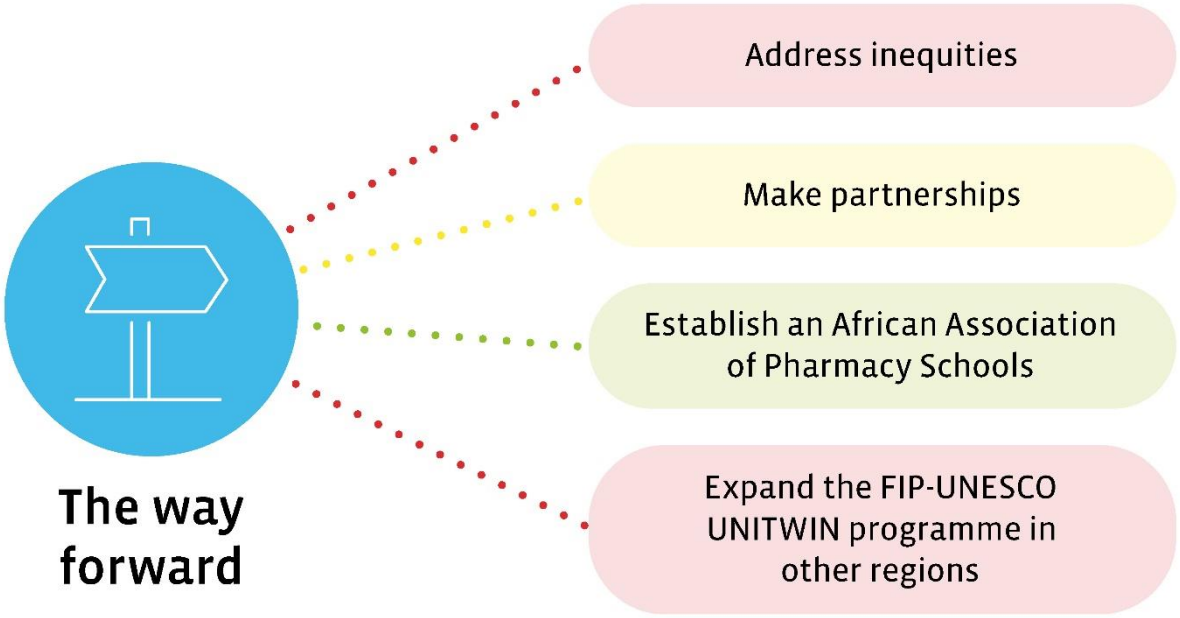

Figure 26. The way forward and recommendations from the "FIP pharmacy education in sub-Saharan Africa" report

This report provides important insights into pharmacy education in sub-Saharan Africa and highlights the strengths and needs for transformative change in pharmacy education to meet the health needs of communities throughout Africa. It also demonstrates the use of key FIP resources to identify gaps in pharmacy education and provide guidance for advancing pharmacy education through individual and collective networking efforts among pharmacy schools.

The Executive Summary of this report provides both key messages and recommended actions by academic institutions, professional organisations and governments to invest in pharmacy education and the need for growth in the pharmacy workforce to address the long-standing deficit in capacity.

This chapter will look at four major directions to maintain and build on the momentum generated by the FIP-UNESCO UNITWIN Programme to continue the transformation of pharmacy education for the purpose of improving health in the continent of Africa. Underlying each of these directions are the three main pillars identified by the FIP-UNESCO UNITWIN Centre for Excellence in Africa (CfEA): (i) building academic capacity in numbers and in expertise to support research, science and industry and to train clinical pharmacists to provide patient care and improve health; (ii) assuring education programmes are designed to meet the healthcare needs of the population for primary

and specialised health care; and (iii) advocacy to gain appropriate professional recognition of pharmacists as healthcare providers with the expertise to provide medication therapy to optimise health.

Addressing inequities

Inequities arise from various factors, two main drivers of which are economics and gender. Economics-driven inequities require greater advocacy efforts by academia and professional organisations to influence government to invest in pharmacy education for the health of their country and to help bolster economic growth.

Strides have been made in addressing gender inequities in terms of numbers but there remain inequities in education and workforce. Africa is seeing a trend towards greater numbers of women students in pharmacy education, which in turn will affect the workforce in the years ahead. Constant vigilance is needed to maintain the momentum towards greater gender equity in educational opportunities and also in career advancement opportunities in academia, industry and clinical practice. FIP has established the FIP-WiSE (Women in Science and Education) programme to support this mission.

Partnerships

FIP serves as the platform to build partnerships among academic institutions within and external to Africa for the purpose of transforming pharmacy education to meet the health needs of the nations and the continent through education and training of students and life-long learning for practitioners. FIP, through the FIP-UNESCO UNITWIN CfEA and the global UNITWIN programme, aims to provide a the platform for developing the academic partnerships that are at the heart of the UNITWIN programme to advance pharmacy education through sharing of challenges, solutions and good practices. One important aspect of partnerships that should not be overlooked is the partnership of the academic programmes with its students and young pharmacy graduates who have a strong stake in their education and early career development.

Academic networking and sharing of ideas, innovations, expertise to advance pharmacy education and health care through an African Association of Pharmacy Schools

Regional collaborations exist in Africa, as seen in both East and West Africa, designed to improve and harmonise higher education, including pharmacy education. The FIP-UNESCO UNITWIN CfEA network has shown a need for a continent-wide association of pharmacy schools to greatly enhance the sharing of ideas, good practices, innovations and advancements in pharmacy education, as seen in other areas of the world including the US, Canada, Latin America, Europe, India, Asia, Australia and others that bring pharmacy academicians together to learn from one another and improve the education mission of each institution and the pharmacy education programme. The CfEA members planted the seed for the formation of such an association — an African Association of Pharmacy Schools — that will be one of the major areas for development in the next few years in the African pharmacy education.

Intention to expand the FIP-UNESCO UNITWIN Programme to achieve its original mandate as a global pharmacy education development programme

The pioneering efforts, experiences and outcomes of the FIP-UNESCO UNITWIN CfEA should be utilised to support expansion of the FIP-UNESCO UNITWIN Programme to other regions of the world in order to meet its original mandate to be a global pharmacy education development programme.

As such, through a renewed partnership agreement with UNESCO, the FIP-UNESCO UNITWIN Programme, from 2021, will support the implementation of the FIP Development Goals through a global education transformation programme to meet UN Sustainable Development Goals, as well as the WHO's urgent health challenges for the next decade to improve primary and specialty health care as they relate to medicines expertise and to support the achievement of universal health coverage.

Annexes

Annex 1. The African pharmaceutical workforce: There is no workforce without education. Data table

Country	WBC *	Data 2006**		Data 2009**		Data 2012**		Data 2016**	
		Population	Pharmacist density***	Population	Pharmacist density***	Population	Pharmacist density***	Population	Pharmacist density***
Cameroon	2	18,137,734	0.39	19,595,026	0.36	20,052,000	0.42	23,439,189	0.68
Egypt	2	71,777,678	12.89	74,946,000	17.76	82,637,400	18.15	95,688,681	no data
Ghana	2	22,019,000	0.74	23,947,000	0.75	24,965,800	1.19	28,206,728	1.34
Kenya	2	33,830,000	0.39	37,954,000	0.42	41,609,700	0.53	48,461,567	no data
Madagascar	1	18,336,724	0.14	19,996,469	no data	21,743,949	no data	24,894,551	0.11
Mali	1	11,941,258	no data	12,716,000	0.64	15,394,000	0.69	17,994,837	no data
Mauritius	3	1,221,003	2.47	1,244,121	no data	1,286,000	no data	1,263,473	3.93
Nigeria	2	143,300,000	0.87	148,071,000	0.89	162,265,000	0.95	185,989,640	1.02
Rwanda	1	9,429,457	no data	9,609,000	0.21	11,144,315	no data	11,917,508	0.57
Senegal	1	11,251,266	no data	12,203,957	no data	12,767,600	0.92	15,411,614	0.98
South Africa	3	47,606,670	no data	49,557,573	no data	50,460,000	2.54	55,908,865	2.59
Tanzania	1	38,824,384	no data	40,213,000	0.17	46,218,500	0.20	55,572,201	no data
Uganda	1	28,724,869	0.06	29,194,000	0.10	34,543,300	0.16	41,487,965	0.24
Zambia	2	12,052,156	no data	13,082,517	no data	13,475,000	0.19	16,591,390	0.36
Zimbabwe	1	12,710,589	no data	13,481,000	0.80	12,084,000	0.56	16,150,362	0.60

Notes:

* WBC — World Bank Classification. The World Bank classifies countries incomes as: high (4) upper middle (3); lower middle (2); and low (1).

** Population data source: World Bank.

*** Density as pharmacists per 10,000 population

Annex 2. ISO 3-digit table

Country	ISO 3-digit Country Code	Country	ISO 3-digit Country Code
Afghanistan	AFG	**Madagascar**	MDG
Albania	ALB	**Malaysia**	MYS
Argentina	ARG	**Mali**	MLI
Australia	AUS	**Malta**	MLT
Austria	AUT	**Mauritius**	MUS
Bangladesh	BGD	**Mexico**	MEX
Belgium	BEL	**Montenegro**	MNE
Brazil	BRA	**Nepal**	NPL
Cambodia	KHM	**Netherlands**	NLD
Cameroon	CMR	**New Zealand**	NZL
Canada	CAN	**Nigeria**	NGA
China Hong Kong	HKG	**Norway**	NOR
China Taiwan	TWN	**Pacific Islands**	PIC
Colombia	COL	**Paraguay**	PRY
Costa Rica	CRI	**Philippines**	PHL
Croatia	HRV	**Portugal**	PRT
Czech Republic	CZE	**Romania**	ROU
Denmark	DNK	**Rwanda**	RWA
Egypt	EGY	**Saudi Arabia**	SAU
Fiji	FJI	**Senegal**	SEN
Finland	FIN	**Singapore**	SGP
France	FRA	**South Africa**	ZAF
Germany	DEU	**Spain**	ESP
Ghana	GHA	**Sri Lanka**	LKA
Hungary	HUN	**Switzerland**	CHE
Iceland	ISL	**Syria**	SYR
India	IND	**Tanzania**	TZA
Indonesia	IDN	**Thailand**	THA
Iraq	IRQ	**Tonga**	TON
Ireland	IRL	**Turkey**	TUR
Israel	ISR	**Uganda**	UGA
Italy	ITA	**United Kingdom**	GBR
Japan	JPN	**United States**	USA
Jordan	JOR	**Uruguay**	URY
Kenya	KEN	**Vanuatu**	VUT
Korea, Rep of	KOR	**Vietnam**	VNM
Lithuania	LTU	**Zambia**	ZMB
Macedonia	MKD	**Zimbabwe**	ZWE

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