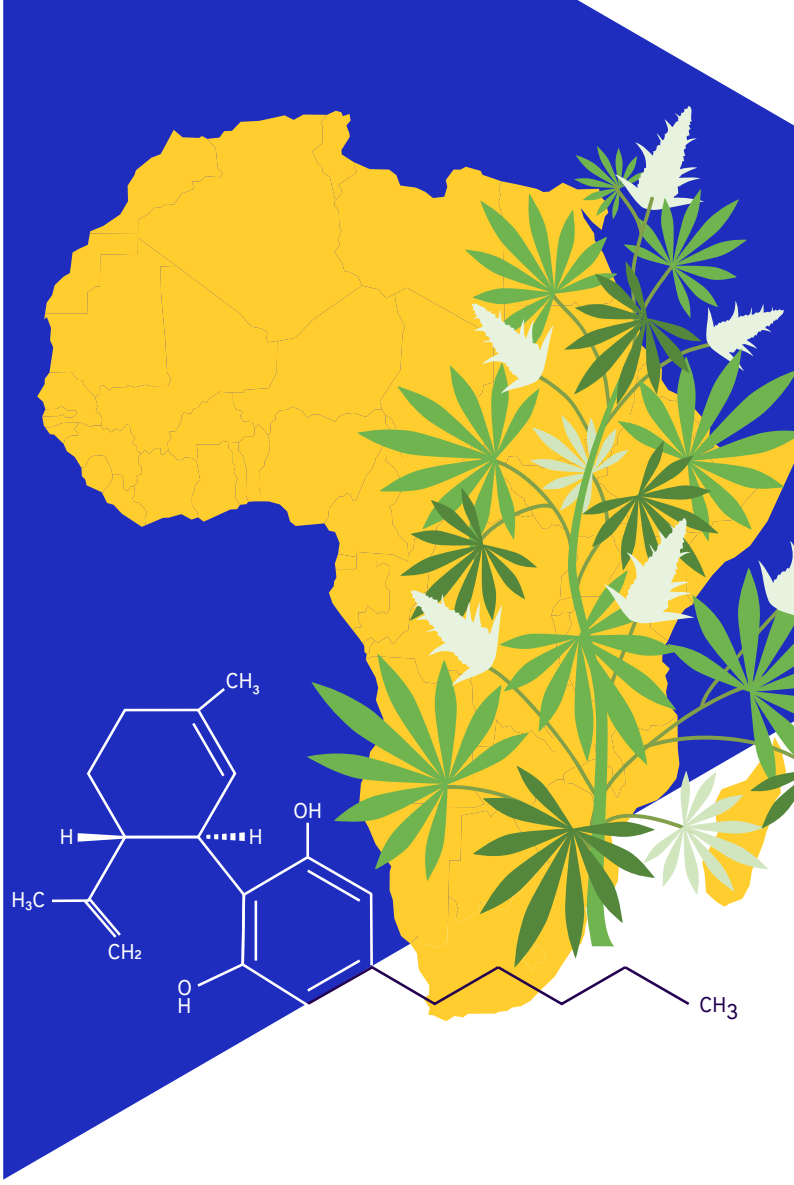
International Labour Organization



Exploring decent work in the pharmaceutical industry

Job creation in the production of medical cannabis in Lesotho and Zimbabwe

Edited by
Maria Sabrina de Gobbi

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Abbreviations

API	active pharmaceutical ingredient
ARIPO	African Regional Intellectual Property Organization
EMA	Environmental Management Agency (of Zimbabwe)
FDI	foreign direct investment
GDP	gross domestic product
GMP	good manufacturing practice
ICT	information and communications technology
ISI	import substitution industrialization
ISO	International Organization for Standardization
LED	light-emitting diode
MCAZ	Medicines Control Authority of Zimbabwe
MNE Declaration	Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy
NEC	National Employment Council (of Zimbabwe)
NHTC	National Health Training College (of Lesotho)
NMRA	national medicines regulatory agency
NSDP	National Strategic Development Plan (of Lesotho)
NUL	National University of Lesotho
OECD	Organisation for Economic Co-operation and Development

R&D	research and development
SADC	Southern Africa Development Community
SAHPRA	South African Health Products Regulatory Authority
SEZ	special economic zone
THC	tetrahydrocannabinol
TRIPS Agreement	Agreement on Trade-Related Aspects of Intellectual Property Rights
WHO	World Health Organization
ZINATHA	Zimbabwe National Traditional Healers Association

Introduction

Is medical cannabis really capable of making a difference for poor countries in terms of growth and job creation? That was the main question motivating the research whose findings are presented in this book. However, at the time the project was launched in January 2020 no one could have foreseen that the entire globe would soon be in thrall to a severe pandemic. Broadening the scope of the research to cover the entire pharmaceutical industry therefore seemed appropriate.

The COVID-19 outbreak has starkly reminded us of the contribution of pharmaceutical drugs to human welfare. The present lacklustre performance of the pharmaceutical industry in some regions of the world is reflected in the way that large numbers of people are left behind, particularly in developing countries. Sub-Saharan Africa imports most of the medicines that are needed across the region, which renders local populations extremely vulnerable to disease and adversities in general. Some illnesses are peculiar to Africa, and imported pharmaceuticals may not always work there, as in the case of some COVID-19 vaccines, which are not effective against certain local variants of the virus.

Medical cannabis has gained in prominence worldwide in recent years. Its use has become legal in an increasing number of advanced economies, and its market volume is projected to grow at double-digit rates in the near future. Some developing countries, in particular those negatively affected by the decline of tobacco exports, have seen a growth opportunity for their economies in the cultivation of cannabis and the production of cannabis-derived pharmaceuticals. The goal of creating new jobs and raising revenues from exports has prompted a number of sub-Saharan African countries to legalize the production of medical cannabis and the cultivation of the cannabis plant to that end. Lesotho was the very first country in Africa to grant licences for the production of medical cannabis, in 2017, and it was followed by Zimbabwe one year later. The early-mover position of these two African countries accounts for the special attention accorded to their experience in the present book. Dependent to a great extent on the capital brought by foreign investors, the activities undertaken in Lesotho and Zimbabwe to set up the necessary infrastructure for medical cannabis cultivation and production were considerably slowed down by the spread of the COVID-19 virus and by the drastic restrictive measures adopted in response. The medical cannabis industry in Africa can therefore still be said to be in its infancy.

Medical cannabis has a long history in African traditional medicine. Nonetheless, its use remains illegal in most countries in the region and it is not integrated into the pharmaceutical sector at large. Lesotho and Zimbabwe – in particular, the pharmaceutical industry and the development of medical cannabis production in these two countries – were the focus of the aforementioned research project.

This book seeks to determine whether medical cannabis can indeed create jobs and wealth, notably in comparison with tobacco, for which the medicinal plant is deemed to be a viable substitute crop. It also explores the extent to which medical cannabis production and foreign investment in this area can benefit domestic pharmaceutical industries. Moreover, it considers the labour and environmental standards applied in the pharmaceutical sector, measuring the performance of multinational companies or foreign-owned enterprises against those standards, especially in the medical cannabis industry. The interviews and surveys conducted for the underlying research project yielded data that allow one to assess decent work deficits in the pharmaceutical sector of Lesotho and Zimbabwe, albeit with certain caveats because of the rather small sample sizes. Although these data need to be interpreted with caution, it is hoped that they will help to shed some light on a scarcely investigated field of research.

The book is based on the findings of a research project carried out by the ILO under the direction of Sabrina De Gobbi. The research was conducted in collaboration with the National University of Lesotho and the University of Zimbabwe: both institutions played an instrumental role in the collection of primary data. Teams of graduate students led by professors produced background papers that were used in the various chapters of this book. Dr Motselisi Mokhethi and Professor Innocent Chirisa were the project coordinators for the National University of Lesotho and the University of Zimbabwe, respectively. Field surveys, interviews and site visits were the main research tools used. Unfortunately, the COVID-19 pandemic significantly constrained field activities. Secondary data, national and international literature, and published and unpublished materials were also consulted, as was "grey literature", specifically to access recent data and cross-check information.

Sabrina De Gobbi, the initiator of the above-mentioned research project and lead author of this book, has over 20 years of experience at the ILO, where she has worked mainly as an economist, focusing especially on Africa. She holds advanced university degrees in economics, law and environmental management. The long list of co-authors reflects the striving to provide solid technical support in all the different disciplines covered by the book's ten chapters. The project coordinator from the National University of Lesotho, Dr Motselisi Mokhethi, is a specialist in the area of entrepreneurship, while her

counterpart from the University of Zimbabwe, Professor Innocent Chirisa, is an expert in environmental planning and public policies.

Each chapter can be read independently, although reference is often made to other parts of the book for further information. Chapter 1 describes the basic principles underlying the research project. Enshrined in international instruments adopted under the aegis of the ILO, these principles refer to labour rights and, more generally, to growth and development, where the creation of decent employment plays a pivotal role. Special attention is paid to norms that regulate the functioning of national and multinational companies. When it comes to environmental protection, guidelines and standards established by other international organizations, notably the Organisation for Economic Co-operation and Development (OECD), are also taken into account.

Chapter 2 presents the pharmaceutical industry in sub-Saharan Africa, including traditional medicine. It gives an overview of the industry's history and development in the region, citing as examples a number of countries in which pharmaceuticals have come to attract greater attention over the years.

The focus on Lesotho and Zimbabwe begins in Chapter 3, which provides a detailed description of pharmaceutical companies in the two countries and of the jobs created in the industry. Chapter 4 deals with industrial policies and explores the two countries' development paths, making reference to the well-known Asian models of development and, in particular, that of the Republic of Korea. The choice of export-led growth based on medical cannabis is considered, as are the capabilities required more generally in the area of pharmaceuticals.

Chapter 5 describes the regulatory framework of the pharmaceutical sector in the two countries and includes an overview of the legislation underpinning labour and environmental standards. Subsequently, Chapters 6 and 7 examine compliance with labour and environmental standards, respectively. These two chapters benefited greatly from the primary data collected through field surveys and interviews with managers and workers at pharmaceutical companies in Lesotho and Zimbabwe.

Chapter 8 focuses on medical cannabis. The industry is at a more advanced stage of development in Lesotho, and most of the empirical evidence presented in the chapter is drawn from that country. Labour and environmental standards are compared with those described in Chapters 6 and 7 for the pharmaceutical sector in general in Lesotho.

Chapter 9 deals with skills and education; it explores the strengths and weaknesses of the two national education and training systems. Chapter 10

covers the area of technology, looking specifically at pharmaceutical manufacturers in Zimbabwe and medical cannabis companies in Lesotho.

A Conclusions section rounds off the volume, setting out the policy implications of the main findings presented in the preceding chapters and offering some recommendations for policymakers.

1 Decent work and a human-centred approach

Introduction

The COVID-19 pandemic has starkly highlighted the importance of the pharmaceutical sector for human welfare. The right to work and the right to health of each and every individual, as enshrined in the International Covenant on Economic, Social and Cultural Rights of 1966, have rarely been as intertwined as they are at present. Worldwide, millions of jobs have been lost owing to the economic crisis triggered by the pandemic. Many businesses have been forced to close down for good. Poverty is on the rise in all regions. Exercising one's right to engage in work has become more challenging than ever in practically every country of the globe. At the same time, hundreds of thousands of people have lost their lives because of inadequate hospital structures and the lack of appropriate medical treatments and vaccines. The right to enjoy good physical and mental health has not been safeguarded for a large proportion of the world's population.

There is an urgent need to galvanize the local pharmaceutical industry in Africa. Diseases are different and drugs that work in the region where they are produced may not be successful in the treatment of patients in other regions into which they are imported (Thomas 2019). For example, certain vaccines do not seem to be effective against some new, emerging variants of the COVID-19 virus (Madhi et al. 2021).

The present lacklustre performance of the pharmaceutical industry in some regions of the world is leaving large numbers of people behind, particularly in developing countries. That is why a human-centred approach is needed. According to the Global Commission on the Future of Work, a human-centred agenda is one that "puts people and the work they do at the centre of economic and social policy and business practice" (ILO 2019a, 24). With that goal in mind, we have examined the pharmaceutical industry and its innovative subsector of medical cannabis production, taking into account the key concept of decent work and the international legal instruments described below.

Decent work

Decent work may be defined as "productive work in conditions of freedom, equity, security and human dignity" (ILO 2019b, 7). In the present volume, this concept is used to assess the labour outlook in the pharmaceutical industry in Lesotho and Zimbabwe.

Decent work has four dimensions: employment creation, social protection, rights at work, and social dialogue. All four need to be considered when looking at the situation of workers in the pharmaceutical industry in order to identify decent work deficits.

ILO Centenary Declaration for the Future of Work

The human-centred approach is encapsulated in the ILO Centenary Declaration for the Future of Work adopted in 2019, which, "taking into account the profound transformations in the world of work" (ILO 2019c, 3), calls on the ILO to focus on a number of priority areas. Some of these areas are particularly relevant to the pharmaceutical sector.

To begin with, the Declaration states that work in the future must contribute to the economic, social and environmental dimensions of sustainable development. The pharmaceutical industry in Lesotho and Zimbabwe has accordingly been analysed in relation to these three dimensions. Around the world, the economic contribution of the pharmaceutical sector is crucial for some countries, especially advanced and emerging economies. The efforts that Zimbabwe is making to foster the industry, especially by promoting import substitution, and the export-oriented approach adopted by Lesotho (with regard to medical cannabis in particular) are described, as are the various challenges. In this book, the scope of the social dimension is limited to labour rights. Decent work deficits in the industry have been highlighted. Special attention has been paid to safety and health at work, as some of the chemical substances used in the industry are particularly dangerous for workers. This aspect is closely linked to the environmental component of sustainable development. Robust environmental standards help to protect not only the health of workers, but also that of their local communities and the environment at large.

The ILO Centenary Declaration also affirms that skills, competencies and qualifications that are in demand in the labour market and allow workers to benefit from decent work opportunities should be promoted. A specific chapter of the book is devoted to knowledge, skills and education in Lesotho and Zimbabwe, and to the gaps that need to be filled in order to ensure decent work for all in the pharmaceutical sector (Chapter 9).

Achieving gender equality at work is another key area of concern of the Declaration. Existing gender gaps in the pharmaceutical sector in Lesotho and Zimbabwe have been identified. Women are under-represented among the employees of the manufacturing companies surveyed in Zimbabwe, but not in the wholesale and retail sector in Lesotho, although the positions that they occupy tend to be lower than those of their male colleagues. Among students enrolled in pharmaceutical training programmes, gender gaps are being filled in Zimbabwe.

Last but not least, the ILO Centenary Declaration refers directly to United Nations Sustainable Development Goal 8, emphasizing that "sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all" must be promoted through trade, industrial and sectoral policies, among others (ILO 2019c, 7). Accordingly, a chapter in this book is dedicated to industrial policies adopted by Lesotho and Zimbabwe for the pharmaceutical industry; these policies are examined with reference to emerging trends identified in the international literature (Chapter 4).

Resolution concerning a global call to action for a human-centred recovery from the COVID-19 crisis that is inclusive, sustainable and resilient

In June 2021, the International Labour Conference adopted a resolution on a human-centred recovery from the social and economic crisis caused by the COVID-19 pandemic. The resolution calls for

> Urgent and coordinated action … to ensure that all people have timely, equitable, affordable and global access to quality, safe and effective COVID-19 vaccines, treatments and preventive measures, such as health technologies, diagnostics, therapeutics, and other COVID-19 health products. (ILO 2021, 3)

Strengthening the pharmaceutical sector in two poor countries such as Lesotho and Zimbabwe would be in line with this call to action.

The resolution advocates a human-centred recovery that is inclusive, sustainable and resilient. In adopting it, governments and employers' and workers' organizations committed themselves to fostering resilient supply chains that promote decent work, environmental sustainability and the principles contained in the Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy (ILO 2017). All these aspects were fully taken into account in the research undertaken for the present book.

The resolution also calls on the ILO to focus on recovery strategies that "boost productivity through diversification and innovation" (ILO 2021, 10). Supporting

the pharmaceutical industry would certainly lead to economic diversification, with the concomitant creation of more productive jobs.

Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy

The ILO Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy (MNE Declaration) offers guidance to national and multinational enterprises as well as governments on inclusive, responsible and sustainable workplace practices and social policy. In order to assess the extent to which decent work is a reality in the pharmaceutical industry in Lesotho and Zimbabwe, the principles underlying the MNE Declaration were used to formulate survey questions for employers, workers, government representatives and other stakeholders.

The MNE Declaration is based on international labour Conventions and Recommendations and covers areas such as employment, training, conditions of work, and industrial relations. It provides guidelines on how to strengthen the positive labour impact of companies' operations to achieve decent work for all, one of the goals of the United Nations 2030 Agenda for Sustainable Development. Significantly, "the 2030 Agenda reflects the understanding of the international community that decent work is both a means and an end to sustainable development" (ILO 2016, 3).

Implementation of the MNE Declaration's guidelines requires the adoption of suitable national laws and policies, not least in the areas of labour administration and labour inspection, and also cooperation among governments and employers' and workers' organizations. Of utmost importance in this respect are the four core ILO Conventions on freedom of association and the effective recognition of the right to collective bargaining; the elimination of all forms of forced or compulsory labour; the effective abolition of child labour; and the elimination of discrimination in respect of employment and occupation. Given their binding value for signatory countries, Conventions are the most powerful type of ILO instrument that can be adopted. The principles enshrined in these Conventions and in the MNE Declaration are, therefore, particularly significant.

The Declaration is intended to promote employment and urges governments to adopt specific policies to that end. Moreover, enterprises are called upon to increase employment opportunities and make use of employment-generating technology. Multinational companies should prioritize the employment of nationals of the host country and conclude contracts with local enterprises for the supply of goods and materials that they require for their production processes. Stable employment is to be promoted by businesses with the

support of appropriate government policies. Laid-off workers should receive income protection from governments acting in coordination with employers.

The Declaration also states that governments should establish social protection floors in order to extend social security coverage to as many people as possible. Moreover, enterprises could complement public social security systems – for example, through employer-sponsored programmes.

Training is another focus of the Declaration. Governments are encouraged to develop vocational training policies that enterprises should comply with in order both to meet their own needs and to advance national development strategies. In addition to providing training for all of their employees, companies should participate in relevant programmes, including special funds to promote skills development.

The Declaration emphasizes that when setting wages, benefits and conditions of work it is necessary to consider the needs of employees' families and domestic economic factors, such as the requirements of economic development and levels of productivity. If an employer provides workers with housing, medical care or food, those basic amenities should be of good quality. Enterprises must ensure adequate safety and health standards, duly taking into account industrial safety and health hazards, and acting in compliance with government policies.

A chapter of this book is devoted to labour standards in the pharmaceutical industry in Lesotho and Zimbabwe (Chapter 6). A related chapter on environmental standards includes information on occupational safety and health; additionally, it covers environmental norms based on the OECD Guidelines for Multinational Enterprises and the ISO 14001 standard for voluntary environmental certification (Chapter 7). The OECD Guidelines, which are also cited in a chapter dealing with technology (Chapter 10), are described in further detail below.

OECD Guidelines for Multinational Enterprises

This OECD document was designed to contribute to economic, environmental and social progress as part of sustainable development (OECD 2011). Chapter VI of the Guidelines deals with the environment. Enterprises should protect the environment and public health and safety. In particular, they are recommended to develop a system of environmental management and to conduct adequate environmental impact assessments for proposed activities with significant environmental, health or safety effects. They should adopt technologies that are safe for the environment and should provide their workers with training on environmental matters, including training on how to handle hazardous materials and prevent environmental accidents.

Chapter IX of the Guidelines deals with science and technology. Enterprises are called upon to contribute to the development of innovation capacity and to foster the transfer and dissemination of technology and know-how. Technology transfer should take place on mutually agreeable terms and in a way that facilitates the sustainable development of the host country. Furthermore, businesses are encouraged to establish linkages with local universities and other research institutions as well as with local industries or industrial organizations.

Other relevant ILO instruments

The MNE Declaration incorporates the principles of the most important ILO Conventions and Recommendations concerning the world of work. However, to assess decent work deficits in the pharmaceutical sector, especially with regard to safety and health in the workplace, three other specific Conventions need to be taken into account, namely the Occupational Safety and Health Convention, 1981 (No. 155), the Chemicals Convention, 1990 (No. 170), and the Prevention of Major Industrial Accidents Convention, 1993 (No. 174). These ILO instruments are of considerable relevance when evaluating the implementation of environmental standards in the pharmaceutical industry in both Lesotho and Zimbabwe.

ILO Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All

Another ILO instrument that informed the research underlying this book is the Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All (ILO 2015). The Guidelines are derived from the conclusions of the International Labour Conference at its 102nd Session in 2013 concerning sustainable development, decent work and green jobs, which set out a policy framework for a just transition for all towards an environmentally sustainable economy. The Guidelines mention some key policy areas that are addressed in this book.

As far as industrial policies are concerned, governments, in consultation with the social partners, should seek to improve the social, economic and environmental sustainability of specific sectors, taking into account the size and type of companies operating within these. This strand of national policymaking has been considered in relation to the pharmaceutical industry in Lesotho and Zimbabwe.

The area of enterprise policy is covered quite thoroughly by the Guidelines. Governments, in consultation with the social partners, are called upon to assist

businesses in embarking on a just transition. Financial incentives should be provided for companies to adopt environmentally sound practices. Moreover, enterprises should receive technical support and advice so that they can set up environmental management and compliance systems and adopt long-term environmental policies. Furthermore, financial and technical support should be made available to firms undertaking research and development (R&D) related to green technologies.

With regard to skills development policies, the Guidelines indicate that needs assessments should be conducted by governments in collaboration with the industry and training institutions. Priority should be given to evolving skills needs, and training programmes are to be adapted accordingly. A chapter on knowledge, skills and employability looks at these issues in detail for the pharmaceutical sector in Lesotho and Zimbabwe (Chapter 9).

Finally, turning to occupational safety and health, the Guidelines point out that there should be greater coherence between institutions dealing with occupational health and those concerned with environmental matters when it comes to regulation and enforcement. The use of appropriate prevention, protection and safety processes should be promoted, and governments' capacity to enforce legislation to prevent major accidents should be enhanced. Companies should be encouraged to reduce or eliminate the use of hazardous materials. These recommendations have been taken into account in the chapter dealing with environmental standards in the pharmaceutical industry in Lesotho and Zimbabwe (Chapter 7).

2 History and development of the pharmaceutical sector

Introduction

Sub-Saharan Africa imports 70 to 90 per cent of the medicines consumed in most of its countries. This is a significant problem because government budgets are very limited and foreign exchange reserves are scarce. In the continent as a whole, there are about 375 pharmaceutical manufacturers, most of which are located in North Africa. Of all the sub-Saharan African countries, only nine have drug manufacturers; moreover, these are small and do not meet international standards of production (Conway et al. 2019).

The COVID-19 pandemic highlighted African countries' inability to provide their citizens with essential drugs and personal protective equipment to cope with the novel coronavirus (Byaruhanga 2020). In addition, pharmaceutical supplies from overseas stopped during the pandemic. As a result, South Africa, for example, ran out of psychiatric drugs and oral contraceptives; oncologists in Kenya complained about challenges in treating their cancer patients; and, in Nigeria, drugs for chronic diseases like HIV/AIDS were barely available. Dependence on global supply chains for many essential medicines is not a sustainable option for Africa (Buckholtz 2021). The delayed arrival of COVID-19 vaccines in developing countries prompted some governments to realize that the domestic pharmaceutical sector has to be prioritized. This is, for instance, the case with Senegal, where the development of a national strategy for the pharmaceutical industry is being discussed. It has been pointed out there that the State must safeguard regular access to pharmaceuticals and medical equipment covering basic domestic needs (APA News 2021). The Pasteur Institute in Dakar is the only facility certified by the World Health Organization (WHO) in Africa where COVID-19 vaccines can be manufactured (Buckholtz 2021).

Medicine supply is increasingly a priority for governments, which have even begun to treat it as a matter of national security. Diseases are different and medicines may work in the region where they are produced but not in all African countries. That is why it is also important to foster local production (Thomas 2019). Some diseases have a high prevalence in Africa, including waterborne illnesses, malaria, tuberculosis and HIV/AIDS. The development

of specialized pharmaceutical manufacturing capacity is therefore essential (Buckholtz 2021).

In 2007, the African Union's Pharmaceutical Manufacturing Plan for Africa was adopted. Five years later, in 2012, Africa's heads of state endorsed a business plan for its implementation. It is more challenging today to develop a viable pharmaceutical industry than it was when countries in other regions, such as India (a notable success story), embarked on that process. The global market has become much more competitive. Furthermore, multilateral and bilateral policies involving the donation of drugs create market distortions that render domestic pharmaceutical production extremely costly (Mackintosh et al. 2016).

At present, in sub-Saharan Africa, fairly large industries are to be found only in Kenya, Nigeria and South Africa, where pharmaceutical companies produce drugs for their local markets and for export to a few neighbouring countries. Most sub-Saharan African manufacturers are involved in packaging or incorporating active pharmaceutical ingredients (APIs) into tablets, syrups, capsules, creams and other finished forms. Active pharmaceutical ingredients are manufactured only in South Africa and Ghana; pharmaceutical firms from all other countries import them, mostly from India (Conway et al. 2019). Lesotho is able to produce APIs for cannabis-based medicines, but the use of such drugs remains illegal in most African countries, and so the APIs concerned are intended only for export to Europe and North America (see Chapter 10).

Although the pharmaceutical sector is not a major generator of employment, the jobs that it does create are characterized by comparatively decent working conditions and high productivity. Modern pharmaceutical firms use automated production facilities that employ only a few hundred people. If the entire value chain is considered, the total number employed may reach a few thousand. A successful pharmaceutical industry can play a significant role in national economies, as it allows governments to access foreign exchange through exports (Conway et al. 2019).

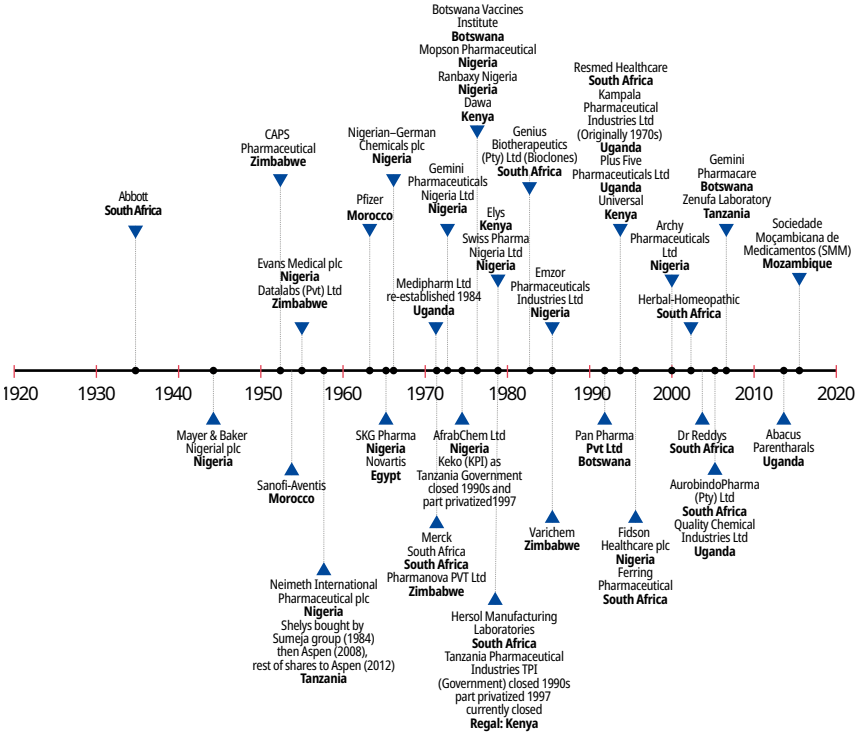
The present chapter traces the recent evolution of the pharmaceutical industry in sub-Saharan Africa, including Lesotho and Zimbabwe. Drawing on existing literature and also on primary data,[1] it offers an overview of conventional and traditional medicine in the region and explores future prospects for the industry.

[1] See Chapter 3 for a description of the methodology used for primary data collection.

A historical overview of pharmaceutical manufacturing in sub-Saharan Africa

The first pharmaceutical companies emerged in Africa in the mid-1930s, as can be seen in figure 2.1.

▶ **Figure 2.1. Establishment of major pharmaceutical manufacturers in Africa, selected countries**



Source: Russo and Banda (2015).

The manufacturing of medicines in South Africa, Nigeria and Kenya originally began with multinational European companies setting up subsidiaries in the parent countries' colonies. These enterprises eventually left Africa almost entirely in order to focus on the more profitable markets of developed countries. However, in recent years, they have returned to the continent, attracted by the anticipated market growth in the region (UNDP 2016).

Kenya, Nigeria, South Africa and Zimbabwe are historically the leading countries of the pharmaceutical industry in sub-Saharan Africa (Banda et al. 2016). A first significant expansion of the industry on the continent occurred in the 1960s and 1970s, when many countries gained independence. Import substitution industrialization (ISI) policies were adopted in most countries. In addition, the striving to overcome the colonial legacy of inequalities and discrimination translated into significant investments in public sector health provision with a view to ensuring access to healthcare for all those citizens who had hitherto been excluded.

The 1980s and early 1990s, on the other hand, witnessed almost no new entrepreneurial activity in the pharmaceutical sector. Those were the years following the oil crises which led to a dwindling of foreign exchange reserves, and the 1980s were additionally marked by severe drought in many of the region's countries. Furthermore, structural adjustment programmes in the 1980 and 1990s slowed down economic activities, not least in the pharmaceutical industry, and resulted in a period of deindustrialization on the continent. In the mid-1990s, a new positive phase started, in which investments were made mainly by local entrepreneurs, some of which had gained valuable experience in multinational companies (Banda et al. 2016).

Survey results reveal that, in 2005, 37 of the 46 sub-Saharan African countries had some pharmaceutical-manufacturing capability (Berger et al. 2010). Pharmaceutical production in the region focuses on generic medicines, which are copies of originator or innovator-branded drugs. Active pharmaceutical ingredients and excipients are imported from India and China, as is the necessary equipment. As already mentioned, only South Africa and Ghana are able to produce APIs that can be used in the region (Banda et al. 2016). Boxes 2.1–2.6 offer a brief description of the evolution of the pharmaceutical industry in selected sub-Saharan African countries where that industry has received special attention.

▶ Box 2.1. Ethiopia

The first pharmaceutical manufacturing company in Ethiopia was a joint venture established in 1964 between the Government and a British firm. After the end of the military regime in 1991, several new enterprises were set up in the sector, some of which failed, while others were successful. The favourable investment climate ushered in by the new Government led to the creation of joint ventures that facilitated effective skills and technology transfer.

A new period of expansion of the pharmaceutical industry began in 2005, when the industry association and other stakeholders urged the Government to adopt measures promoting local manufacturing. The Government duly introduced incentives and undertook a policy reform. As a result, new joint ventures were launched. In 2014, there were 15 pharmaceutical manufacturers in the country, three of which had good manufacturing practice (GMP) certification.[1] Despite the rapid expansion of the national industry, local production in 2014 still met less than 15 per cent of domestic needs.

Pharmaceutical manufacturing is a priority of the Country Strategic Plan (2020–25). Furthermore, the Government has adopted a national strategy for pharmaceutical manufacturing. Joint ventures are at the heart of the successful development of the pharmaceutical sector in Ethiopia. A major obstacle at present is the lack of API production in the country. Advanced skills and technology to close this gap are being introduced through strategic partnerships and joint ventures with foreign investors. The stable political and macroeconomic environment of the country is a key factor in its ability to attract capital from abroad. An industrial park for pharmaceutical manufacturers was recently established. Special incentives are granted, including incentives for foreign investors that are willing to produce APIs in the country.

[1] For more details about such certification, see Chapter 5.

Sources: Gebre-Mariam, Tahir and Gebre-Amanuel (2016); UNIDO (2018).

▶ Box 2.2. Ghana

One of the biggest pharmaceutical manufacturers in Ghana was established in 1969. In 2016, there were 38 pharmaceutical production firms in the country; about 20 of them focus on the manufacture of formulations. Local production can meet only 30 per cent of domestic market needs. Like other countries in the region, Ghana relies heavily on pharmaceutical imports. Besides South Africa, it is the only country on the continent that can produce APIs. However, only one company is involved in such production: LaGray. It manufactures a single API, namely erythromycin, which is used for "captive consumption" – that is, it is not sold or exported. LaGray has signed an agreement with a multinational company to manufacture one of its generic products at a lower cost.

Ghana is the first country to have embarked on the implementation of the African Union's Pharmaceutical Manufacturing Plan for Africa. To support local production, the Government in recent years introduced a restricted imports list, a 15 per cent value added tax on imported finished formulations, and an import duty of 10 per cent. It also granted a price preference of 15 per cent to local producers in public procurement. The most effective measure was a ban of imports of finished formulations of 14 drugs that could be locally produced.

Sources: Chaudhuri (2016); UNDP (2016).

▶ Box 2.3. Kenya

The first local manufacturer started production in 1948. In the 1950s and early 1960s, three multinational companies followed. Their headquarters were in the United States of America, the United Kingdom of Great Britain and Northern Ireland, and Australia, respectively.

After gaining independence in 1963, Kenya adopted an ISI policy that fostered domestic production during the 1970s and 1980s, when there was a lack of foreign currency for imports. The Government actively promoted investment and technology upgrading. It created the Industrial and Commercial Development Corporation to provide financial and technical support, and set up a few parastatal joint ventures. Following the introduction of liberalization and structural adjustment programmes in the mid-1980s and 1990s, exports were promoted, but with limited success. A "buy local" approach was adopted with more positive results, through local health section procurement.

In 2001, the Government allowed compulsory licensing of generic production of HIV/AIDS medicines. Since the early 2000s, import liberalization has increased competition, prompting the departure of some multinational producers from the country.

By 2020, 35 pharmaceutical manufacturers of medicines for human health were registered with the national regulatory body; almost all of them were locally owned. The industry produces generic drugs and imports APIs and excipients. Only a few key inputs are locally supplied. Poorly functioning machinery and the lack of specialized skills for product development are the main constraints faced by the Kenyan industry. Nonetheless, the country has the strongest pharmaceutical sector in East Africa. It exports pharmaceuticals to the Common Market for Eastern and Southern Africa. Kenya is the third-largest exporter of pharmaceuticals in the continent.

Affordable healthcare for all is one of the four priorities of the Government in its 2018–22 planning cycle. The Kenya National Pharmaceutical Policy seeks to make medicines accessible to all by improving local pharmaceutical production. At present, domestic manufacturers cover 30 per cent of local needs. Export promotion zones have been established to promote export-oriented investments, including investments in the pharmaceutical industry.

Sources: Banda, Wangwe and Mackintosh (2016); Simonetti, Clark and Wamae (2016); Vugigi (2020).

▶ Box 2.4. Nigeria

The first pharmaceutical company in Nigeria was founded in 1944 by a British multinational business. Despite a rather strong presence of multinational enterprises, the industry is now predominantly locally owned. The Government has tried to boost local production, but Nigeria still largely depends on pharmaceutical imports. The country utilizes only 40 per cent of its manufacturing capacity, and domestic manufacturers can meet only 25 per cent of national needs. With a population of over 200 million, local producers have a large domestic market to cover.

Active pharmaceutical ingredients are imported from India and China, as are 75 per cent of excipients. Primary and secondary packaging materials are locally produced and so are 25 per cent of excipients. Measures adopted by the Government to encourage local pharmaceutical manufacturers include the granting of a margin of preference to domestic producers in public bids, a ban on imports of essential medicines that can be locally produced in adequate amounts, and the structuring of tariffs for pharmaceuticals to discourage imports and stimulate domestic manufacture.

Among the obstacles to local pharmaceutical production are undercapitalization, limited access to adequate credit lines, high interest rates, high production costs due to expensive inputs from abroad, poor infrastructure, obsolete technology, unstable demand due to the low purchasing power of most people in the country, and the lack of GMP certification. Companies must install their own electricity generators and purified water sources. These utility costs account for 25 to 40 per cent of production expenditure. The lack of a properly trained labour force, the phenomenon of "brain drain", and insufficient government support for research are other challenges that the industry is faced with.

In 2014, GMP certification was granted to the first pharmaceutical firm in the country. However, very few of the existing pharmaceutical production facilities are currently GMP compliant. The industry is vibrant with over 115 registered manufacturers. Nigeria provides about 60 per cent of the pharmaceutical production of all countries in the Economic Community of West African States. The Nigerian pharmaceutical industry has a comparative advantage in treatments for neglected tropical diseases.

Sources: UNIDO (2011a); Buckholtz (2021); Pharmapproach (2020; 2021); Obialo (2020).

▶ Box 2.5. South Africa

Pharmacies that initially imported finished drugs from abroad and later ventured into basic manufacturing are at the root of the pharmaceutical industry in South Africa. For example, Aspen Pharmacare, the largest manufacturer in the country, originated from a pharmacy established in 1850. Multinational and foreign companies established a strong presence, particularly up to the mid-1950s. By the 1980s, there were about 45 manufacturing facilities in the country, including local ones.

The end of apartheid marked the beginning of a period of deindustrialization, during which pharmaceutical multinationals left South Africa and moved their production facilities elsewhere, while local facilities had to make do with obsolete equipment acquired in an era of sanctions and scarce resources. About 30 pharmaceutical-manufacturing companies closed down, causing the loss of around 6,500 jobs. By 2006, 41 per cent of medicines were imported, mainly from India.

Unlike all other sub-Saharan African countries, South Africa started the production of APIs as early as 1962, focusing on the manufacture of codeine phosphate, morphine sulfate and paracetamol. Locally produced APIs constituted only 13 per cent of all APIs in use in the country in the late 1970s. Moreover, fine chemicals needed to be imported even for products with domestic formulation, which made the national pharmaceutical industry highly dependent on imports. In 2011, APIs imported from abroad accounted for about 95 per cent of the total. The main impediment to the domestic production of APIs is the lack of economies of scale. However, about a decade ago, the Government set up a company (co-founded by foreign partners) focusing on the production of APIs for antiretrovirals to treat HIV/AIDS. Since then, the price of imported APIs has decreased.

The Government has adopted an import substitution policy, introducing several measures to bolster local pharmaceutical production. Since 2007, it has prioritized the pharmaceutical sector by providing support and incentives to the industry. Such programmes have had mixed results. Competition from India remains very strong. The domestic industry has also been fostered through public procurement, in which local manufacturers are

favoured. Even in this case, though, Indian competitors tend to prevail. The Government also introduced a legal provision for compulsory licensing for antiretrovirals to treat HIV/AIDS.

South Africa has the strongest pharmaceutical industry in sub-Saharan Africa. At present, 276 pharmaceutical-manufacturing companies have been licensed by the South African Health Products Regulatory Authority. Among them is Aspen, one of the world's top 20 producers of generic drugs. Many of these companies operate in high-technology facilities comparable to those of advanced economies. The national regulatory body was established only a few years ago, and it has quickly cleared the significant backlog of drug applications that had accumulated over time. Issues that remain unresolved include skills shortages and the development of new areas of medicines that have just started to be explored, such as medical cannabis and other traditional drugs.

Sources: Horner (2022); Hassen (2017); Parrish (2020); Naudé and Luiz (2013).

▶ Box 2.6. United Republic of Tanzania

The first pharmaceutical company was established by a local pharmacist in the early 1960s. Starting in those years and continuing during the following decade, the Government supported industrial development through public investment. An ISI policy secured pharmaceutical production for the local market. Two state-owned pharmaceutical companies were set up to produce essential medicines for the growing public health sector.

Expansion of the local market sparked the creation of a new private company in 1979, Shelys, which became the largest pharmaceutical firm in the country. When the Government ceased providing high levels of protection and launched a particularly radical economic liberalization process, this led to a period of deindustrialization and a crisis of the pharmaceutical industry in the 1980s. The situation was further worsened by the drastically reduced government budget for the public health sector. The two state-owned firms closed down in the 1990s. In the latter half of that decade, some local investors and managers sought to revitalize and expand the industry. Shelys bought a Kenyan company and the Shelys Africa Group became the largest pharmaceutical firm in East Africa.

In 2018, there were more than 12 registered pharmaceutical enterprises in the United Republic of Tanzania, producing both for the domestic market and for export. Key inputs must be imported, and even for packaging the quality of local supplies is sometimes not sufficient. In 2014, domestic production was able to meet only 12 per cent of national needs, compared with about 35 per cent in 2009, indicating that the performance of the pharmaceutical sector has worsened considerably in recent years.

Sources: Banda, Wangwe and Mackintosh (2016); Tibandebage et al. (2016); Wande et al. (2019).

Evolution of the pharmaceutical sector in Lesotho and Zimbabwe

With a population of slightly over 2 million, Lesotho is a very small country enclosed within the territory of South Africa. The large surrounding country has shaped the short history and evolution of Lesotho's pharmaceutical manufacturing industry. In 1977, fearing that, because of apartheid, South Africa might close its borders and stop the provision of pharmaceuticals to the country, the Government decided that Lesotho should manufacture its own drugs. As described in detail in Chapter 3, it established the Lesotho Pharmaceutical Corporation to that end. This publicly funded company was rather successful and exported its products to members of the Southern Africa Development Community (SADC) and to other countries, including Eritrea and Somalia. Economic sanctions against South Africa's apartheid regime resulted in limited competition and favourable market conditions for the Lesotho Pharmaceutical Corporation. The lack of a national medicines regulatory agency in Lesotho made pharmaceutical production easy and quick. Drugs produced by the Corporation, such as anti-tuberculosis medicines, were highly appreciated and used, including by South African patients.

The situation changed completely in the early 1990s, when South Africa became a democracy and economic sanctions were lifted. Competition increased and the South African regulatory body mandated GMP certification for medicines that were to be prescribed to South African citizens. The Lesotho Pharmaceutical Corporation did not have GMP certification. After a few attempts to find solutions to its financial problems, it was closed down in 2007 (Mothibe, unpublished).

Until the recent launch of medical cannabis production, there were only wholesale and retail pharmaceutical enterprises in Lesotho (see Chapter 3). The new manufacturing activity in the country is the most advanced of its kind in Africa. The first company to embark on medical cannabis manufacturing, MG Health, obtained GMP certification in March 2021. As already mentioned, thanks to this firm, Lesotho has become the first African producer of APIs for medical cannabis. Sadly, despite the lack of APIs in the continent, these ones are only for export to Europe and North America (see Chapters 8 and 10).

In 2018, Lesotho adopted a second National Strategic Development Plan covering the years 2019–23, which is based on an export-led growth model. Medical cannabis production is part of the strategy to diversify manufactured exports. The Plan mentions the promotion of investment in targeted industries, including niche targeted products (Government of Lesotho 2018), and that may well apply to medical cannabis.

As noted in the preceding section, Zimbabwe has historically been one of the leaders of the pharmaceutical industry in Africa. In the early 1990s, its manufacturing sector was one of the most diversified and vibrant in the region, and the production of pharmaceuticals was well integrated and supported by other manufacturing activities.

Import substitution started just after the Second World War, when there was a sudden shortage of manufactures from the United Kingdom and South Africa. Industrial diversification and local manufacturing were successfully encouraged. Later on, imports from overseas resumed and competition increased. The rising volume of imported drugs resulted in overproduction of locally manufactured medicinals. Hence, the Zimbabwean industry started to export to regional markets to avoid waste of medicines. Vigorous ISI policies were implemented from the mid-1960s onwards (Banda, Wangwe and Mackintosh 2016). Even at present, such policies continue to be followed (AfDB 2019).

After Zimbabwe gained independence in 1980, access to healthcare for all was pursued to redress the inequalities and racial discrimination of the recent past. The domestic market for medicines was to be covered by local pharmaceutical production. Varichem Pharmaceuticals was founded in 1985 by local entrepreneurs for that purpose.

The case of Zimbabwe shows that an African country can manufacture medicines for its national health system and that health and industrial policies can be aligned. The Government adopted industrial policy measures to tackle problems stemming from the 15 years of political unrest before independence. Pharmaceutical machinery was obsolete and could not be replaced because of the difficulty in accessing foreign exchange. The Government set up an export revolving fund and an export retention scheme to ease the situation. In the mid-1990s, an open general import licence was introduced along the same lines (Banda, Wangwe and Mackintosh 2016).

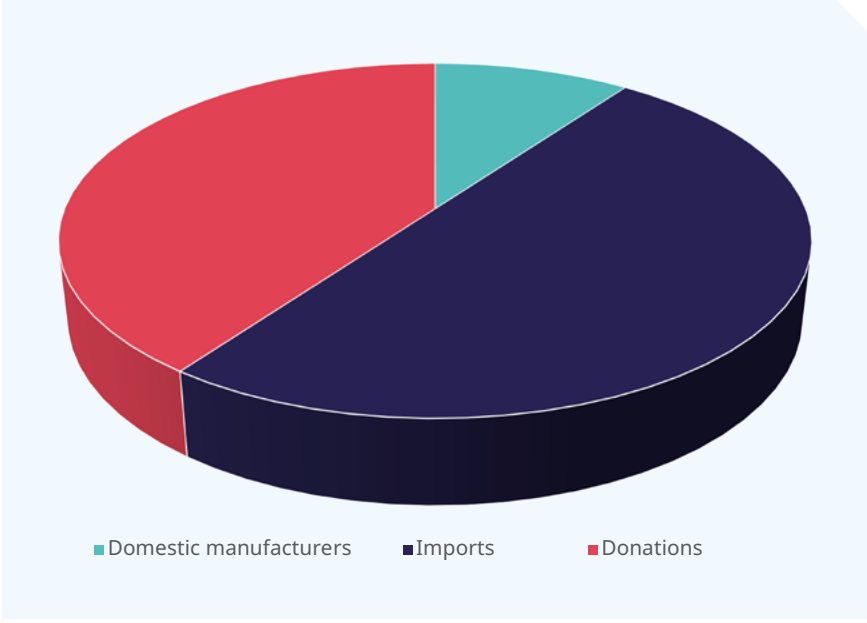
Unfortunately, the financial situation of the country did not improve. In 1991, Zimbabwe, like other countries in the region, started a structural adjustment programme under the guidance of the International Monetary Fund. The result was deindustrialization and the collapse of the healthcare system. However, the pharmaceutical sector continued to be robust and vibrant, as reflected in the creation of Plus Five Pharmaceuticals in 1996 with venture capital funding.

During the decade from 1997 to 2008, Zimbabwe experienced a period of deep crisis marked by deindustrialization and hyperinflation. Skills and technological capabilities also declined, and "brain drain" became widespread. The country became dependent on donors to finance both public healthcare and drug procurement. The national pharmaceutical industry lost public

health procurement as a support measure. In addition, donor funding was allocated through external procurement because the national drug procurement agency was not functioning owing to a lack of finance (Banda, Wangwe and Mackintosh 2016).

The period after 2009 saw some improvements, as reflected in increasing exports to the East Africa region, and to Namibia, Angola and South Africa (Banda, Wangwe and Mackintosh 2016). However, there continue to be major obstacles preventing the industry from performing well, including a lack of credit lines, competition from imported medicines, drug donations, reduced government spending on drugs, lengthy registration processes (often lasting up to 24 months) and power outages (Zimbabwe, Ministry of Finance and Economic Development 2013). At present, as figure 2.2 shows, domestic manufacturers produce only 10 per cent of the pharmaceuticals that are needed in the country; 50 per cent come from imports; and donations account for the remaining 40 per cent. There is clearly underutilized capacity and it is estimated that local producers could cover up to 60 per cent of the national market share (Republic of Zimbabwe 2020).

▶ Figure 2.2. Origin of pharmaceuticals needed in Zimbabwe in 2020 (percentage)



Source: Republic of Zimbabwe (2020).

Of the 313 essential medicines contained in the Zimbabwean Essential Medicines List of 2015, only 93 were locally produced (UNIDO 2017). The Reserve Bank of Zimbabwe notes that joint ventures and/or strategic partnerships with foreign investors are viable options for reviving the pharmaceutical sector in the country (RBZ 2016). Some partnerships have been reported recently – for example, that between the Ministry of Health and Child Welfare with Novartis to ensure that drugs for non-communicable diseases, such as hypertension and diabetes, become available in Zimbabwe at a lower cost (ZBC 2020).

Zimbabwe's National Development Strategy 2021–25 supports pharmaceuticals by stressing the need for "resuscitation" of existing value chains (Republic of Zimbabwe 2020, 33). There is also a Zimbabwe National Industrial Development Policy 2019–23, which is still in force; it calls for investment and innovation-led industrialization, with a focus on export-oriented growth. A value-chain approach is taken and pharmaceuticals are mentioned in that regard (Zimbabwe, Ministry of Industry and Commerce 2019). The introduction of medical cannabis manufacturing is part of the export-oriented growth strategy announced in that policy document. In June 2021, a Pharmaceutical Manufacturing Strategy 2021–25 was adopted, signalling the Government's determination to promote the sector (Zimbabwe, Ministry of Industry and Commerce 2021).

The following sections describe the types of drugs that are produced in Africa and, in particular, in Lesotho and Zimbabwe. The difference between conventional medicines and traditional drugs is highlighted, with special emphasis on the situation in those two countries.

Conventional medicines

In Africa, pharmaceutical manufacturing focuses on generic medicines, which are copies of originator or innovator-branded drugs. These pharmaceuticals have the same dosage form, delivery route, therapeutic effect, and side effects and risks as the originator medicines. Active pharmaceutical ingredients and excipients are imported, mainly from India and China. It is believed that there is scope for African countries to manufacture APIs and excipients, especially those for moderately priced medicines, because Indian generics manufacturers, which would be the main competitors, are increasingly prioritizing more lucrative drugs that are more expensive and in greater demand in the markets of advanced economies (Fortunak et al. 2016).

Pharmaceutical manufacturing consists of three phases (Pharmapproach 2021):

- Primary production including APIs and excipients: it may involve chemical or biological processes. An API is the part of a medicine that produces

the intended effect thereof. Some drugs have multiple pharmaceutical ingredients to treat different symptoms at the same time. The production of APIs is the most expensive phase of pharmaceutical manufacturing because it requires high levels of investment in capital equipment, process development and quality control. An excipient is a substance other than the medicine which delivers the drug to the human system. It is an inactive chemical substance.

- Secondary production: based on primary production, this phase consists of the large-scale processing of the finished dosage form from raw materials or intermediate products. Examples are tablets and injections. The sources used may be local or imported. A distinction is made between sterile and non-sterile preparations, the latter (including oral solids, such as tablets, and liquids, such as eye drops) being less sophisticated than the former (including antibiotics, injections and intravenous fluids). Inputs for packaging can be locally supplied or imported. This production phase requires modern, high-precision equipment.

- Tertiary production: this phase includes the packaging and labelling of finished products from primary and secondary production. Packaging forms range from bulk packs to bottles, smaller packets and so on. The quality secured in the primary and secondary phases must be maintained.

African pharmaceutical manufacturers produce creams, suspensions, syrups, sprays, injectables and ophthalmic preparations such as eye drops. Medicines include analgesics, anti-infectives (such as the penicillin family of antibiotics), anthelmintics and antivirals, including antiretrovirals for HIV/AIDS (Banda, Wangwe and Mackintosh 2016).

A common phenomenon in sub-Saharan Africa is the widespread circulation of counterfeit medicines. For instance, Nigeria has large illicit markets for fake and substandard products (UNIDO 2011a).

In the case of Zimbabwe, two major causes of the informal drugs market have been identified: the inefficient distribution of medicines, on the one hand, and the inequitable health insurance coverage forcing consumers to choose cheaper products, on the other (Gwatidzo, Murambinda and Makoni 2017). Mutambara (2017) reports that, in Zimbabwe, Sildenafil, Betasol and Appetito as well as antibiotics (amoxycillin, diclofenac and ibuprofen) are informally sold in the street. According to his survey results, in 49 per cent of cases, illegal medicines enter the Zimbabwean market through cross-border traders, and in 38 per cent through foreign merchants. Porous borders and inefficient border control systems seem to be the main cause of the large informal market for drugs in the country. In general, low-quality medicines tend to proliferate in

poor countries (Yadav, Smith and Hanson 2012). This means that consumers receive both counterfeit and substandard drugs.

In Lesotho, pharmaceuticals are often sold by ordinary people in the street without any prescription whatsoever. Moreover, many traditional medicines are produced and sold in the country without being regulated, as revealed by interviews with experts conducted in 2021.

Alternative medicines

This category of drugs includes phytomedicines or herbal medicines, based on herbs, plants, purified natural products, and extracts. Such medicines depend on the handing down of traditional knowledge. Over 80 per cent of people in poor countries make use of traditional drugs (Fortunak et al. 2016).

In Zimbabwe, for instance, at least 80 per cent of the population rely on traditional medicines as substitutes for more expensive conventional drugs that they cannot afford (Nkatazo 2010). The Complementary Medicines Regulations adopted in 2015 give traditional drugs an official status in the Zimbabwean medical framework. Alternative medicines include herbal, homeopathic, nutraceutical and anthroposophic medicinal products that are used as complements to conventional drugs (MCAZ 2017). A good deal of the knowledge enabling the creation of conventional pharmaceuticals originates from indigenous traditional wisdom. Examples of such products are aspirin, opium and quinine (Maroyi 2013). Other examples can be identified elsewhere in the world, such as the understanding in Chinese traditional medicine that the herb artemisinin could treat malaria and the subsequent use of this discovery in conventional drugs (Talwar, Thaker and Wilson 2016).

In general, rules for the approval of phytomedicines are less strict than for conventional drugs. The efficacy of alternative products is also less certain. The World Health Organization has adopted guidelines on quality assessment, pharmacovigilance and GMP for herbal medicines. It is possible to prove that traditional drugs are effective through clinical trials. The production of these medicines can be standardized and rolled out on a larger scale than is currently the case. The production of phytomedicines is cheaper than that of conventional pharmaceuticals. By promoting traditional medicines, poor sub-Saharan African countries can focus on the discovery of drugs to treat their endemic tropical illnesses, in which foreign multinational companies invest very little (Fortunak et al. 2016).

The Nigerian pharmaceutical industry is said to have a comparative advantage in the provision of treatments for tropical diseases. A phytomedicine, Niprisan, which cures sickle-cell anaemia, was developed from four plant species that are endemic to Nigeria. Niprisan was licensed to a US company, which

subsequently gave the medicine the generic name of Nicosan. This drug is produced in Nigeria entirely from indigenous APIs (UNIDO 2011a).

Medical cannabis has a long history in African traditional medicine (see Chapter 8). At the University of Zimbabwe's Department of Pharmacy and Pharmaceutical Sciences, research is being conducted on indigenous species of seeds that can be used for pharmaceutical purposes (*Zimbabwe Mail* 2020).

Interviews conducted in 2021 with informal cannabis growers in Lesotho reveal that the plant is illegally sold there, being used to reduce high blood pressure and to make children sleep. In the second case, the plant is boiled and given to the child in a teaspoon or tablespoon amount.

Concluding remarks

A whole chapter of this book is devoted to industrial policies (Chapter 4). However, it is worth highlighting here the importance of ISI policies in laying solid foundations for the pharmaceutical sector in some African countries. The cases of Kenya and Zimbabwe, in particular, show that protecting the local industry to ensure that national needs can be met has proved not only necessary in some historical periods of international isolation, but also crucial in terms of establishing the basis for further development under favourable macroeconomic conditions. Import substitution policies are not the only effective route towards the development of a national industry, but, in some cases and in certain periods, they are a promising option.

It should be noted that access to pharmaceuticals is key to saving human lives and that the pharmaceutical industry, therefore, warrants special attention on the part of policymakers. Practically all the countries considered in boxes 2.1–2.6 have introduced import substitution measures to foster their domestic pharmaceutical industry. In addition, especially in recent years and even more so with the COVID-19 pandemic, a number of sub-Saharan African countries have adopted or are about to adopt national strategies for the development of the pharmaceutical sector.

Supporting the pharmaceutical industry is particularly important for the development of poor countries, because that sector greatly depends on knowledge and research capacity. Decades ago, Robert Solow (1957) understood that improvements in living standards were driven by advances in knowledge. Greenwald and Stiglitz (2013) conclude that, in order to close the knowledge gap between rich and poor countries, development strategies should focus on learning. Specializing in sophisticated products such as pharmaceuticals is challenging, but can be extremely rewarding for national development if it is carried out successfully.

The pharmaceutical industry does not create many jobs, but the few that it does generate are distinguished by high productivity and comparatively decent working conditions. In addition, the pharmaceutical sector is high value added, which is extremely beneficial to a country's economy and can help to improve its development status.

What appears evident is that sub-Saharan Africa needs to reduce its pharmaceutical imports, particularly of APIs that are very expensive. At present, only South Africa and Ghana can produce some APIs and, what is more, only in very small volumes. As the case of medical cannabis in Lesotho shows, high levels of investment that in general only multinational enterprises can afford are necessary for pharmaceutical primary production. It is to be hoped that the growing drug market in Africa and the strong corporate social responsibility engagement shown by some multinational companies will contribute to the development of API manufacturing in the region.

The comparative advantage of several sub-Saharan African countries in traditional medicine should be leveraged, in particular to treat neglected tropical diseases that are endemic in the region. However, this area of medicine should not be regarded as a substitute for conventional medicine, which has higher efficacy levels and where procedures undergo stricter tests to ensure safety and to meet quality standards.

Traditional medicine can foster the creation of jobs – in particular, by formalizing activities that are normally illicit. A still rather ambiguous case is that of medical cannabis, which has the potential to employ many small growers but currently does not seem to follow a development model that would benefit indigenous people. As a cannabis grower from Lesotho perceptively argued:

> Truly, we understand that those people came to our country with the idea that here in Lesotho they could do whatever they liked and could freely take over the economy. The children of our country are left with nothing because, after planting the cannabis, they take it back to their countries. Still, the cannabis does come back to Lesotho, but with a different character, as in the form of medicines, though this is something we could make in the country ourselves. We could use indigenous products instead of the ones coming from outside.[2]

[2] See the introduction to Chapter 5 for details of the source of this quotation.

3 Jobs and enterprises

Introduction

The pharmaceutical industry in Africa has been growing rapidly over recent decades, its volume rising from US$4.7 billion in 2003 to US$20.8 billion in 2013 (Holt, Lahrichi and Santos da Silva 2015). It was projected that by 2020 it would reach an annual market worth of between US$40 billion and US$65 billion (UNIDO 2019). This forecast will almost certainly have been proved wrong by the economic effects of the COVID-19 pandemic.

To fully unlock the potential of this sector in the continent, it is important to know where growth is currently concentrated and what is inhibiting further growth. Africa is composed of 54 countries, each with a distinctive regulatory framework, macroeconomic outlook and political situation, but only in a small number of them can growth be observed. Foreign direct investment through joint ventures, partnerships, acquisitions and private-equity arrangements have largely driven the industry's expansion in those few countries (Holt, Lahrichi and Santos da Silva 2015). Clearly, the pharmaceutical sector is most likely to thrive in countries that can attract foreign investment.

In sub-Saharan Africa, access to pharmaceuticals remains a problem, as most of the essential medicines needed there have to be imported (UNIDO 2019; WHO 2011). UNIDO (2019) estimates that the local production of sub-Saharan African countries meets between 10 and 30 per cent of total requirements. Among the countries with a more substantial pharmaceutical sector are Ghana, Kenya, Nigeria and South Africa. Most of these countries were engaging in pharmaceutical production as far back as the 1930s. Some benefited from investment by multinational companies, notably South Africa, Nigeria, Kenya, Zimbabwe, the United Republic of Tanzania, Botswana, Uganda, Ethiopia and Ghana (Banda, Wangwe and Mackintosh 2016).

The development of local drug manufacturing in sub-Saharan Africa can lead to economic diversification, gross domestic product (GDP) growth, positive impacts on the balance of trade, and job creation. On the other hand, Conway et al. (2019) predict that the pharmaceutical industry is likely to remain a small sector of the economy in the region, contributing to negligible GDP

growth. The generation of jobs would be minimal, as modern pharmaceutical enterprises employ only a few hundred workers each. However, if the supply chain is also taken into account, up to a few thousand jobs could be created.

The pharmaceutical sector in Africa employed 250,000 people in 2014, compared with 199,000 in 2006 (IFPMA 2017). Jobs in the sector tend to be highly productive, formal and decent, generally requiring workers with high skill levels (ILO 2018a).

The present chapter provides an overview of jobs created in the pharmaceutical sector and of the enterprises operating in the domestic pharmaceutical markets in Lesotho and Zimbabwe. Understanding national markets in depth makes it possible to identify future opportunities for development. As secondary data on employment in the industry are almost non-existent, some primary data were collected through interviews and surveys.

Professors and students from the National University of Lesotho surveyed pharmaceutical companies in their country. A questionnaire was developed on the basis of a literature review and advice provided by academics and ILO experts. As table 3.4 shows, in Lesotho there seems to be a total of 46 pharmaceutical firms, including 6 or 8 wholesalers and 38 or 40 retailers, depending on the source. A non-probability judgemental sampling approach was adopted for the survey. The ten districts of Lesotho were divided into four geographical areas. The three mountainous districts were represented by one retail enterprise, the northern region by one retail and one wholesale company. The southern region was meant to have been represented by one retail and two wholesale firms, but one wholesaler did not respond. The capital city, Maseru, accounts for a larger share of the total number of pharmaceutical companies; the plan had been to survey four retail companies and one wholesaler there, but one retailer failed to respond. All in all, six retail enterprises and three wholesalers were surveyed across the country. Only 5 managers completed the questionnaire, whereas a total of 25 employees could be surveyed. Details of the responses are provided in various chapters of this book.

The COVID-19 restrictions made it impossible to conduct face-to-face surveys and site visits, particularly in Zimbabwe. Employees in that country could not be reached, despite several attempts. Given that the strength of the Zimbabwean pharmaceutical sector lies in manufacturing, companies involved in drug production were the main target group of the study. Unfortunately, access to these firms was also hindered by the rigid anti-contamination rules in place to safeguard production processes. Hence, only online and telephone interviews with key informants and managers

were conducted.[3] Secondary data were used to complement the information gathered through surveying.

Employment situation

In both countries, there are no recent and precise statistics on employment in the national pharmaceutical industry. However, the data that are available confirm that jobs in this sector are scarce.

The unemployment rate in Zimbabwe is low, standing at 5.7 per cent of the total labour force in 2020. However, the informal economy is predominant in the country, and most jobs offer poor salaries and working conditions. In Lesotho, unemployment is much higher, reaching 24.6 per cent in the same year.[4] Jobs in the pharmaceutical sector do not contribute much to reducing overall unemployment, but they certainly support national economic growth and development by providing decent and productive work.

Table 3.1 presents information on pharmaceutical personnel in Zimbabwe about ten years ago.

▶ Table 3.1. Pharmaceutical human resources in Zimbabwe (2011)

Human resources	Number
Licensed pharmacists (all sectors)	567
Pharmacists in the public sector	71
Pharmaceutical technicians and assistants (all sectors)	295
Physicians	2 086
Nursing and midwifery personnel (all sectors)	9 357

Source: Zimbabwe, Ministry of Health and Child Welfare and WHO (2011).

The pharmaceutical sector has strong industrial, wholesale and retail forward linkages with the economy through its numerous value-addition activities. Jobs are created through several value chains, including insurance, sugar manufacturing, packaging, and research conducted at universities and colleges. The Medicines Control Authority of Zimbabwe (MCAZ 2018) estimates that one job in the pharmaceutical sector results in the creation of seven other jobs in supporting industries, such as transport, information and communications technology, and insurance.

[3] Details on interviewees for both countries are provided in the introduction to Chapter 5.
[4] The unemployment rates for both countries are taken from the ILOSTAT database, https://ilostat.ilo.org/data/.

Table 3.2 shows the number of pharmacists and medical doctors in both the public and private sectors in Zimbabwe from 2011 to 2018. The number of medical doctors increased considerably from 1,054 to 1,364, whereas that of pharmacists declined over the same period, from 467 to 338. During those years, the industry faced several operational challenges, including limited lines of credit, power outages, drug donations, competition from imported drugs, and reduced government spending on medicines. The past decade has also seen major manufacturing firms being forced to shut down or downsize their scale of production in response to unfavourable economic conditions. CAPS Pharmaceuticals closed its operations in 2013, which contributed to the loss of jobs in the sector, although the company resumed activities later on.

▶ **Table 3.2. Pharmacists and doctors in Zimbabwe (2011–18)**

Year	Pharmacists	Medical doctors
2011	467	1 054
2012	378	1 059
2013	394	1 114
2014	392	1 176
2015	414	1 230
2016	401	1 321
2017	361	1 324
2018	338	1 364

Source: ZIMSTAT (2018).

The value added for the Zimbabwean pharmaceutical sector in 2014 was US$18.99 million, while the total wages and salaries in the same year amounted to US$5.75 million (IFPMA 2017).

Digitalization, which is sweeping across the pharmaceutical sector worldwide, could create both opportunities and challenges for the local industry. Automation can reduce risks for companies and workers by enabling remote control in the execution of the most hazardous tasks, which not only improves workers' safety but also mitigates environmental impacts (ILO 2018a). Employment could, however, be threatened by complete automation, as many human functions are no longer required, particularly those performed by middle- to lower-skilled workers.

Where labour is cheap, automation is likely to occur much later than where wages are higher. In Zimbabwe, where labour is relatively inexpensive, the process of complete automation is expected to be gradual.

New technology should induce firms to invest consistently in building a skilled workforce for the future. This could involve developing new talent, reskilling existing employees through training programmes, and redesigning work to minimize skills shortages.

In Lesotho, some available data on employment come from the 2003 census on human resources in the health sector (Mwase et al. 2010). They are presented in table 3.3.

▶ Table 3.3. Selected categories of health workers in Lesotho (2003)

Category	Total number	Density per 1,000 population
Physicians	89	0.049
Nurses and midwives	1 123	0.623
Dentists and technicians	16	0.009
Pharmacists and technicians	62	0.034
Environmental and public health workers	55	0.031
Laboratory technicians	146	0.081

Source: Mwase et al. (2010).

The Lesotho Ministry of Health and Social Welfare and WHO (2011) report that, in 2011, there were 93 licensed pharmacists, which corresponds to a density of 0.49 per 10,000 inhabitants. Of these, 30 were employed in the public sector. Table 3.3 shows that, in 2003, there were 62 pharmacists and technicians, indicating that the number of pharmacists rose considerably from 2003 to 2011. Furthermore, in this later year there were 59 pharmaceutical technicians and assistants engaged in the public and private sectors.

A survey conducted in 2012 covering 89 countries and territories reveals that in Africa there are fewer pharmacists and pharmacy technicians per country population than in other regions of the world (Bates et al. 2016). There is remarkable variation between countries, the density ranging from 0.02 per 10,000 in Somalia to 25.07 per 10,000 in Malta. The same study found that in Africa fewer than 5 per cent of pharmacists work in the pharmaceutical industry. Hospitals, community pharmacies, academia and research, and regulatory institutions are more popular employment options.

Overview of the sector

As of December 2019, Zimbabwe had a total of 57 wholesale pharmaceutical companies and 559 retailers (Medpages n.d.). A different source reveals that, in 2017, there were 670 registered pharmacies in the country (MCAZ 2017). In addition, some manufacturers have their own retail shops. For example, Plus Five Pharmaceuticals is registered as a wholesale distributor as well.

According to the current Register of Licensed Pharmaceutical Manufacturing Premises, there are nine manufacturing enterprises that are registered and strictly guided and monitored by the MCAZ. One of them makes veterinary products. The country's pharmaceutical industry currently includes secondary production (processing of finished dosage forms such as tablets, capsules or injections from raw materials or intermediate products) and tertiary production (packaging and labelling of finished products from primary and secondary sources).[5] This means that the eight firms focusing on human medicines specialize in the manufacture of medicines and in commercial services that support the production and distribution process (such as transportation, advertising and warehousing). Only four of the eight companies are large generic manufacturers. The other four are small, engage in trading and have a narrow product range. Ninety per cent of the pharmaceutical industry in the country may be attributed to the four main manufacturers.

Some of the manufacturers produce cosmetics as well, and there are also companies focusing on cosmetics only. Given that the definitions of a cosmetic and of a drug depend on their different intended uses, if a product has a dual purpose, it can be included in the category of medicinals (United States, FDA 2021).

The pharmaceutical industry in Zimbabwe comprises both private and public players. The Government assists with the procurement and distribution of medicines through the National Pharmaceutical Company, which is subordinated to the Ministry of Health and Child Welfare. Various firms, including Varichem Pharmaceuticals and Plus Five Pharmaceuticals, are privately owned. They manufacture and distribute products to private wholesalers and retail pharmacies. There is only one foreign-owned manufacturing company and it is a small one that does not contribute much to the pharmaceutical industry in the country.

[5] For a definition of primary, secondary and tertiary production in the pharmaceutical context, see Chapter 2.

Lesotho has no local production of pharmaceuticals. To meet demand among the population, the services of distributors and retail companies are indispensable. According to Krämer et al. (2014), the distribution and supply of drugs throughout Lesotho remains a challenge because of the remoteness of some parts of the country, which can be reached only at high cost.

An attempt to launch manufacturing activity in the country is worth mentioning here. In 1997, the Lesotho Pharmaceutical Corporation started operations. It successfully reached the markets of SADC member countries, but it never met the GMP standard and closed down in 2007 after facing a number of difficulties (Mothibe, unpublished). A survey conducted in 2011 revealed that there were still no pharmaceutical manufacturers in the country, merely enterprises engaged in the distribution and dispensing of pharmaceutical products (Mothibe, unpublished).

After the closure of the Lesotho Pharmaceutical Corporation, a few companies ventured into cosmetics manufacturing, filling the gap left by the termination of the former's cosmetics line. For instance, Tripharm, a still existing pharmaceutical wholesaler, started making cosmetics. In addition, small-scale unlicensed cosmetics manufacturers can be found throughout the country (Mothibe, unpublished).

Both Lesotho and Zimbabwe have embarked on the manufacturing of medical cannabis. A chapter in this book is devoted to this particular area of production (Chapter 8), as it seems that in both countries it is not integrated with the conventional pharmaceutical industry.

Companies' characteristics

Table 3.4 provides an overview of the number and geographical distribution of retail and wholesale enterprises in Lesotho issued with a licence by the Ministry of Health. The Lesotho Bureau of Statistics gives different figures, which suggest a much higher number of pharmaceutical companies in the country (91 in 2012 and 113 in 2016). However, the database containing those figures was last updated in 2016, and the information provided by the Ministry of Health should be regarded as more reliable.

Further investigation through the website of the Ministry of Trade and Industry of Lesotho revealed some details of companies' shareholder arrangements. The addresses of all investors are local and no conclusion on their nationality can be reached from their names alone. Although some are not typical Basotho names, that does not necessarily mean that those shareholders are foreign nationals.

▶ Table 3.4. Licensed pharmaceutical retail and wholesale enterprises in Lesotho and their geographical distribution

Region	District		Number[1]	Number[2]	Comments
1. Mountains	Qacha's Nek	Wholesalers	–	1	
		Retailers	–		
	Mokhotlong	Wholesalers	–	2	
		Retailers	–		
	Thaba-Tseka	Wholesalers	–	–	
		Retailers	1		
2. Southern	Quthing	Wholesalers	–	–	
		Retailers	1		
	Mohale's Hoek	Wholesalers	–	3	
		Retailers	–		
	Mafeteng	Wholesalers	1	5	Does not appear in the list from the Ministry of Health
		Retailers	2		
3. Northern	Berea	Wholesalers	–	3	
		Retailers	1		
	Leribe	Wholesalers	3	4	
		Retailers	2		
	Butha-Buthe	Wholesalers	–	1	
		Retailers	2		
4. Central	Maseru	Wholesalers	2	27	
		Retailers	31		
Total			**46**	**46**	

Note: – = nil.

[1] **Source**: Unpublished data shared with the authors by the Ministry of Health of Lesotho, 2021.

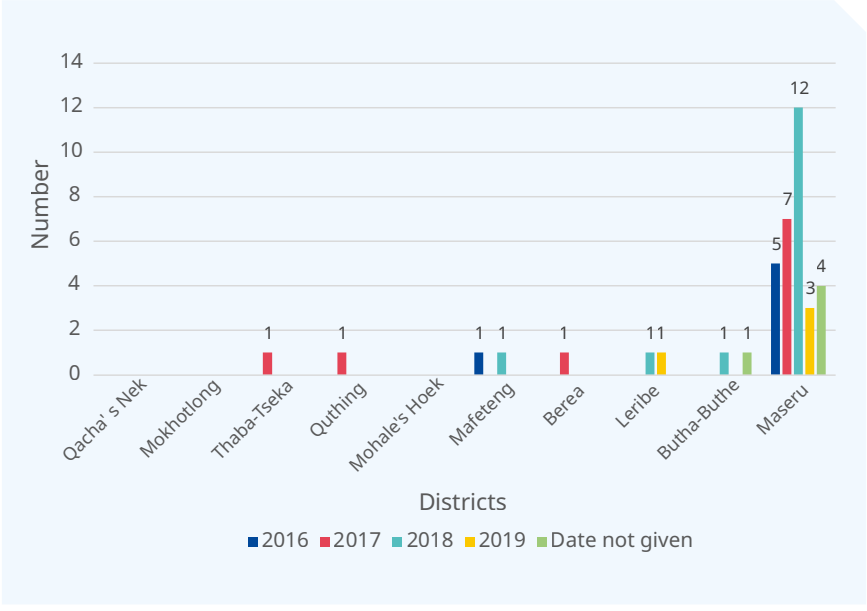
[2] **Source**: Mwase et al. (2010). The number of pharmaceutical companies remains 46, although the figures are different for each district and, where such companies are recorded, they are not categorized into retail or wholesale.

According to the Small Business Project (SBP 2008), enterprises with fewer than 3 employees are classified as micro, those with between 3 and 9 employees are small, while medium-sized firms have between 10 and 49 employees. Companies with 50 employees or more are classified as large. If we apply these criteria to

pharmaceutical enterprises in Lesotho, all businesses except two fall into the micro or small category; the two exceptions, Tripharm and the National Drug Service Organization, are in the medium and large categories, respectively.

Currently employing 14 people, Tripharm started operations in 1997 as a drug wholesaler, distributing prescription drugs and over-the-counter medicines. In 1999, it diversified its activities and branched out into the manufacture of a range of cosmetics. It is worth noting that, in the survey used to collect the data reported in table 3.4, the company described itself as a wholesaler, disregarding the cosmetics-manufacturing part of its business. Tripharm opened two retail pharmacies in 2005 and 2010, which have further facilitated the distribution of drugs in the country. The company is also a supplier for several supermarkets.

▶ Figure 3.1. Licensed retail pharmacies in Lesotho, by district and year of establishment



Source: Unpublished data shared with the authors by the Ministry of Health of Lesotho, 2021.

The National Drug Service Organization (formerly the Lesotho Pharmaceutical Corporation) is a state-owned wholesale company tasked with procuring and distributing medicines and medical consumables for the Government and health institutions in Lesotho. It currently employs 155 staff. As a state-owned enterprise, it receives financial support from the Government.

Several pharmaceutical retail companies were already registered by 2016, but many did not start operations until 2018 (figure 3.1). In order to obtain more precise information on pharmaceutical companies in Lesotho, a survey was organized (see the introduction to this chapter). As can be seen from table 3.5, the sample comprised six licensed retailers and three licensed wholesalers. There was one state-owned pharmaceutical enterprise; the ownership of the others was a mixture of joint ventures and sole traders. Unfortunately, it was not possible to obtain information on the nationality of investors.

▶ Table 3.5. Some characteristics of pharmaceutical retail and wholesale enterprises in Lesotho

	Number of firms	Total staff	Category of staff	Type of ownership
Licensed retailers	6			
1. Mountain region	1	3	1 manager, 2 employees	Joint venture
2. Northern region	1	4	1 manager, 3 employees	Sole trader
3. Southern region	1	3	1 manager, 2 employees	Joint venture
4. Maseru	3	2 to 4	1 manager, 2 employees	1 sole trader, 1 joint venture; information not available for the third
Licensed wholesalers	3	n/a		
1. Mountain region	–	–		
2. Northern region	1	2	1 owner, 1 employee	Sole proprietor
3. Southern region	1	155	1 chief executive officer, 7 heads of department, 147 employees	State owned
4. Maseru	1	n/a		Joint venture

Note: – = nil; n/a = data not available.

Source: Survey conducted under ILO research project, 2021.

According to the Register of Licensed Pharmaceutical Manufacturing Premises, the Zimbabwean pharmaceutical industry consists of a total of eight manufacturers producing human medicines. These companies are the focus of this chapter. As table 3.6 shows, five of them (CAPS Pharmaceuticals, Graniteside Chemicals, the Gulf Drug Company, Pharmanova and Varichem) are located in or around Harare, whereas the remaining three (Datlabs, Plus Five Pharmaceuticals and ZimPharm) are based in Bulawayo (UNIDO 2017; Mutambara 2017). Of these eight companies, four are major generic manufacturers that dominate the sector, namely Varichem, CAPS Pharmaceuticals, Plus Five Pharmaceuticals and Datlabs. The rest concentrate mainly on trading and have narrow product portfolios (UNIDO 2011b). All eight are classified as small to medium-sized enterprises, in that each one has a sales volume of less than US$15 million a year (Zimbabwe, Ministry of Industry and Commerce 2021).

▶ Table 3.6. Some characteristics of pharmaceutical manufacturers in Zimbabwe

Company	Number of employees	Location
CAPS Pharmaceuticals	100	Southerton, Harare
Datlabs	159	Belmont, Bulawayo
Graniteside Chemicals	50	Graniteside
Gulf Drug Company	50	New Ardbennie, Harare
Pharmanova	50	Southerton, Harare
Plus Five Pharmaceuticals	116	Kelvin West, Bulawayo
Varichem Pharmaceuticals	100+	Willowvale, Harare
Zimpharm	75	Belmont, Bulawayo

Sources: UNIDO (2017); Mutambara (2017).

Table 3.7 provides further details of the principal Zimbabwean pharmaceutical companies, including one involved in national public procurement of medicinal products. Unlike in Lesotho, for Zimbabwe the manufacturing of personal care products and cosmetics falls under the overall category of "pharmaceuticals", at least for the purposes of the following overview.

▶ Table 3.7. Profile of pharmaceutical companies in Zimbabwe

Company	Activity
Varichem Pharmaceuticals	Established in 1985, it serves both domestic and export markets. Malawi, Botswana, South Africa, Namibia, Lesotho and Eswatini are export destinations for its products. It is the largest wholly Zimbabwean-owned pharmaceutical company in the country.
CAPS Pharmaceuticals	Founded in 1952, it is a Zimbabwean-owned public company listed on the Zimbabwe Stock Exchange. It serves both domestic and export markets. At one point it accounted for 75 per cent of local healthcare products and was involved in the manufacture, wholesale, distribution and retail of pharmaceutical, consumer and veterinary drugs. It started off as a government-owned company but was privatized after experiencing financial difficulties. However, it is now back in government hands, since the privately owned shares were recently acquired by the Government of Zimbabwe.
Datlabs	This is a subsidiary of the South African Adcock Ingram group and was established in the early 1950s. It has two factories in Bulawayo, while the sales and marketing division is based in Harare. It manufactures, markets and distributes a wide range of pharmaceutical and personal care products. It is a leading supplier to both the private and public sectors of the Zimbabwean-market, and serves both domestic and export markets.
Plus Five Pharmaceuticals	Established in 1996, it is a Zimbabwean-owned generic pharmaceutical company. It is part of a vertically integrated group comprising a manufacturing plant in Bulawayo, a pharmaceutical wholesaler in Harare and a retail pharmacy in Ascot, Bulawayo. It serves both domestic and export markets.
Pharmanova	It is the only multinational company in the country. Its headquarters are in India. The company is not well known in Zimbabwe, but it supplies its products to clinics, hospitals, pharmacies and retail outlets throughout the country.
Zimpharm	It was established in 1992, when the Wellcome Group sold its shares to the present private Zimbabwean shareholders. It serves both domestic and export markets.
Graniteside Chemicals	Privately owned, it manufactures and distributes a broad range of pharmaceuticals, hospital consumables, and animal health and consumer products.

Company	Activity
National Pharmaceutical Company	This state-owned company was established in 2001. It was created to fulfil the role of a national medicines procurement agency. It is responsible for procurement, storage and distribution of health commodities for the public sector. It is no longer a major procurer of medicines. Although it has extended sales to the private sector, the company must give priority to serving the needs of the State.
Gulf Drug Company	A privately owned company, it started production in 2014 and focuses on beauty products and cosmetics. It serves both domestic and export markets and operates in many countries in Southern Africa.

Sources: UNIDO (2017); Mutambara (2017); MCAZ (2017); Noguera et al. (2003).

As in Lesotho, foreign investors are present through pharmaceutical distributors and wholesalers in Zimbabwe, too. One example is the joint venture centred on Pharmaceutical and Chemical Distributors Private Limited, a local pharmaceutical wholesaler that represents 14 pharmaceutical companies, including a major Indian one (UNIDO 2011b).

Interestingly, in February 2019, the MCAZ licensed one traditional medicine manufacturer under the Complementary Medicines Regulations (Zimbabwe, Parliament 2019). The registration process lasted three years and required two licences: one to register a product and another for the manufacturing company. The fees were US$34 for the former and US$257 for the latter. Such a lengthy and burdensome procedure causes traditional medicine practitioners to remain informal in their operations (Mujuru 2020). It is worth pointing out that the fees charged by the MCAZ for the registration of new products and the retention of already registered ones are considered prohibitive in general, even for conventional drugs (Khoza 2016).

The herbal remedies market is rather dynamic in Zimbabwe. It is dominated by international players, such as the Aloe Vera Company and its Forever Living Products range, originally from the United States, and the Green World Group, which has Chinese origins. The distributors of these herbal remedies in Zimbabwe are small to medium-sized enterprises.

Some indigenous companies are also active in this subsector. They include Musimboti and 1202 Herbal Solutions. The Musimboti traditional medicine brand markets local herbal medicines such as *moringa, intolwane, umgugudu, umganu* and *isihaqa*. The company 1202 Herbal Solutions is both a manufacturer and a distributor of traditional medicines. At the peak of its operations, in 2018, it had 1,600 employees. Unfortunately, the number of

workers shrank to 600 in 2019 as a result of the stiff competition from the other players in the subsector (*NewsDay* 2020).

Concluding remarks

Jobs in the pharmaceutical industry of both countries are scarce. However, employment opportunities in this sector can be a source of decent and productive work that contributes to national economic growth and development.

The pharmaceutical sector does not seem to enjoy much foreign investment support, particularly in Zimbabwe. The adoption of policies to attract players from abroad is key to the development of the industry. This particular area of government intervention is explored in detail in Chapter 4.

Interestingly, there are cosmetics manufacturers in both Lesotho and Zimbabwe. This is an aspect of the industry that may warrant greater attention. There is also scope for introducing natural drugs based on traditional medicine which could be successfully exported in the region.

As can be seen in table 3.7, several Zimbabwean pharmaceutical companies export to a number of Southern African countries. This intraregional market could be targeted by specific government policies and business strategies.

4 Industrial policies, growth and development

Introduction

This chapter describes and analyses the strategies adopted in Lesotho and Zimbabwe to support national development through the pharmaceutical industry, including the emerging medical cannabis subsector. The main theories on development and industrial policy are taken into account, with a special focus on Africa. The two country situations are examined in detail to identify potential drivers of success in the promotion of the pharmaceutical industry by existing national industrial policies, but also areas for improvement.

From 1990 to 2012, sub-Saharan Africa's growth rates followed an increasing trend with a median of 2 percentage points. The rise was particularly sharp in the poorest countries in the region, whose economies grew by 2.7 percentage points for the median over the same period (Lin and Vu 2017). Despite economic growth, development is still lagging behind, and the structure and composition of national economies remain unchanged. The reasons for this are difficult to explain.

In seeking to understand the causes of such an undesirable outcome, general agreement has been reached on the fact that markets alone do not lead to economic transformation (Page and Tarp 2017). Accordingly, the focus of theories about structural transformation has shifted to industrial policies and state intervention.

Economic development is normally based on industrialization and, in particular, on the expansion of manufacturing, which sub-Saharan African countries have not experienced to so great an extent as have more advanced economies. Employment in industry is lower than in other poor countries at a similar level of development. The region is reportedly undergoing premature deindustrialization, which points to the difficulties it faces in exploiting its comparative advantages and embarking on structural transformation that would be accompanied by a shift of labour from lower- to higher-productivity sectors (Lin and Vu 2017). Rodrik (2015) argues that premature deindustrialization in developing countries is due to trade and globalization.

According to this theory, after opening up to trade, economies that did not have a strong comparative advantage in manufacturing became importers of goods belonging to that sector. Moreover, the decline in prices of manufactured products in advanced economies inhibited even further the development of manufacturing in poor countries.

Although this model places the industrial sector at the very centre of development, the concept of "industrial policy" has recently been interpreted much more widely than as referring simply to industry. Noman and Stiglitz (2015, 9) thus suggest that industrial policies include "any action that aims to alter the allocation of resources (or the choice of technology) from what the market, left to itself, would bring about". According to this definition, industrial policies involve actions that also affect other sectors, such as finance, information technology and agriculture. Stiglitz (2017) adds that the objectives of industrial policies are now broader than in the past, and that more relevant instruments are available. Governments pursue industrial policies even when they are simply setting rules to shape the economy. They may be unaware that they have an industrial policy, but every State does in fact have one.

Another interesting and useful concept is that of "industrial policy in the "large", formulated by Hausmann, Rodrik and Sabel (2007). According to this notion, an industry or activity that is to be developed must benefit from all the necessary public inputs (including some types of subsidies) so that private entities can then unfold their activities. Put differently, individuals who wish to move from a low- to a high-productivity sector should be provided with the necessary resources they could not obtain if markets alone were to be relied on. As this approach suggests, public and private coordination is key to successful industrial policymaking (Page and Tarp 2017).

Industrialization through manufacturing in Lesotho and Zimbabwe

The most successful industrial policies that are usually put forward as models are those adopted in Asia between the mid-1960s and 1990s by the "Four Tigers": Hong Kong (China), Singapore, the Republic of Korea, and Taiwan Province of China. A few other countries could be added to this list, such as Japan, Malaysia and Thailand. Their development was based on growth driven by the export of labour-intensive manufactured goods (Lin and Vu 2017; Cherif and Hasanov 2019). African countries could follow the same growth model, but manufacturing requires higher skill levels than agriculture, which is the sector producing the commodities that the continent has historically exported.

By the same token, a development opportunity for Africa could lie in China's economic progress. Over the past few years, that country has enjoyed a

remarkable comparative advantage in several kinds of manufactured goods requiring rather low skill levels. Over time, Chinese wages have been rising and the national economy has had to engage in new industries with more sophisticated product markets. Poor countries at a lower level of development, such as many African ones, may have a chance to fill the gap left by China in the world markets (Stiglitz 2017; Lin 2013). The main question is whether the manufacturing sector in the continent is strong enough. As mentioned in the introduction to this chapter, Africa has followed a trend that can be described as premature deindustrialization.

In Lesotho and Zimbabwe, agriculture is at present not a driving sector of the economy. Its contribution to GDP decreased from 7.8 per cent in 2000 to 4.5 per cent in 2019 in Lesotho, and from 15.7 per cent in 2000 to 8.3 per cent in 2018 in Zimbabwe (World Bank n.d.(a)). Tobacco, cotton and maize are the principal crops that Zimbabwe has traditionally exported (FAO 2003). In both countries, agriculture remains the principal source of livelihoods for the large majority of the population who are poor and live in rural areas.

In both countries, foreign investment has been attracted by the mineral-based extractive industry. However, besides having very negative environmental effects, natural resource extraction has few linkages with other economic sectors, and certainly fewer than manufacturing (Greenwald and Stiglitz 2013). Mining is therefore not a sensible option for national sustainable development.

Zimbabwe is no exception to the trend towards deindustrialization in the region. The value added by manufacturing as a share of GDP has shrunk significantly, having contributed averages of 20 per cent in the early 2000s (see figure 4.1). Its share fell from 16.3 per cent in 2008 to below 10 per cent in 2010 and 2011 (World Bank n.d.(a)). In 2018, the manufacturing sector was projected to grow by 1.4 per cent as a result of a favourable agricultural season having a positive impact on foodstuffs, tobacco and beverages (CZI 2018). Manufacturing contributed 10.6 per cent to GDP in that year (World Bank n.d.(a)). The main subsectors are metals and metallic products, tobacco, drinks, foodstuffs, chemicals, textiles and cotton ginning (Dube 2011). Agriculture provides 60 per cent of the raw materials needed by manufacturing industry in the country (FAO n.d.).

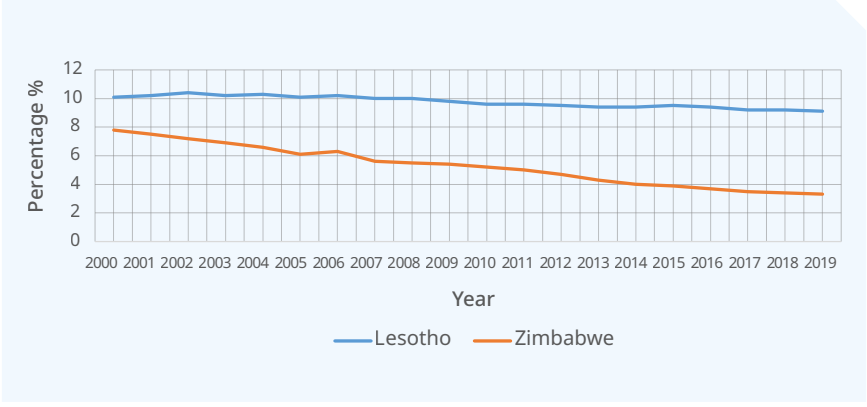
Lesotho, a much smaller economy, has followed a more positive industrialization trend. Since 2001, the contribution to GDP of its manufacturing sector has been steadily above 20 per cent. A decline to levels just over 10 per cent was observed between 2010 and 2015, after which shares of about 16 per cent were reached and maintained until 2019 (World Bank n.d.(a)). Very successful export of clothing and textiles has characterized the development of manufacturing in the country.

▶ Figure 4.1. Value added by manufacturing as share of GDP, Lesotho and Zimbabwe, 2000–19 (percentage)

Source: World Bank's World Development Indicators database.

Figure 4.2 depicts employment trends in the manufacturing sector in the two countries. In Lesotho, the industry maintains a regular share of total employment varying only between 10.1 per cent in 2000 and 9.1 per cent in 2019. Female participation in the sector is consistently higher than that of men, which is typical of textiles.

▶ Figure 4.2. Employment in manufacturing as share of total employment, Lesotho and Zimbabwe, 2000–19 (percentage)



Source: ILOSTAT database.

In Zimbabwe, the situation looks quite different, with a much lower proportion of jobs in manufacturing, which has steadily decreased from 7.8 per cent in 2000 to a mere 3.3 per cent in 2019. The male participation rate in this sector is higher than the female rate.

Despite the divergent paths of the manufacturing sector in the two countries, both Lesotho and Zimbabwe remain very poor economies. Lin (2012) proposes a new structural economic framework whereby a country should develop its industries by exploiting comparative advantages derived from its endowment structure and relying on the potential benefit of backwardness in industrial innovation (Lin and Treichel 2014). In contrast, going back to the successful Asian cases mentioned earlier, Cherif and Hasanov (2019) point out that the Republic of Korea's main exports in the 1960s included rice and silk. These commodities offered comparative advantages, yet the country nevertheless ventured into shipbuilding, the automotive industry and electronics. These two authors argue that to replicate the Republic of Korea's success, a country must constantly introduce new goods and adopt new technologies to generate productivity gains. New industries must be created and domestic enterprises promoted so that they can become stronger and are able to export beyond sectors in which the country has a comparative advantage. Cherif and Hasanov (2019) identify three key steps in the Asian development model:

- creating new capabilities in sophisticated industries;
- focusing on exports; and
- encouraging competition among domestic firms while providing support for specific industries.

Sophisticated sectors have more linkages and spillovers and are more conducive to the introduction of new technologies and productivity gains. These tend to be tradable sectors, including pharmaceuticals. The cutting-edge products that are typical of such sectors require intensive R&D efforts and protection by patents.

Creating domestic capabilities and developing national technologies in sophisticated sectors are fundamental to this growth strategy. In addition to high levels of investment, there must also be innovation and export sophistication. There may be little or no comparative advantage at the outset, that is, no relevant skills, experience or resources. Venturing into a sophisticated industry requires major efforts with a high probability of failure. The greater the risk, the higher the return in the event of success, and the better the chances of attaining a high income level for poor countries (Cherif and Hasanov 2019).

After describing the current industrial policies that are being implemented in the two countries, the following sections will explore how the principles

explained above – notably the three key elements identified by Cherif and Hasanov (2019) – apply to the development efforts of Lesotho and Zimbabwe and to their decision to promote the pharmaceutical industry and, in particular, medical cannabis production.

Current industrial policies

Since gaining independence in 1980, Zimbabwe has implemented several economic development strategies. In 2017, a policy document entitled "Vision 2030" was adopted, the main objective being to reach the status of an upper-middle-income society by 2030. The Zimbabwean dollar was reintroduced in 2019 and attempts were made to stabilize the exchange rate. Despite all these efforts, high inflationary pressures, exchange rate fluctuations and exogenous shocks, including Cyclone Idai and the COVID-19 pandemic, have had very negative effects on the economy (Republic of Zimbabwe 2020).

Zimbabwe's National Development Strategy 2021–25 seeks to achieve economic growth through agriculture, mining, manufacturing and tourism. The contribution of industry to GDP is meant to increase from a share of 11.7 per cent in 2020 to 15 per cent in 2025. Similarly, the share of value-added exports in total exports is meant to increase from 9 to 20 per cent over the same period.

As already mentioned in Chapter 2, support for pharmaceuticals in the country is described in the National Development Strategy as "resuscitation" of existing value chains, since until the early 2000s the Zimbabwean pharmaceutical industry was second only to that of South Africa in the SADC region. The value chains of pharmaceuticals are considered "quick win". This sector will benefit from the scaling up of innovation hubs and industrial parks. It is hoped that the establishment of a Zimbabwe National Productivity Institute will improve the performance of the pharmaceutical industry, together with that of other sectors. Some specific targets to be met by 2025 are as follows:

- Increase the share of locally produced essential medicines from 30 to 60 per cent.
- Set up a monitoring system to check the expiry dates of patent rights.
- Reduce the timelines of registration with the MCAZ and grant special exemptions for locally produced medicines.
- Strengthen the capacity of key institutions, such as the MCAZ, schools of pharmacy and the African Institute of Biomedical Science and Technology.

- Export within the regional market, taking advantage of existing pharmaceutical deficits, regulatory harmonization and the SADC free trade area.
- Review the list of medicines requiring import licences in the light of national production capacity.

There is also a Zimbabwe National Industrial Development Policy 2019–23, which is still in force. This calls for investment and innovation-led industrialization, with a focus on export-oriented growth. A value-chain approach is being followed and pharmaceuticals are mentioned in that regard (Zimbabwe, Ministry of Industry and Commerce 2019).

In June 2021, a Pharmaceutical Manufacturing Strategy 2021–25 was adopted (Zimbabwe, Ministry of Industry and Commerce 2021). Additional targets to be reached by 2025 in that sector include:

- increasing the domestic market share of local pharmaceutical products from 12 to 35 per cent;
- improving the registration rate of new local products from 5 to 20 per cent;
- having at least four pharmaceutical companies that meet GMP standards; and
- increasing the share of total domestic pharmaceutical production that is exported from 10 to 25 per cent.

In 2018, Lesotho adopted a National Strategic Development Plan II (NSDP II) for 2019–23, which followed on from the first such plan covering the period 2013–17. The main challenge in the implementation of NSDP I was political uncertainty. One of the areas in which it was successful was the promotion of a more dynamic private sector (Government of Lesotho 2018). Private sector development is the focus of the current Plan. The document states explicitly that an export-led growth model has been adopted.

Four sectors are expected to drive the country's growth: agriculture; manufacturing; tourism and creative industries; and technology and innovation. Export expansion and diversification are key elements of the development strategy. The manufacturing sector largely consists of textiles, garments and footwear exports facilitated by the African Growth and Opportunity Act, which was passed by the US Congress in 2020 and ensures, inter alia, that Lesotho's textile and apparel products have favourable access to the US market. Over the past few years, Lesotho's apparel goods have faced increasing competition in the United States from Asian producers. The contribution of manufacturing to GDP has diminished considerably. Export diversification in terms of both destinations and products is therefore

essential. The limited value chain addition and the weak business linkages between large and small enterprises which have hitherto been observed further accentuate the need for diversification in manufactured exports.

In recent years, investments in manufacturing have been more diversified and now include the production of leather seat covers for the automotive industry in South Africa, electronics, food and beverages, and cement (Government of Lesotho 2018). In the NSDP II, no mention is made of medical cannabis production, which was launched in Lesotho at the same time as the Plan was being formulated. Although the Government was approached by foreign investors seeking licences in 2016, national elections in 2017 led to a change in government composition and the new ministers were not very supportive of the domestic production of medical cannabis. For that reason, proper legislation on medical cannabis production was not adopted until 2018, and some issues still remained unresolved afterwards, such as how to create effective partnerships between national and foreign investors (Vickers 2019).

However, it can be assumed that this emerging industry in Lesotho falls under the strategy to diversify manufactured exports. The NSDP II does mention the promotion of investment in targeted industries, including niche targeted products, which may well encompass medical cannabis, among others.

The national development strategy makes no reference to the pharmaceutical sector as such, but alludes to "medicaments", which are seen as promising because of linkages with South Africa and the possibility of expanding into the market in Botswana (Government of Lesotho 2018). One listed strategic objective is based on improving manufacturing capabilities to move towards knowledge-intensive value chains. Nevertheless, the apparel industry remains the focus of that document.

Creating new capabilities in sophisticated industries

This section considers the first of the three key steps that characterize the successful Asian development model according to Cherif and Hasanov (2019). Ideally, it should have been entitled "Creating new capabilities in the pharmaceutical industry"; however, such a heading would work for Zimbabwe, but not really for Lesotho, where pharmaceuticals are not being promoted per se.

In Zimbabwe, there are several research centres that support the technical capacity of the pharmaceutical sector. These include the Medical Research Council of Zimbabwe and the Scientific and Industrial Research and Development Centre. The latter is directly involved in the pharmaceutical industry through two specialized research entities, namely the Biotechnology Research Institute and the National Institute of Health Research. Despite the existence of these centres, one of the chief reasons for the inadequacy of the pharmaceutical

sector in Zimbabwe is poor technical capacity (UNIDO 2017). As described in Chapter 9, there is a pressing need to enhance research skills in Zimbabwe. The main stakeholders, including education and training institutions and pharmaceutical companies, all agree on this. Strengthening the capabilities to identify stable formulations that can be used to produce new ingredients could provide the local labour force with skills that could find application in the medical cannabis industry as well. Indeed, one of the objectives of Zimbabwe's National Development Strategy 2021–25 is to build the capacity of key pharmaceutical institutions, such as schools of pharmacy and the African Institute of Biomedical Science and Technology.

However, the nature of capabilities is complex – they encompass much more than simply the existence of formal training institutions and research centres. Apart from capabilities based on learning, there are productive capabilities derived from investment in physical and human capital. Learning capabilities occur in training and education systems, but also in enterprises, social networks (such as professional associations), public–private partnerships, value chains and public policy institutions (Nübler 2014).

In Lesotho, the successfully developed textile sector is a low-technology industry that cannot easily serve as a model for knowledge transfer. As indicated in Chapter 9, the area of pharmaceutical production (including medical cannabis), which is a high-technology industry, is completely ignored by the national education and training system. The NSDP II includes a Research and Innovation Strategy, but so far nothing has been heard about the implementation of such a strategy for the pharmaceutical sector or even just for medical cannabis production. Institutions of higher learning require a licence to conduct research on medical cannabis, yet the National University of Lesotho has none. Scientists from some South African universities that do have such licences from the Government of Lesotho travel to the country and conduct research there under a bilateral agreement.[6]

Focusing on exports

Both countries are currently pursuing export-led growth.

In 2017, the item most exported by Lesotho was T-shirts, followed by pullovers (World Bank n.d.(b)). Lesotho can look back on decades of successful experience in exports in the apparel industry. As table 4.1 indicates, over the past few years the ratio of pharmaceutical exports – excluding medical cannabis, whose production has not fully started yet – to total exports has been low but nevertheless on the rise. Exported items include first aid boxes and kits, absorbent gauze, and medicaments. These are all items that do not require high

[6] Interview with an expert, 22 July 2021.

levels of knowledge and are not produced by pharmaceutical companies. Hence, the data in table 4.1 present a somehow distorted picture of the pharmaceutical industry in the country (Mokhethi 2012).

▶ Table 4.1. Lesotho's pharmaceutical exports (2015–20)

Year	Total exports (in million US$)	Exports of pharmaceuticals (in US$)	Ratio of pharmaceutical exports to total exports
2015	457	90 525	0.02
2016	856	492 623	0.60
2017	926	453 249	0.49
2018	1 100	408 805	0.37
2019	879	485 877	0.55
2020	906	843 462	0.93

Source: Authors' compilation from Lesotho Bureau of Statistics data.

Table 4.2 shows that Lesotho imports pharmaceuticals to a far greater extent than it exports them.

▶ Table 4.2. Balance of pharmaceutical trade in Lesotho (2015–20)

Year	Exports of pharmaceuticals (in US$)	Imports of pharmaceuticals (in US$)	Balance of pharmaceutical trade (in US$)
2015	90 525	22 279 966	–22 189 440
2016	492 623	41 763 110	–41 270 487
2017	6 924 841	553 297 202	–546 372 361
2018	6 245 617	617 068 114	–610 822 497
2019	7 423 097	889 861 964	–882 438 867
2020	12 886 179	847 903 917	–835 017 738

Source: Authors' compilation from Lesotho Bureau of Statistics data.

Analysing data from 23 least developed countries, Gladson (1986) concludes that foreign direct investment (FDI) has a positive impact on exports; one US dollar of FDI generates about two US dollars in exports. The magnitude of the positive impact varies from country to country. Lesotho's performance in attracting FDI is remarkable on a regional level. Improvements that were made to promote textile exports can support also the export of other products such as medical cannabis. The incentives offered to foreign investors for the

garments sector could work for medicaments, too. Over the past few years, progress has been made in enhancing the investment climate – for example, by streamlining business and property registration processes – and for FDI in particular. Weaknesses that have yet to be addressed include the absence of a proper framework for public–private partnerships and inadequate technical and institutional capacity (Government of Lesotho 2018).

Learning spillovers happen with some forms of FDI more than with others (Greenwald and Stiglitz 2013). So far, it does not look like Lesotho has managed to attract foreign investment that promotes knowledge transfer. Indeed, the apparel sector requires low technology and skill levels.

Zimbabwe lacks a diversified export base, which makes it very difficult to adjust to changing world demand for tradable goods (AfDB 2019). According to the World Bank (2021 n.d.(b)), the most exported items in 2019 for Zimbabwe were gold, tobacco and other minerals like nickel. Medicaments were the second most imported item, after petroleum oils, in the same year. Nowadays, the country depends on imported medicines, but, until just over a decade ago, Zimbabwe was able by itself to meet its national essential drugs and medicines requirements. In terms of volume and sophistication of pharmaceutical production, it was second only to South Africa in the SADC region (Zimbabwe, Ministry of Industry and Commerce 2012). It used to export pharmaceuticals to several countries in Southern Africa and in the East African region (UNIDO 2017).

Figure 4.3 chart shows the volume of imports and exports of pharmaceuticals in Zimbabwe throughout 2018.

▶ Figure 4.3. Pharmaceutical products trade in Zimbabwe, 2018

Source: Adapted from ZIMSTAT (2019).

Both Lesotho and Zimbabwe are well integrated at a regional and subregional level. They were among the ten leading intra-African exporters during the period 2015–17 (UNCTAD 2019). Intraregional trade represents an excellent opportunity for exports, particularly for the Zimbabwean pharmaceutical industry. Both countries have ratified the Agreement Establishing the African Continental Free Trade Area, which aims to create a single market for goods, services and the movement of people. This agreement should encourage FDI flows (UNCTAD 2018).

The pharmaceutical industry in Zimbabwe is dominated by local investors. Since 2008, the Indigenisation and Economic Empowerment Act has sought to empower historically disadvantaged Zimbabweans by granting them the right to have a majority (at least 51 per cent) share in almost all types of business. This law was amended in 2018 and its restrictive provisions now apply only to the extractive industries of diamond and platinum mining (Zimbabwe, Ministry of Finance and Economic Development 2017). Foreign investors prevail in the mining sector. In 2016, the Special Economic Zones Act was adopted to attract foreign investment in export-oriented industrial activities (AfDB 2019). Investors operating in special economic zones (SEZs) are exempt from paying duty on imported capital equipment, products and materials as long as these are used exclusively within the zones (UNCTAD 2018).

Special economic zones played a significant role in the success of East Asian countries and in the promotion of exports and FDI. This is why SEZ schemes have been replicated all over the world, including in sub-Saharan Africa, albeit with disappointing results there (Farole and Moberg 2017). Such zones may be defined as geographical areas or specific groups of enterprises that benefit from more liberal rules and enjoy advantages in terms of infrastructure, special customs conditions (such as duty-free import and export), fiscal incentives and special regulatory arrangements.

Lesotho does not have a properly defined SEZ scheme, but it has introduced a combination of policy instruments that are the same as those normally adopted in such zones. In 2007, it established a one-stop shop for investors. Since its staff still reported to different ministries, the new structure was rather ineffective. Furthermore, the Government invested scarce resources in developing zones in remote regions that failed to attract companies and investors (Farole and Moberg 2017). Nevertheless, it must be acknowledged that SEZ activities in the country have achieved some degree of success (UNCTAD 2018).

Encouraging domestic competition while supporting specific industries

Cherif and Hasanov (2019) believe that the focus of development policies should be on supporting domestic innovators and local technology. As to how to attain that objective, they argue that export orientation leads to productivity gains and innovation, whereas import substitution industrialization (ISI) policies result in "perverse incentives" and distortions. When protections for local firms are lifted as part of fiscal consolidation or during a currency crisis, these enterprises are unprepared to face the international market and to export successfully. In the Asian model, businesses benefiting from special support were expected to export, invest in research, innovate and compete on international markets.

Rodrik (2000) offers a different view of ISI policies, arguing that they led to high total factor productivity growth until 1973, including in some sub-Saharan African countries. He concludes that the issue is not whether trade protection or trade liberalization is to be preferred; each developing country should be free to experiment with its own growth strategy. Noman (2013) cites evidence in favour of a protectionist approach. He refers to the case of Pakistan, which, in the 1950s and over a period of about five years, created a group of dynamic entrepreneurs through protection measures. Similarly, Stiglitz (2017) argues that opportunities for manufacturing-led export growth are more limited now than in the past, and that other policies ought therefore to be considered, such as import substitution.

In the Republic of Korea, large private domestic enterprises were chosen as business partners by the Government in its development efforts. They were selected because of their large capital bases and high level of access to technology. They were granted preferential subsidies through low interest rates on domestic capital, access to foreign capital loans underwritten by the Government, and the protected status of monopolies or oligopolies in national markets. Severe sanctions were imposed on firms that slid into corruption and did not meet the performance standards set (Kim 2017).

In Zimbabwe, Statutory Instrument No. 64 of 2016 introduced a protectionist policy to support local industry (AfDB 2019). As Chang (2015) argues, in order to strengthen domestic high-productivity activities in a poor country, the logic of infant industry promotion ought to be applied. Local enterprises must be protected through tariffs, subsidies and other measures. Otherwise, the market left to its own devices will allow more competitive producers from advanced economies to prevail.

Zimbabwe has been following ISI policies for several years with mixed results. Meeting its tremendous national medicines needs through imports is not sustainable for a battered economy like that of Zimbabwe. Imports increase

government expenditure on health and render the population vulnerable to supply interruptions (Dong and Mirza 2016). They also compete for the allocation of scarce foreign currency from the national budget. The unstable macroeconomic situation in Zimbabwe and the subsequent volatility of the exchange rate have made access to foreign currency difficult. Paying for imports of pharmaceutical active ingredients and excipients that the country can at present not produce has proved extremely challenging. That is why import substitution to encourage national manufacturers to make active pharmaceutical ingredients and excipients as inputs for finished products seems an appropriate strategy.

A rebate facility in the country allows essential raw materials used in the manufacturing of drugs to be imported free of duties. This measure has enhanced local production of pharmaceuticals. As a result, and to further boost the domestic pharmaceutical industry, more inputs have been included among those benefiting from duty-free arrangements, such as zinc oxide and zinc peroxide, silicates, certain ethers, alcohols, sulfonamides, pigments and preparations, colourants and dyes, and certain cellulose acetates and cellulose ethers (Zimbabwe, Ministry of Finance and Economic Development 2019). Together with Statutory Instrument No. 64, which bans the import of certain specific goods, the rebate facility has promoted local generic production of pharmaceuticals (Zimbabwe, Ministry of Finance and Economic Development 2017).

As noted in Chapter 10, technological transfer and competition in the Zimbabwean pharmaceutical sector have clearly suffered from ISI policies. A certain degree of innovation seems to have been promoted not so much by technological transfer and competition as by the demands of the regulatory system, at least in terms of upgrading equipment and machinery (see Chapter 7).

In Lesotho, local enterprises are not in a position to compete with international firms. Linkages between small domestic businesses and large foreign-owned ones are very weak. That may be the reason why one objective of the NSDP II is the development of a policy to protect infant industries.

Applying the Asian development model to Lesotho and Zimbabwe

With regard to the first of the three steps emphasized by Cherif and Hasanov (2019), it should be noted that in the Republic of Korea skills improvement was at the centre of national development (Cheon 2014). In Zimbabwe, there is strong consensus among stakeholders that new, more sophisticated skills need to be promoted and research capacity enhanced. With the adoption of the Pharmaceutical Manufacturing Strategy 2021–25, the Government has also started to identify sources of funding for development of the sector.

What may not necessarily be in line with the model described by Cherif and Hasanov (2019) is the specific industry chosen. The pharmaceutical sector has a long history in Zimbabwe and the development model adopted looks more like the new structural economic framework advanced by Lin (2012), whereby a country should exploit the comparative advantages stemming from its endowment structure.

A similar conclusion cannot be reached for medical cannabis production, which is being treated as a separate industry in its own right. This specific type of manufacturing would indeed require new capabilities for very sophisticated products. Enhancing research capacity and skills linked to conventional pharmaceutical production could, however, create a strong linkage with the medical cannabis area.

In view of the information presented in other chapters of this book, it seems that Zimbabwean stakeholders would rather focus on developing skills for the production of new traditional drugs, which would easily gain the support of a rising number of customers in existing local and regional markets and benefit from intraregional trade opportunities.

In Lesotho, a focus on medical cannabis production does indeed reflect the model described by Cherif and Hasanov (2019). However, creating new capabilities does not seem to be a priority for the country. As in Zimbabwe, medical cannabis production remains an isolated industry, confined to foreign investors and without linkages with local enterprises.

The national education and training system totally ignores skills that could be used in that subsector. The country's successful experience with a low-technology field like the apparel industry has not led to the development of robust knowledge transfer mechanisms that could be replicated for medical cannabis.

As for the second step of the model proposed by Cherif and Hasanov (2019), both countries are making clear efforts to boost exports. For Zimbabwe the ultimate goal is the export of medicines in general, whereas for Lesotho the objective is to export medical cannabis. With this specific sophisticated product, both economies are recording good results, as can be seen in Chapter 8. Zimbabwe's aim of entering the regional market with its pharmaceutical goods does not seem impossible in the medium to long term.

The third and last step of the model put forward by Cherif and Hasanov (2019) is quite a challenge for both countries. To increase competition among domestic firms is difficult in Zimbabwe because of ISI policies and in Lesotho because of the lack of linkages between foreign investors and local enterprises.

The recent measures adopted by the Government of Zimbabwe to encourage foreign investment may improve the situation. In Lesotho, low knowledge and

skill levels constitute an all too real obstacle preventing local enterprises from becoming more competitive.

Foreign exchange rates and industrial policies

According to Stiglitz (2017), the objective of industrial policies is not necessarily the promotion of industrialization. Industrial policies consist of measures that modify the sectoral composition of the economy. Hence, such policies are also part of monetary policies. A competitive and stable real exchange rate policy is, in that author's view, one of the most important macroeconomic instruments. Drawing on UNIDO (2013), we may add that policies on FDI and exchange rates can undermine industrial policy objectives if they are not aligned with these.

The exchange rate plays a pivotal role in an economy's competitiveness. Low exchange rates make domestic enterprises more competitive and enable them to export successfully. At the same time, though, they increase the cost of imports, thereby encouraging substitution. The level of the exchange rate can be affected by several instruments. For example, promoting foreign companies' investment in a country results in appreciation of its national currency. The interest rate and other direct government interventions are additional instruments that have an impact on the level of the exchange rate (Greenwald and Stiglitz 2013).

Rodrik (2008) argues that what boosts economic growth in poor countries is currency undervaluation and the price of tradable goods relative to non-tradable goods, namely the real exchange rate. He concludes that developing economies reach more rapid growth when they can increase the relative profitability of their tradable goods, and that "undervaluation is in effect a substitute for industrial policy" (Rodrik 2008, 405). Astorga, Cimoli and Porcile (2014) add that a competitive exchange rate promotes the diversification of production and leads to employment and productivity increases.

In Zimbabwe, the exchange rate regime has shifted from a flexible to a fixed/multi-currency system anchored in the US dollar. Brixiová and Ncube (2014) find that the country's real exchange rate experienced overvaluation for rather long periods both before the 2008 economic crisis and under the multi-currency regime. They conclude that undervaluation will not increase growth in the country, contrary to what one might expect on the basis of the hypothesis advanced by Rodrik (2008).

In June 2019, the Zimbabwean dollar was reintroduced. Since the adoption of the domestic currency, the exchange rate has rapidly fallen. Jefferis (2020) points out that the country will not be able to stabilize the new Zimbabwean dollar in the near future. The same author mentions four other countries that introduced

a new currency: Botswana, Czechia, Slovakia and South Sudan. The only one of these that was not successful was South Sudan.

Lesotho has a constrained fiscal and monetary policy framework, as its currency is pegged to the South African rand at one to one. The country's effective exchange rate is tied to the commodity cycles of the South African economy. Despite the lack of autonomy as regards an important macroeconomic management tool, Lesotho has benefited from South Africa's credible monetary policy. Domestic inflation is low, as it follows the South African inflation rate. This situation has played to the advantage of Lesotho's exports, which have remained competitive in international markets (Government of Lesotho 2018).

Concluding remarks

For both countries, international and national ethical and legal concerns with regard to cannabis cultivation in general seem to be a significant factor inhibiting government action or at least transparency in statements contained in official development strategies. Medical cannabis production has been successfully launched in both countries, but their national development plans are completely silent on that score.

The Asian development model as described by Cherif and Hasanov (2019) is not being applied or, at best, is proving difficult to implement. Stiglitz (2017) stresses that the world today has changed considerably since the time when Asian countries experienced economic transformation. Industrial policies that were successful in a given context and at a specific stage of development do not necessarily work in other circumstances. One may therefore legitimately conclude that applying the Asian model to Lesotho and Zimbabwe simply makes no sense.

Gisselquist (2017) adds that the Asian economies had robust state capabilities at the outset of their transformation periods, in contrast to many fragile African countries. In her view, the potential for state-supported industrial transformation in some of these countries is by no means clear. This may well be true of Lesotho and Zimbabwe. One should, however, take note of some success stories, such as the development of floriculture in Ethiopia, where the Government played a pivotal role (Gebreeyesus 2017; Dinh 2017).

Major challenges in relation to Lesotho's development are knowledge and skills, and the involvement of local businesses. Zimbabwe is struggling more with unstable basic macroeconomic parameters, including a fluctuating exchange rate. Should Rodrik's (2008) hypothesis that currency devaluation favours growth be borne out, then the latest trends in the country after the reintroduction of a domestic currency could well lead to positive outcomes.

5 The regulatory framework

Introduction

In all countries in the world, governments are responsible for developing policies and laws that regulate the operation of the pharmaceutical industry. Moreover, a government's ability to provide incentives for producers and, where necessary, impose sanctions on them determines the overall efficiency of the sector (Cohen 2000). The range of regulatory activities related to pharmaceuticals is broad and includes factory licensing, product registration, quality monitoring, pharmacovigilance and intellectual property oversight. Pharmaceutical regulation ensures efficacy, safety, quality and access to essential medicines with a view to protecting human and animal health and safety and the environment. Globally, however, the pharmaceutical sector is governed by three main types of general pharmaceutical laws that regulate pharmacy personnel, narcotics and medicines, respectively. These key areas of regulation of the pharmaceutical industry are examined in the present chapter, together with other aspects of the sector, which in some cases are more relevant to one or the other of the two countries under consideration and are linked to their national development strategies. The scope of this chapter is circumscribed by the book's overarching objectives and their focus on jobs, environmental and labour standards.

Regulation is a process whereby the government controls or influences the activities of actors or individuals deliberately through manipulation of variables such as quality, quantity and price (Kumaranayake et al. 2000). The expansion of the private sector in the pharmaceutical industry has resulted in a call for stronger regulation to promote high quality and price competitiveness. Furthermore, as noted in Chapter 4, government action through regulation is indispensable to fostering national growth and development. The following sections provide an overview of existing regulations in Lesotho and Zimbabwe, highlighting characteristics, strengths and weaknesses of the two national systems.

The research findings benefited from the collection of some primary data, which are particularly rich in the case of Lesotho. A survey of nine pharmaceutical retail and wholesale firms (see the introduction to Chapter 3)

and a survey of some medical cannabis manufacturers (see the introduction to Chapter 8) were conducted by the National University of Lesotho. Furthermore, the same team of experts used semi-structured interviews to capture the views of two small-scale informal cannabis growers, two traditional healers, four informal stakeholders and seven key informants. Similar interviews were also carried out by the University of Zimbabwe with 20 key informants from technical agencies and public institutions and with 5 managers of pharmaceutical manufacturers.

National medicines regulatory agencies

Usually, in any country, the law (often entitled Medicines Act or Health Products Act) that regulates medicines first establishes a regulatory body that is responsible for overseeing the law's implementation. Such an entity, authority or agency schedules and registers all medicines, including narcotics. The regulatory body is responsible for licensing the manufacture of medicines, controlling drug development, product quality and registration, and pharmacovigilance.

All countries in the world ought to have effective and efficient national medicines regulatory agencies (NMRAs) (Ndomondo-Sigonda et al. 2017). However, Nayyar et al. (2015) point out that, according to WHO, only 7 per cent of NMRAs in Africa have moderately developed capacity, whereas more than 90 per cent of them have minimal or no capacity. The lack of a well functioning NMRA has serious negative consequences, as it exposes the population to potentially unsafe medical products of variable quality and effectiveness (Doua and Van Geertruyden 2014). The same authors note how a regulatory void facilitates the propagation of substandard, spurious, falsely labelled, falsified and counterfeit medical products.

Sadly, in Lesotho, the type of law under consideration is still just a draft law (Medicines and Medical Devices Bill, 2013). This is supposed to be the main law governing the practice of pharmacy, regulating medicines, granting licences to pharmaceutical companies and establishing a national regulatory body.

The absence of an NMRA in Lesotho limits access to medical products used in the country and can even slow down the acquisition of drugs. Currently, no medical product is allowed to be sold in any country unless it has been approved by that country's NMRA. In Lesotho, the medical products that can enter the country must be obtained from WHO-approved pre qualified suppliers, namely manufacturers meeting the standard prescribed by the WHO, which is known as "good manufacturing practice" (GMP).

Because of the lack of an NMRA in Lesotho, similar issues to those described above apply also to narcotic drugs and traditional medicines. Significantly,

the WHO recommends that all types of medicines be regulated by NMRAs, including traditional or herbal medicines and food supplements (Ndomondo-Sigonda et al. 2017).

Regulation of medicines in Zimbabwe began in 1969 with the promulgation of the Drugs and Allied Substances Control Act. This law created the Drugs Control Council (a body corporate), which started to operate in 1971. From the outset, Zimbabwe had a highly regulated pharmaceutical private market. In 1997, an amendment transformed the original law into the Medicines and Allied Substances Control Act, which established the Medicines Control Authority of Zimbabwe (MCAZ), endowing it with greater authority than its predecessor. The Medicines and Allied Substances Control Act has since then remained the main legislative instrument governing the pharmaceutical sector in Zimbabwe.

According to this law, only medicines registered or authorized by the MCAZ following evaluation and against payment of a fee are normally permitted to be imported, manufactured, sold by way of wholesale or retail, prescribed, dispensed or otherwise supplied in the country (Zimbabwe, Ministry of Health and Child Welfare and WHO 2011). With the onset of Zimbabwe's economic woes and reduced access to affordable quality medicines, illicit importation, underground distribution and the sale of unregistered and potentially substandard and falsified medicines became widespread.[7] The MCAZ has authority over formal businesses, but not over drug peddlers and other individuals involved in the production and sale of medicines. It is meant to work together with other law enforcement agencies, but this appears to be difficult because the MCAZ has no control over them and there is a general lack of resources and motivation to carry out such tasks.

Although none of the drug producers in Zimbabwe meets the GMP standard of the WHO, the MCAZ reports that eight of them do meet a local basic GMP standard, the requirements of which include ensuring the traceability of ingredients and preventing contamination and cross-contamination of the product.

For the MCAZ, GMP inspections are part and parcel of the licensing system. The licensing of premises, persons and production is handled by the MCAZ for medicines and by the Minister of Health and Child Welfare for dangerous drugs, including medical cannabis production.

There is ample evidence of the strong role played by the MCAZ in the national pharmaceutical industry. For example, although people in the country have been using traditional drugs since time immemorial, the MCAZ at one point warned the public against their use, since the drugs' promoters were claiming

[7] Interview with an MCAZ official, 26 May 2020.

that traditional medicine could cure all diseases, including HIV/AIDS. The MCAZ observed that some medicines were posing a serious health risk to those who would use only the traditional drugs in question instead of prescribed conventional products (Shoko 2018). Clearly, monitoring the activities of traditional healers is essential to prevent the use of unsafe medicines in the country.

Traditional medicine

- Only a few African countries have a legal framework for controlling access to indigenous knowledge and biological resources, or for ensuring that benefits arising from their use are shared fairly (Hebden 2006).

- Traditional medicine has always been at the heart of most African communities, especially the Shona people in Zimbabwe (Shoko 2007). This is because traditional medicine is cost effective and sometimes more easily available than biomedical therapy. About 80 per cent of Zimbabweans use traditional medicine to meet their health needs (Oyebode et al. 2016; Cavender 1988).

- Traditional healers are present in high numbers in Lesotho. However, there is no legal framework covering them and their operations in that country. Although some operate illegally or informally, traditional healers in Zimbabwe were professionalized in 1980 through the establishment of the Zimbabwe National Traditional Healers Association (ZINATHA). This is a national organization of registered African traditional medicine practitioners that promotes the practice of such medicine and associated research. Traditional healers are characterized by the use of bone-setting, indigenous medicine, divination, and spiritual and faith healing. A total of 55,000 such healers are registered with ZINATHA.[8] The reason for this regularization was to free traditional healing from the negative perceptions with which it had been stigmatized by the former colonial government. To that end, in 1981, the Parliament passed the Traditional Medical Practitioners Act, signalling a reappraisal of the role of traditional medicine in the country.

- In Zimbabwe, traditional healers have faced cooperation and resource barriers when attempting to patent their medicines.[9] Indeed, one shortcoming of the regulatory framework is the lack of integration between traditional and modern medicine.[10]

[8] Interview with a ZINATHA representative, 28 May 2020.
[9] Interview with a ZINATHA representative, 27 May 2020.
[10] Interview with the Chairman of the Pharmaceutical Manufacturers Association, 5 June 2020.

Pharmacy personnel legislation and licensing

In Lesotho, pharmacy personnel are governed by the Medical, Dental and Pharmacy Order, 1970, which established an eponymous Council to keep registers of medical doctors, dentists, pharmacists and allied health professionals. This instrument was intended to guard against malpractice by professionals and to protect the public.

The Medical, Dental and Pharmacy Order has some weaknesses. First of all, there is no inspection component. In addition, government entities such as hospitals and clinics do not require the registration of pharmacists. The situation is different for pharmacists working for non-governmental organizations, who are required to be registered and to submit annual retention certificates to their employer.

As the main legislative instrument designed to regulate the pharmaceutical industry in Lesotho is still only a bill, there is a regulatory gap in the registration of pharmaceutical companies. Thus, pharmaceutical enterprises are at present licensed only by the Ministry of Trade and Industry under general business law and, in particular, the Companies Regulations, 2012. The regulatory regime does not provide for a number of important functions, such as quality monitoring, which is a major problem for the sector.

In Zimbabwe, pharmaceutical regulation has retained its original focus on entry (licensing) requirements for medical personnel, drugs and other medical devices and services. Such standard-setting continues to be the principal aim of pharmaceutical regulation (Kumaranayake et al. 2000).

The Medicines and Allied Substances Control Regulations stipulate the licensing of pharmaceutical manufacturers, wholesalers and retailers. Typically, an operator requires five licences: a shop licence, which is obtained from the local authority; a premises licence; a certificate from the relevant national association (manufacturers', wholesalers' or retailers' association); and two personal licences (one each from the MCAZ and the Health Professions Authority). The chairpersons of the three national associations pointed out in interviews that requiring two personal licences unduly increased the cost of doing business. Inspection of the premises where pharmaceutical activities are to be performed is a prerequisite for the granting of a licence. These premises include manufacturing plants, wholesale and retail distribution facilities, and pharmacies. They are inspected for GMP compliance. A licence for premises lays down conditions for manufacturing or selling approved medicines only. Interestingly, Zimbabwe has a licensed manufacturer of African traditional medicines. Licensing is required of pharmacists, dispensing medical practitioners, veterinary surgeons and other such practitioners.

The licensing of sites and persons for medical cannabis production entails compliance with more stringent conditions.

Narcotics legislation

In Lesotho, narcotics were initially regulated by the Dangerous Medicines Act of 1973, which was eventually replaced by the Drugs of Abuse Act of 2008. Unlike the earlier instrument, which was a purely pharmaceutical law regulating narcotics, the 2008 Act also stipulates how to deal with the medical use of narcotics, including prescribing, dispensing, using and storing such drugs. Moreover, it established the Lesotho Narcotics Bureau as a regulator for all matters related to drugs of abuse.

The 2008 Act allows cannabis to be legally cultivated in Lesotho for medicinal purposes. On the basis of this law, regulations have been developed by the Minister of Health to license and regulate the operation of medical cannabis companies, namely the Drugs of Abuse (Cannabis) Regulations, 2018, and their amendment of 2019.

The Cannabis Regulations stipulate how to cultivate, manufacture, export and transport cannabis plant matter. They do not regulate the use of medical cannabis in the country; normally, potent products would be kept in locked narcotics storage cupboards, used under prescription and dispensed by pharmacists. The Regulations also do not specify what should be done with cannabis products that fail tests in the foreign markets where they are meant to be sold. These gaps in the regulatory framework favour the manufacturing of different formulations that are locally marketed, and mean that health professionals are unprepared to deal with medical cannabis in the country.

According to Uwakonye (2020), some of the cannabis licensing requirements include submitting proof of one's right to the land used for operations, an aerial map of the operations site, proof of adequate capital and funds, a plan for the implementation of activities, security arrangements and an environmental impact assessment. Licences are valid for one year and are renewable upon expiry. The licence fee is about US$39,000 and it costs around US$26,000 to renew.[11] A licensee is allowed to manufacture, supply, export and transport medical cannabis and cannabis products.

In 2018, the Government of Zimbabwe passed the Dangerous Drugs (Production of Cannabis for Medicinal and Scientific Use) Regulations (Statutory Instrument No. 62) in response to significant demand from corporates interested in the production of medicinal cannabis. Part II of the Regulations focuses on the licensing of sites and persons; it outlines the procedure involved in applying

[11] Interview with an expert, 2021.

for a producer's licence. Pursuant to the Regulations, the application should be submitted to the Minister of Health and Child Welfare.

Applicants for a licence undergo security vetting and have to disclose their plans for the quantity to be produced, sales, production period and the site to be used. If granted, the licence authorizes growers to grow, sell, possess and transport fresh cannabis, dried-out cannabis products, and cannabis oil. A licence to cultivate cannabis costs about US$40,000, whereas a licence to carry out research costs approximately US$5,000 (Prohibition Partners 2019a). A licence is valid for five years and is renewable for a fee of about US$15,000 to grow the crop and US$2,500 to conduct research. Renewal can be requested prior to or upon expiry. The Cannabis Regulations also regulate the general conditions for production, including packaging, labelling and shipping. The Minister may refuse to grant a licence if its issuance is likely to create a risk to public health, safety or security, including the risk of cannabis being diverted to an illicit market or activity.

Good manufacturing practices

Good manufacturing practices entail a system for ensuring that pharmaceutical products are produced in a consistent manner all over the world and are controlled in order to meet quality standards (WHO 2015a). Such a system is important mainly for two reasons:

- Poor quality drugs that do not meet the GMP standard can damage health.
- Pharmaceutical manufacturing companies that meet the GMP standard can export their products abroad.

As noted above, Lesotho has no NMRA that could monitor the application of GMPs, with the inevitable consequence that unsafe drugs get distributed in the country. The case of companies operating in the area of medical cannabis is different. Since they deliver products for export, they must meet the GMP standard.

The Medicines Control Authority of Zimbabwe has published Good Manufacturing Practice Guidelines covering, inter alia, the licensing of new pharmaceutical-manufacturing plant and routine inspections. The MCAZ has opted to apply what can be described as a national, simplified version of GMPs to domestic pharmaceutical enterprises. Clearly, meeting the Zimbabwean GMP standard does not allow national manufacturers to export their products to economically advanced regions of the world, where the WHO-recommended GMP standard is applied. As in Lesotho, companies in Zimbabwe that specialize in medical cannabis meet the WHO GMP standard and can therefore export their products to Europe and North America.

Intellectual property legislation

In Lesotho, there are three intellectual property regimes: the industrial property regime, the copyright regime and the plant breeders' rights regime. The first of these includes patents for inventions, utility models (petty patents), industrial designs, trademarks for the identification of goods, trade secrets, service marks for the identification of services, and topographies of integrated circuits. The industrial property regime is relevant to pharmaceuticals in that it provides for the legal protection of new drug discoveries made in the country, and also in view of the fact that there are many emerging medicinal plant formulations that require protection.

A number of laws and regulations deal with intellectual property in Lesotho: the Copyright Order, 1989, Industrial Order No. 5 of May 1989, the Industrial Property Amendment Act of 1997, and Industrial Property Order No. 22 of April 1993.

Both Lesotho and Zimbabwe have aligned their legislation on intellectual property rights with the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement). This is one of the agreements adopted under the aegis of the World Trade Organization that has created opportunities for the pharmaceutical sector. The TRIPS Agreement has introduced global minimum standards for protecting intellectual property rights, including pharmaceutical products and processes. The 2001 Declaration on the TRIPS Agreement and Public Health exempts developing countries from compliance with the Agreement with respect to pharmaceutical products until 1 January 2033 (Banda et al. 2016). TRIPS flexibilities allow countries to manufacture patented medicines as long as they declare a state of emergency.

Zimbabwe has modified its intellectual property rights legislation to implement the TRIPS Agreement. This was reflected in the amendment to the 1971 Patents Act in 1994 and the development of the Patents Amendment Bill of 2001 (Munyuki and Machemedze 2010). The statutes have provisions for granting patents to pharmaceutical manufacturers. Despite the diligent management of intellectual property rights by the Zimbabwe Intellectual Property Office, the Government declared a state of emergency in 2002 and overrode patents on antiretrovirals (Mabika, Makombe and Loewenson 2006). The Government issued a compulsory licence to facilitate the local manufacture and import of such drugs (Kokerai 2005; Shonge 2018). This intervention was justified by Section 35 of the Patents Act (1994), which stipulates that in an emergency the State or any person authorized by the State may make, use or sell any patented invention for any purpose deemed by the Minister to be necessary or expedient for the maintenance of supplies and services that are essential to the community (Kokerai 2005).

The African Union has called upon its Member States to promote and ensure access to medicines by adopting TRIPS flexibilities and taking advantage of waivers from the provisions of the TRIPS Agreement. Moreover, one of the key objectives of the African Regional Intellectual Property Organization (ARIPO) – originally established as the African Regional Industrial Property Organization in 1976 – is to promote the harmonization and development of intellectual property laws among Member States. Both Lesotho and Zimbabwe are members of ARIPO, which seeks to strengthen cooperation among States on the protection and exploitation of patents. This includes the implementation of new global systems for the regulation of intellectual property standards dating from as early as the mid-1990s. Such efforts have prompted a number of developing countries to establish new national institutions to review, approve and manage the developing intellectual property rights system. Zimbabwean pharmaceutical companies have been producing generic products, and there has been no demand for patents (UNIDO 2017).

Regional trade regulations

More than for Lesotho, whose pharmaceutical sector consists solely of wholesale and retail enterprises, regional trade regulations are important for Zimbabwe, whose comparative advantage in exports may be ascribed to its pharmaceutical manufacturing companies.

A major challenge in accessing the Southern African regional market is that the regulatory processes of countries have not been harmonized to provide for easy access and testing of medicines. An opportunity was the launching, in 2011, of the ZAZIBONA regulatory harmonization initiative by Zambia, Zimbabwe, Botswana and Namibia (WHO 2015b; Sithole et al. 2020). These four countries agreed to work under a collaborative procedure for medicines registration with technical support from the WHO (Sithole et al. 2020). Under the initiative, it is possible to submit registration applications simultaneously to all SADC members for joint evaluation and approval in all the countries. By 2013, the time taken to grant marketing authorization in the individual States had decreased significantly. Assessments of medicine-manufacturing and -testing facilities are performed jointly. Medicines that meet the assessment criteria are subsequently granted marketing authorization in the participating countries to which applications have been submitted. Sadly, a lack of political will has led some States in the region to impose non-tariff barriers to trade. For example, South Africa accepts only pharmaceutical products imported by air, thereby making the export of Zimbabwean drugs to that country non-competitive (Sithole et al. 2020). The insistence on air transport

for pharmaceuticals has been justified on the grounds that the border between Zimbabwe and South Africa is porous.[12]

Compliance with laws and regulations

In Lesotho, a major issue apart from compliance is the incomplete regulatory framework. Product registration, quality monitoring and pharmacovigilance are still not covered by legislation, as the Medicines and Medical Devices Bill, 2013, has not yet become law. Moreover, the Medical, Dental and Pharmacy Order, 1970, has no inspection component. Hence, there is still a legal gap concerning the responsibility of pharmacists for the compounding of medicines.

At present, safe access to and use of medicines cannot be guaranteed in Lesotho. The licensing process has serious shortcomings. In particular, pharmaceutical retail and wholesale enterprises are licensed like any other retailer, and there is no regulated professional supervision or inspection.

Because of Lesotho's inadequate regulatory framework, in order to determine the level of standards applied in the industry, compliance has been checked against South African regulations. Formerly known as the Medicines Control Council, the South African medicine control agency is now called the South African Health Products Regulatory Authority (SAHPRA). It monitors compliance with pharmaceutical regulations, some of which are relevant to Lesotho, as they are general pharmacy requirements that are applicable to any pharmacy setting in any country. Other conditions are country specific and will not apply to the pharmaceutical sector in Lesotho.

Nine pharmaceutical companies (retailers and wholesalers) participated in the survey (see the introduction to Chapter 3 for details). Only five managers completed the questionnaire, of whom one was the manager of a medical cannabis company (see the introduction to Chapter 8 for details of a specific survey targeting medical cannabis manufacturers). Three of the five managers responded to questions regarding the SAHPRA regulations from 2019. The findings, presented in table 5.1, indicate that the companies met the requirements pertaining to licensing, staff competence and protective clothing.

Some rules apply to manufacturing companies. Since the respondents were drawn from retail pharmacies and wholesalers, they did not answer questions that did not concern them directly, such as questions about whether quality control laboratories had issued them with certificates of analysis. Nevertheless, two managers indicated that they were in compliance with the requirements related to packaging and labelling, equipment used, storage and pharmacovigilance, which are relevant for manufacturers but not for distributors.

[12] Interview with a representative of the Pharmaceutical Retailers Association, 28 May 2020.

▶ Table 5.1. Compliance with SAHPRA regulations according to three managers of pharmaceutical retail and wholesale companies in Lesotho

SAHPRA regulations		Yes
a.	Does your company have a valid licence?	3
b.	Are the personnel competent and qualified? Does the training schedule for personnel meet all the requirements?	3
c.	Do the premises of your company comply with current SAHPRA regulations (from 2019)?	1
d.	Have you met all the requirements applicable to the manufacture of pharmaceutical products / distribution of pharmaceutical products / retail of medicines and medical commodities?	3
e.	Does the manufacturing of pharmaceutical products meet all the requirements?	0
f.	Does your company have adequate and correct protective clothing for all personnel according to their station of work?	3
g.	Is manufacturing / distribution / retailing-related record-keeping performed in line with the requirements?	2
h.	Does your company's quality control laboratory meet all regulatory requirements?	0
i.	Do your company's equipment and instruments meet the requirements for the purposes intended?	2
j.	Do the packaging and labelling of pharmaceutical products fulfil all the conditions stipulated by the SAHPRA regulations?	2
k.	Does the storage of the pharmaceutical products meet the legal requirements?	2
l.	Do the corrective and preventive action and pharmacovigilance plans meet the requirements?	2
m.	Does your company have periodic regulatory inspections in line with the SAHPRA regulations?	0

Source: Survey conducted under ILO research project, 2021.

Lesotho's Cannabis Regulations, promulgated in 2018 and amended in 2019, govern licensing, personnel, premises, cultivation, manufacturing, record-keeping, security packaging, labelling and testing (see Table 5.2). The Regulations also cover transportation and export and import licensing. For the cannabis companies to remain in operation, they have to comply with all legal

requirements. They provide a monthly report to the Ministry of Health, which in turn reports to the International Narcotics Control Board.

▶ Table 5.2. Compliance with Lesotho's Cannabis Regulations from 2018 according to the manager of a medical cannabis company

Compliance with the Drugs of Abuse (Cannabis) Regulations, 2018	Fully met	Not yet fully met
Does your company have a valid licence? Type of licence_____	✓	
In terms of key personnel hired, are you compliant? (A pharmacist ✓; a grower ✓; an analyst ✓)	✓	
Do the premises of your company comply with the relevant requirements? (2 metre security fence ✓; video cameras ✓; running water ✓; ventilation ✓; security alarm system ✓; armed security guards ✓)		✓
Have you met all the requirements to cultivate cannabis?	✓	
Does the manufacturing of cannabis products meet all the requirements?		✓
Is cannabis record-keeping performed according to the requirements?	✓	
Is testing of cannabis products carried out at an independent laboratory?	✓	
Do the packaging and labelling of the cannabis products fulfil all the conditions stipulated by the Cannabis Regulations?		✓
Does the handling of cannabis waste meet all the requirements stipulated in the Cannabis Regulations?	✓	
Does the transportation of cannabis and cannabis products meet all the legal requirements?	✓	
Do the exportation and importation of cannabis meet the legal requirements?		✓

Source: Survey conducted under ILO research project, 2021.

As indicated in Chapter 8, at least eight medical cannabis businesses are registered and licensed in Lesotho. Of the three that were surveyed, one provided the responses presented in table 5.2. According to its manager, the company complied with most of the requirements of the Drugs of Abuse (Cannabis) Regulations, 2018. The enterprise was fully compliant with regard to having a licence, key personnel, cultivation requirements, record-keeping,

testing of cannabis and waste management. The areas in which the legal requirements were not yet fully met were manufacturing, premises, packaging and labelling, although for premises most of the requirements were met (2 metre security fence, armed security guards, running water and ventilation).

Some unstructured interviews with informal stakeholders were also organized. These respondents pointed out that retail pharmacies were inspected before they started operations, but that what happened afterwards was not checked. Pharmacies were run by individuals who were not qualified and no one was stopping them. In addition, medicines were sold without prescription. The respondents revealed that "a lot of traditional medicines are produced and sold in the streets of Lesotho without being regulated". One even asserted that "some small companies are producing products with cannabidiol, which is the medicinal component of cannabis, even when they do not have a licence to do so".

The general feeling is that it is very easy to enter the pharmaceutical sector: some respondents said that they were "not aware of restrictions", adding that "if laws were restricting, there would not be so many street concoctions".

In Zimbabwe, as a result of the impact of political and economic crises on the sector, there has been a proliferation of substandard and falsified medicines in recent years. Some analysts have observed that although the Zimbabwean market is well regulated, particularly as regards import and export controls on licit medicines, enforcement of the law has been ineffective (Gwatidzo, Murambinda and Makoni 2017). Some shortcomings have also been identified in quality assurance for imported medicines (Kumaranayake et al. 2000; Zimbabwe, Ministry of Health and Child Welfare 2011). The likelihood of prosecution is perceived as being very low, which highlights the need to strengthen the regulatory framework in relation to substandard and falsified medicines, and to enforce adherence to policies, standards and procedures.

With the informal economy on the rise in Zimbabwe, innovative solutions are needed to address the proliferation of substandard and falsified medicines. Informality in the sector has included the employment of unlicensed pharmaceutical sales representatives by some importing companies – a practice ascribed to the fact that no permit is required to import registered drug products. Therefore, once a company registers a product, any other company may import and distribute that product using unregistered sales representatives (Ratanawijitrasin and Wondemagegnehu 2002).

National regulations require domestic and international manufacturers to comply with GMP standards, but compliance with internationally recognized standards for producing medicines has proved to be daunting. In 2017, the United Nations Industrial Development Organization carried out a GMP assessment of eight Zimbabwe-based pharmaceutical manufacturers on

17 key quality elements as outlined in the WHO guidelines on GMP standards. The assessment revealed that all eight companies were not fully compliant. For internationally recognized GMP standards to be met, there needs to be substantial investment in plant refurbishment and training in quality assurance (UNIDO 2017). The application of GMPs has nevertheless been observed in cannabis production in Zimbabwe. For instance, a manufacturing company located in the outskirts of the city of Marondera has trained its staff in GMP certification (Bulawayo 24 News 2019).

Small-scale cannabis growers

In Lesotho, two small-scale informal cannabis growers were interviewed. They were unhappy about the situation – in particular, about the restrictions on entering the cannabis subsector due to licence fees and the various operational requirements. They complained that these restrictions were not fair, all the more so since they were local farmers who knew about cannabis, though not what was referred to as medical cannabis. Their indigenous cannabis had long been used for medicinal purposes, so they did not regard medical cannabis as having distinctive characteristics. In addition, they felt that locals should be allowed to pay less for a licence than foreign applicants:

> We say that the laws should be made properly, since it is not fair that people are being discriminated against. Mostly poor people are the ones who deal with cannabis. Laws should be made bearing in mind poor people so that they can have a way of living.

In contrast, other interviewees argued that entry into the sector should be restricted to ensure that the country's products complied with international regulations. They further pointed out that "the high fees have the advantage of keeping out any unscrupulous players that might come in and ruin the legal landscape of the industry".

In Zimbabwe, some potential growers may not be able to afford the exorbitant application fees of US$46,000 for a licence (Gomes 2019). Unless countries are able to put carefully designed regulatory frameworks in place that allow local farmers to work in mutually beneficial partnerships with companies, the legalization process risks excluding marginalized small-scale farmers from the medical cannabis value chain (Bewley-Taylor, Jelsma and Kay 2019).

Concluding remarks

What appears to be evident is that the regulatory framework for the pharmaceutical sector in Lesotho is incomplete. Immediate action is required to ensure that the Medicines and Medical Devices Bill, 2013, finally becomes law.

The regulatory framework in Zimbabwe seems quite comprehensive, yet the pharmaceutical sector is not growing. It is difficult to assess whether this is due to the legislation or to the economic and political challenges that the country has been facing over the past few years. Some of the evidence presented in this chapter invites the conclusion that simplifying the licensing procedures could help to boost the sector.

There has been no progress in enhancing GMPs in Zimbabwe to ensure compliance with WHO standards, but it is difficult to conclude that the regulatory framework is to blame. The problem, rather, is the unaffordable level of investment that domestic companies need to undertake in order to upgrade their production.

The influx of substandard and falsified medicines has not stopped, because the enforcement mechanism is weak. Even in this case, though, the information presented in this chapter does not allow one readily to conclude whether it is due to an inadequate regulatory framework or to the increasingly challenging economic situation in the country and the high cost of medicines, which large numbers of people cannot afford.

In both Lesotho and Zimbabwe, the situation of the medical cannabis subsector is very different. Non-compliance is reportedly limited because entry into the subsector is not easy, owing to the high licence fees and regular inspections. In both countries, indigenous cannabis farmers seem to have been disappointed in their expectations: they had thought that the legalization of cannabis would extend to their operations as well. Illegal cannabis cultivation remains an issue in both countries. It is to be hoped that the growth and development of the formal subsector will lead to innovative ways of involving small-scale growers in the legal medical cannabis industry.

6 Labour standards and decent work deficits

Introduction

This chapter explores the extent to which fundamental principles and rights at work are respected in the pharmaceutical industry in Lesotho and Zimbabwe and the implications of this for decent work. When it comes to achieving sustainable development, decent work is both a means and an end. It plays a key role in poverty eradication. Sustainable Development Goal 8 calls for, among other things, "decent work for all" (ILO 2016).

The core international labour Conventions inform the analysis undertaken for this chapter. The collection of primary data through surveys and interviews provided the necessary material to assess country situations. Two factors determined the adoption of different methodological approaches.

First of all, the COVID-19 restrictions made it impossible to conduct face-to-face surveys and site visits, particularly in Zimbabwe. Employees in that country could not be reached, despite several attempts. Moreover, since the strength of the Zimbabwean pharmaceutical sector lies in manufacturing, companies involved in drug production were the target of the research. Unfortunately, access to these firms was also made difficult by the stringent anti-contamination rules that were in place to protect production. Hence, only online and telephone interviews with key informants and managers were conducted. Secondary data were used to complement the information presented.

Accessing distributors and retail enterprises in Lesotho was easier. Face-to-face interviews were sometimes possible thanks to the strict COVID-19-related safety measures observed by the local researchers. Online surveys were, however, used in most cases.

As mentioned in the introduction to Chapter 3, a non-probability judgemental sampling approach was adopted for Lesotho. Out of a total of 46 existing enterprises nationwide, 10 were surveyed and responses were obtained from 9 of them: 1 retailer from the mountainous districts, 1 retailer and 1 wholesale firm from the northern region, 1 retailer and 1 wholesale firm from the southern region, and 3 retailers and 1 wholesale firm from the capital city Maseru, where most pharmaceutical activity takes place. Both owners/

managers and employees were surveyed. In total, answers were received from 5 owners/managers and 25 employees. One of the five managers was from a medical cannabis company.

The information obtained through these interviews and surveys is presented in the following sections, though first of all an overview of the legal framework is provided.

Ratification of international labour Conventions

Both Lesotho and Zimbabwe have ratified the eight core international labour Conventions on freedom of association and collective bargaining and on the abolition of child labour, forced labour and all forms of discrimination. These Conventions are as follows:

- Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)
- Right to Organise and Collective Bargaining Convention, 1949 (No. 98)
- Forced Labour Convention, 1930 (No. 29)
- Abolition of Forced Labour Convention, 1957 (No. 105)
- Minimum Age Convention, 1973 (No. 138)
- Worst Forms of Child Labour Convention, 1999 (No. 182)
- Equal Remuneration Convention, 1951 (No. 100)
- Discrimination (Employment and Occupation) Convention, 1958 (No. 111)

Lesotho has ratified a total of 23 international labour Conventions and 1 protocol. Twenty-one of these instruments are in force and one has been denounced.

Zimbabwe has ratified 26 international labour Conventions and 1 protocol. All of them are in force and one has been denounced. Unlike Lesotho, Zimbabwe has ratified the Chemicals Convention, 1990 (No. 170), and the Prevention of Major Industrial Accidents Convention, 1993 (No. 174) (ILO n.d.). These two ILO instruments are particularly relevant – alongside the Occupational Safety and Health Convention, 1981 (No. 155) – when identifying decent work deficits in relation to environmental standards in the pharmaceutical industry (see Chapter 7).

Labour legislation

In both countries, labour legislation is based on principles contained in the national constitution which are further detailed in a labour code or labour act. Tables 6.1–6.2 provide a snapshot of the main provisions of these acts.

▶ Table 6.1. Labour legislation in Lesotho

Source of law	Description
Constitution of 1993 as amended up to 2018	• The right to freely choose or accept work • Remuneration that provides fair wages and equal remuneration for work of equal value • Rest, paid holidays and limited working hours • Freedom from discrimination • Freedom to join and form a trade union
Labour Code Order, 1992	• Covers employees with contracts that clearly specify the terms and conditions of employment (e.g. employment duration, working hours, wages, benefits, holidays and overtime remuneration) • Describes unfair labour practices and forced labour, in which employees are forced to perform any work or service by any kind of threat, intimidation or coercion (e.g. a different job from that specified during recruitment, with a substantive change in job tasks from those agreed; for a longer period of time than agreed; with no or limited freedom to terminate the work contract) • Describes other unfair labour practices, notably ones facing employees with sexual harassment (where job benefits such as salary increases and promotion are conditional on acceding to some form of sexual behaviour) • Protects female employees, young persons and children from experiencing abuse or discrimination in terms of lower wages and fewer promotion opportunities • Protects employees with disabilities from experiencing discrimination in terms of lower wages and fewer promotion or employment opportunities • All workers, regardless of their natural characteristics at birth and of their socio-economic background, are to receive equal opportunities and treatment • Companies respect the right of employees to establish or engage in collective bargaining with trade unions (collective bargaining is the negotiation between an employer, or top management, and a group of workers, usually through a union; the negotiations can be about wages and working conditions)

Source: Authors' compilation.

▶ **Table 6.2. Labour legislation in Zimbabwe**

Source of law	Description
Constitution of 2013	Sets out fundamental human rights and freedoms, including: • freedom from forced slavery • freedom from forced or compulsory labour • equality and non-discrimination (for instance, the right to equal opportunities for women and men) • freedom of assembly and association • freedom of profession, trade or occupation • freedom to demonstrate and petition • labour rights: – right to fair and safe labour practices – right to form and join trade unions – right to participate in collective job action – right to just and equitable working conditions • rights of children to be protected from child labour
	• Declares and defines the fundamental rights of employees, general conditions of employment, trade union rights and registration of trade unions • Includes the right to fair and safe labour practices and to be paid a fair and reasonable wage • Secures equal opportunities for women through non-discrimination in job advertising; recruitment; the creation, classification or abolition of a post; determination of wages and any other employment benefit; and the provision of facilities related to the workplace • Upholds the principle of non-discrimination and provides for the establishment of institutions and actors responsible for collective bargaining and settlement of disputes, including employment councils, advisory councils and the Labour Court

Source: Authors' compilation.

The following sections examine the extent to which these provisions are being implemented in the pharmaceutical industry in the two countries.

Freedom of association and collective bargaining

Consultation and participation at the workplace can be effective only where there is sufficient respect for the rights of employers and workers to associate freely and for their organizations to represent their interests

adequately (Trebilcock 2011; Nhede 2016). As noted in Chapter 3, the medicine industry in Lesotho is almost entirely composed of micro and small businesses and in Zimbabwe of small and medium-sized firms. Evidence shows that employment relations in small enterprises are informal and based on social networks (ILO 2018b). This helps to explain why formal and collective representation through workers' organizations and collective bargaining are not common in the two countries.

In Lesotho, during an interview with a representative of the Ministry of Health, it emerged that employees' freedom of association at the workplace in the pharmaceutical sector is generally allowed if workers initiate the process. Employers do not, of their own accord, encourage it and employees do not regard employers as supporting unionization. Survey data collected for this study (see Chapter 9) reveal that 62.5 per cent of the alumni of pharmaceutical training institutions are registered with their professional body. This may well be because they find that that organization adequately addresses their needs.

An analysis of open comments provided by some of the 25 interviewees points to ways in which employees handle disputes and conflicts, especially in areas of the country where there are no unions. This information is reported in table 6.3.

▶ Table 6.3. Procedures for handling disputes in Lesotho, especially where there are no unions

	How disputes are handled	Frequency
1.	Procedure was not given, but employees are free to join the union and have been made aware of its existence	8
2.	Procedures are set out in the human resources policies of the organization	1
3.	Approaching the boss directly (all the way up to senior management)	5
4.	At times, supervisors threaten subordinates (this is actually an avoidance approach, whereby employers discourage employees from reporting disputes in the hope that these will eventually go away without having to undergo a formal process)	1
5.	Forums are organized at which the views of people are heard	1
6.	There is a suggestion box for all employees	2
7.	Sending concerns through the staff representative committee	1

Source: Survey conducted under ILO research project, 2021.

In theory, Zimbabwe's pharmaceutical sector supports the rights of employees to set up and join trade unions and associations of their choice

as articulated in international labour Conventions, the country's Constitution and the Labour Act (Nhede 2016; Zimbabwe, Ministry of Public Service, Labour and Social Welfare 2016; Zimbabwe, Ministry of Health and Child Welfare and WHO 2011). Workers in the pharmaceutical industry are represented by the Zimbabwe Congress of Trade Unions. Employers, including those in the pharmaceutical industry, are represented by seven business organizations under the coordination of the Employers' Confederation of Zimbabwe.

Organizations dealing with workers' issues in Zimbabwe's pharmaceutical sector include the National Employment Council (see box 6.1), the Commercial Workers Union of Zimbabwe, the Zimbabwe Chemicals, Plastics and Allied Workers' Union, the Pharmaceutical Society of Zimbabwe and the Pharmaceutical Retailers and Medical Allied Workers' Union (UNIDO 2011b and 2017; Nhede 2016).

▶ Box 6.1. Mandate and functions of the National Employment Council in Zimbabwe

The National Employment Council (NEC) is a state-created body that includes representatives of labour, business and the Government. Workers in the chemicals- battery- and plastic-manufacturing industries are represented. It focuses on the manufacturing sector, including pharmaceuticals as part of the chemical industry. The NEC was established in 1987 to promote industrial relations and is regulated by the Labour Act and related statutes. Its functions include assisting members in preventing and resolving disputes. The NEC has an oversight role in relation to many sectors, but it has proved difficult to agree on specific working arrangements, such as wages and grades. As a result, salaries and grades across the various sectors are not uniform. Each sector participates in the development of its own collective agreement, salaries, grades and conditions of service. The NEC faces serious structural challenges owing to financial constraints. For instance, it has offices only in Harare, despite attempts to set up branches elsewhere in the country. On the other hand, the NEC conducts inspections and site visits throughout Zimbabwe, regardless of where the industries and companies in question are located.

Source: Interview with an NEC official, 2021.

Despite the existence of organizations bringing workers together, the situation on the ground points to inadequate employee representation. In an

interview conducted in 2021 about the participation of workers in collective bargaining, an official from the National Employment Council (NEC) said the following:

> There is very limited stakeholder participation in doing pharmaceutical business. Employees are not considered to be an important business partner and there is arbitration by the employer. With respect to collective bargaining, the employees do not have much power and influence. The trade union is no longer powerful owing to a number of reasons, one of which is the changes emanating from the Labour Act. It is difficult for employees to engage in a lawful strike; it is also very difficult for them to successfully pressurize employers to improve conditions of service. On issues of capital expenditure, employers acquire new technology in response to the Medicines Control Authority of Zimbabwe. Employees have limited say.

The challenges described above with regard to the right of workers to engage in collective bargaining and constructive negotiations are relatively recent, as the NEC official argued: "Prior to 2000, trade unions had more power; employees could threaten by withdrawing their labour and this had the effect of pushing the employers to accede to the demands of the employees."

In accordance with Zimbabwe's Labour Act, the pharmaceutical industry (including manufacturers, wholesalers and retailers) is classified as an essential service. That is why the right of workers to participate in collective job action, including the right to strike, sit in or withdraw labour, is restricted.

Collective bargaining takes place through industry-specific negotiations within the NEC. However, on the whole, the arrangements provided by this mechanism are deficient when it comes to Zimbabwe's pharmaceutical industry. In an interview conducted in July 2020, a representative of the Pharmaceutical Manufacturers Association reported that, owing to the high inflation rate in the country, collective bargaining agreements on wages were reached every three months in the pharmaceutical manufacturing industry.

In 2019, the Tripartite Negotiating Forum Act was adopted with a view to establishing a tripartite entity for consultation, cooperation and negotiation on social and economic issues (ILO n.d.).

There is very scanty information on collective bargaining in Lesotho. Daemane (2014), focusing on textile workers, concludes that the law in the country is not effective in protecting workers' right to bargain. Furthermore, the Public Service Act of 2005 does not allow public and civil servants to engage in a strike as one of the tools of collective bargaining.

To try to gauge the extent to which the right to collective bargaining is respected in the pharmaceutical sector, the perceptions of employees and owners/managers were captured using a five-point Likert scale, as shown in table 6.4.

▶ Table 6.4. Perceptions of employees and owners/managers of retail and wholesale pharmaceutical enterprises in Lesotho regarding respect for the right to collective bargaining (percentage)

	Perception	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	No answer given
Employees	Right to collective bargaining is respected	26.9	23.1	38.5	3.8	3.8	3.9
Owners/ managers	Right to collective bargaining is respected	80.0	20.0	–	–	–	–

Note: – = nil.
Source: Survey conducted under ILO research project, 2021.

Interestingly, the views of employees differ considerably from those of owners/managers. Fifty per cent of employees agree or strongly agree that the right to collective bargaining is respected, compared with 100 per cent of owners/managers.

If employees' responses are disaggregated by years of experience, it emerges that those who have worked for more than ten years have more positive views than the rest. Furthermore, if the type of ownership is taken into account, it may be seen that employees in joint ventures opt for a neutral opinion more frequently than sole traders and employees of the state-owned company, who take a more positive view.

Child labour and forced labour

The literature suggests that in Lesotho the problem of child labour is prevalent in agriculture, where children are engaged as herd boys or used in farming activities such as applying pesticides and harvesting. Child labour is also found frequently in the services sector, where children are engaged as

domestic workers or street vendors (Kimane 2006; World Vision 2010; United States, Department of Labor 2018).

In Zimbabwe, a significant number of pharmaceutical products are imported from countries such as India and South Africa (Zuma 2016; UNIDO 2017). Some of these drugs are imported illegally and sold to the public through informal drug dealers. Child labour can be observed in this type of informal activity, mostly in the streets of urban centres (Mutambara 2017). Children are often seen selling pharmaceutical products such as body creams outside the purview of any formal control mechanism.

No information is available on forced labour in the pharmaceutical sector in Zimbabwe. To find out whether this phenomenon occurs in Lesotho, the perceptions of employees and owners/managers were captured using a five-point Likert scale, as shown in table 6.5.

▶ Table 6.5. Perceptions of employees and owners/managers of retail and wholesale pharmaceutical enterprises in Lesotho as to whether forced labour is practised in their sector (percentage)

	Perception	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	No answer given
Employees	Forced labour is practised	7.7	7.7	–	11.5	73.1	–
Owners/ managers	Forced labour is practised	–	–	–	–	100.0	–

Note: – = nil.
Source: Survey conducted under ILO research project, 2021.

Although it is encouraging to learn that a large majority of employees (84.6 per cent) disagree or strongly disagree that forced labour is practised, the fact that over 15 per cent believe the opposite is striking. Interestingly, this negative view is found mainly among female respondents, those with over ten years of professional experience and the employees of joint venture companies. The surveyed owners/managers unanimously considered forced labour not to be practised.

Wages and employment conditions

The primary data collected in Lesotho prompt some observations on employment conditions in relation to education levels. Of the total 25 respondents employed in pharmaceutical retail and wholesale companies, the majority (52 per cent) are diploma holders, while those with a degree make up 28 per cent.[13] This employment pattern is in agreement with the findings of Falk and Leoni (2009), who argue that the dynamics in the sector play a significant role in determining employment paths. Indeed, until 2001, the highest qualification of pharmacy professionals in Lesotho was a diploma (pharmacy technician). This resulted in diploma holders comprising the majority of professional staff in the industry. Degree holders (pharmacists) are only gradually beginning to occupy professional positions that are commensurate with their qualifications (Mwase et al. 2010).

In an interview, officials from the Ministry of Health of Lesotho raised concerns about pharmacists' remuneration being unfair. They pointed out that companies violated labour standards by failing to pay pharmacists in accordance with the value of their profession. Companies typically employed pharmacists in pharmacy technician positions and paid them as such while expecting them to fulfil pharmacist duties.

To further explore employment conditions in the pharmaceutical industry in Lesotho, the perceptions of employees and owners/managers were captured using a five-point Likert scale, as shown in table 6.6.

▶ Table 6.6. Perceptions of employees and owners/managers of retail and wholesale pharmaceutical enterprises in Lesotho as to whether contracts clearly show terms and conditions of employment (percentage)

	Perception	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	No answer given
Employees	Employees have contracts that clearly show terms and conditions	50.0	19.2	7.7	11.6	11.5	–
Owners/ managers	Employees have contracts that clearly show terms and conditions	60.0	–	20.0	–	20.0	–

Note: – = nil.

Source: Survey conducted under ILO research project, 2021.

[13] The remaining 20 per cent have a secondary school qualification.

There seems to be general agreement among employees and owners/managers about contracts setting out clear employment terms and conditions, almost 70 per cent of employees and 60 per cent of owners/managers believing that they do. Surprisingly, employees are slightly more optimistic on that score than owners/managers. The most positive views are expressed by respondents with over ten years of professional experience, those with a diploma and employees of the state-owned company. Sole traders have the most negative views among respondents disaggregated by type of firm ownership.

In Zimbabwe, wages seem to be a genuine problem in the pharmaceutical sector. Because of the difficult economic situation that the country has faced over the past decade or so, companies have failed to regularly pay salaries to their employees. This is true of a local company that had experienced recent closures and that left its workers without wages for months (Mandimika 2015). Negotiations in which employees seek salary increments have become commonplace in the industry as a result of the changing economic conditions (*Zimbabwean* 2008; *NewsDay* 2012). Another company withheld the salaries of 37 workers for over two months to force them to accept voluntary exit packages. Whereas exit packages are normally the outcome of a proper negotiation between workers and employers, this example suggests that unfair social practices do occur in the Zimbabwean pharmaceutical industry (*NewsDay* 2012).

There are also some positive experiences that are worth reporting. Dominant pharmaceutical companies, such as Varichem, CAPS Pharmaceuticals, Datlabs and Plus Five Pharmaceuticals, provide competitive remuneration and have arrangements in place to maintain the real value of wages. Salaries are offered in both local and foreign currencies. This helps to cushion employees from the inflation rampant in the country. The aforementioned companies also provide employees and their families with medical care (Munjanganja, unpublished; Musundire, unpublished; Mutsekwa, unpublished).

Discrimination in respect of employment and occupation

Some interesting conclusions on the pharmaceutical industry in Lesotho can be drawn by considering the sex of survey respondents. A total of 26 answers were received on this variable from employees. There were 16 women and 10 men on the staff of retail or wholesale pharmaceutical enterprises. Among managers, three were women and two were men. In higher education institutions in Lesotho that provide qualified labour for this sector, female students always outnumber their male counterparts (Lesotho, Council on Higher Education 2017).

Some information on discrimination against women and sexual harassment was obtained by capturing the perceptions of workers and owners/managers on a five-point Likert scale, as shown in table 6.7.

▶ Table 6.7. Perceptions of employees and owners/managers of retail and wholesale pharmaceutical enterprises in Lesotho with regard to discrimination against women and sexual harassment (percentage)

	Perception	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	No answer given
Employees	Employees face sexual harassment	7.7	7.7	3.9	3.8	76.9	–
Owners/ managers	Employees face sexual harassment	–	–	–	–	100.0	–
Employees	Women experience discrimination	3.8	15.4	–	7.7	73.1	–
Owners/ managers	Women experience discrimination	–	–	–	–	100.0	–

Note: – = nil.
Source: Survey conducted under ILO research project, 2021.

The responses to the two questions are similar, in that owners/managers completely rule out the possibility of discrimination against women or sexual harassment against employees, whereas about 80 per cent of workers do the same. The respondents who felt that discrimination against women and sexual harassment did take place were all female. Interviewees with over ten years of professional experience believed more than others that sexual harassment did occur, and those aged 25–44 felt more than other age cohorts that women were discriminated against. Interestingly, respondents from the state-owned company denied that any form of sexual harassment or discrimination against

women took place, whereas employees from joint ventures felt more than others that women were discriminated against.

In Zimbabwe, the data provided by a major manufacturer in the country indicate that there is scope for improving the employment situation of women, particularly in terms of numbers (see table 6.8). Clearly, female employees are absent from what one can assume are rather low-skill jobs, such as those in the area of production. However, the specific occupations in each department are not mentioned and it is not possible to conclude whether a woman employed in R&D is a researcher with a high skill level or a secretary.

▶ Table 6.8. Distribution of employees by sex in the departments of a manufacturer in Zimbabwe

Department	Men	Women
R&D	1	4
Quality control	3	4
Accounting and administration	5	3
Validation	3	2
Production	65	0
Quality assurance	2	0
Purchasing	2	0
Human resources	5	2
Engineering	6	1
Marketing and sales	2	6
Total	**94**	**22**

Source: Survey conducted under ILO research project, 2021.

The surveys conducted in Lesotho explored other dimensions of discrimination besides discrimination based on gender. Questions were asked about the perceptions of employees and owners/managers about discrimination against employees with disabilities and about equal opportunities and treatment for all workers. A five-point Likert scale was used to capture their perceptions, as shown in table 6.9.

▶ Table 6.9. Perceptions of employees and owners/managers of retail and wholesale pharmaceutical enterprises in Lesotho with regard to discrimination against disabled employees and equal opportunities and treatment for all workers (percentage)

	Perception	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	No answer given
Employees	Employees with disabilities experience discrimination	7.7	7.7	19.2	7.7	53.9	3.8
Owners/ managers	Employees with disabilities experience discrimination	–	–	–	20.0	80.0	–
Employees	Employees receive equal opportunities and treatment	42.3	30.8	15.4	3.8	3.8	3.9
Owners/ managers	Employees receive equal opportunities and treatment	100.0	–	–	–	–	–

Note: – = nil.
Source: Survey conducted under ILO research project, 2021.

There seems to be disagreement between workers and owners/managers concerning discrimination against disabled employees. Whereas all owners/managers believe that there is no discrimination, only 60 per cent of workers share that view. Those who feel that discrimination does occur are mainly workers with over ten years of professional experience.

Similarly, as far as equal opportunities and treatment for all employees are concerned, views differ between the two groups. All owners/managers believe that equal opportunities and treatment are granted to all workers, whereas just over 70 per cent of employees share that opinion. It is especially diploma holders who are in strong disagreement with owners/managers on that score.

Concluding remarks

Despite obvious limitations in data collection and small sample sizes, it may be concluded that the pharmaceutical sector generally conforms to decent work standards, although some deficits occur in both countries.

Freedom of association is guaranteed by the two countries' laws, but it does not seem to be upheld in Lesotho and it is not upheld very vigorously in Zimbabwe.

Some weaknesses have been identified in the regulatory framework of both countries, particularly as regards collective bargaining and the right to strike. Collective bargaining is perceived to be respected in Lesotho, though the rate of positive responses in the survey was not very high. In Zimbabwe, collective bargaining is marked by tension and takes place under rather conflictual conditions and with very uneven levels of negotiation power between the two parties involved. The NEC appears to be an effective institution in Zimbabwe that can be relied upon for future improvements.

Not much information is available on child labour or forced labour in the pharmaceutical sector. The fact that, according to a few survey respondents in Lesotho, there may be some instances of both iniquitous phenomena should draw general attention to them. In Zimbabwe, a clear situation of child labour has been identified.

Unfair remuneration practices are reported in both countries. In Lesotho, wages do not always reflect the level of qualification, and in Zimbabwe there have been cases where workers did not receive their salaries for extended periods.

Discrimination against women does not seem to be a major issue in Lesotho, where pharmaceutical retail and wholesale activities are female dominated. Nonetheless, some respondents do feel that discrimination and sexual harassment occur. Perceptions on discrimination against other vulnerable groups of workers are not completely positive, which suggests that there is scope for improvement. The information available for Zimbabwe on discrimination is too scanty to allow conclusions to be drawn.

In general, it appears that larger companies in Zimbabwe and the state-owned one in Lesotho offer better working conditions than do smaller enterprises. Some major Zimbabwean pharmaceutical firms provide benefits and wage treatment that are deemed to be extremely important for workers. In Lesotho, respondents from the state-owned company (a large enterprise) were the ones most likely to say that contracts clearly indicated the terms and conditions of employment. In addition, they felt that there was no sexual harassment or discrimination against women in their sector.

7 Environmental protection and occupational safety and health

Introduction

Medicines can have a negative impact on the environment at any stage of their life cycle, whether during production, use or disposal. Among the harmful effects of pharmaceutical wastes on ecosystems are renal failure in birds of prey such as vultures, and reproduction and growth inhibition in fish. Pharmaceutical residues in the environment are also a driver of antimicrobial resistance, which is a major public health issue (Maghear and Milkowska 2018). The active ingredients of prescribed drugs that are discharged into the natural aquatic environment through wastes may pollute drinking water and lead to negative impacts on human health (Kadam et al. 2016). Clearly, pharmaceutical companies have a significant role to play in the control of wastes and pollution that may have major negative consequences for humankind and the environment.

The pharmaceutical industry presents health risks also from the inside. Exposure to pharmaceutical agents at work can have negative health effects on employees. Occupational health interventions and policies to protect workers from occupational hazards are therefore crucial (Scott 2003). Furthermore, the hazardous nature of the chemical substances that are handled in the industry makes potential accidents extremely dangerous, necessitating special precautionary measures.

This chapter explores the extent to which environmental standards and policies are respected in the pharmaceutical industry in Lesotho and Zimbabwe. The focus is on those national norms and international standards that limit the potentially dangerous environmental impact of pharmaceutical firms and that safeguard workers' health. By taking occupational safety and health standards into consideration as well as labour standards (see Chapter 6), it is possible to assess further decent work deficits in the sector.

The collection of primary data through surveys and interviews helped to shed some light on country situations. Two factors determined the adoption of different methodological approaches.

First of all, the COVID-19 restrictions made it impossible to conduct face-to-face surveys and site visits, particularly in Zimbabwe. Employees in that country could not be reached, despite several attempts. Moreover, since the strength of the Zimbabwean pharmaceutical sector lies in manufacturing, companies involved in drug production were the target of the research. Unfortunately, access to these firms was also made difficult by the stringent anti-contamination rules that were in place to protect production. Hence, only online and telephone interviews with key informants and managers were conducted. Secondary data were used to complement the information presented.

Accessing distributors and retail enterprises in Lesotho was easier. Face-to-face interviews were sometimes possible thanks to the strict COVID-19-related safety measures observed by the local researchers. Online surveys were, however, used in most cases.

As mentioned in the introduction to Chapter 3, a non-probability judgemental sampling approach was adopted for Lesotho. Out of a total of 46 existing enterprises nationwide, 10 were surveyed and responses were obtained from 9 of them: 1 retailer from the mountainous districts, 1 retailer and 1 wholesale firm from the northern region, 1 retailer and 1 wholesale firm from the southern region, and 3 retailers and 1 wholesale firm from the capital city Maseru, where most pharmaceutical activity takes place. Both owners/managers and employees were surveyed. In total, answers were received from 5 owners/managers and 25 employees. One of the five managers was from a medical cannabis company.

The information obtained through these interviews and surveys is presented in the following sections, though first of all an overview of the legal framework is provided.

International environmental standard

The OECD Guidelines for Multinational Enterprises recommend that companies put in place a system of environmental management and carry out adequate environmental impact assessments for proposed activities. Enterprises should also adopt technologies that are safe for the environment, and provide their workers with training in environmental matters, including training on how to handle hazardous materials and prevent environmental accidents. It is worth remembering that guidelines, by definition, are not mandatory. Firms can therefore choose whether or not to implement them, without facing sanctions if they decide not to.

In 1996, the International Organization for Standardization (ISO) issued an international standard for environmental management systems, ISO 14001, which provides for the certification of those businesses that meet its requirements. This standard calls for the adoption of an environmental policy demonstrating that an enterprise wishes to improve its environmental performance. In order for that policy to be implemented properly, an environmental management system is necessary. Through external audits by authorized bodies, a business can be granted ISO 14001 certification indicating that it has an effective and well-functioning environmental management system in place to support its implementation of an existing environmental policy. This is a voluntary process that does not in any way exempt a company from respecting national environmental legislation and regulations. It should be noted that meeting the requirements of the ISO 14001 standard may prove too expensive for small businesses, which may not always see the benefits of certification (Imperial College 2005).

Some international labour Conventions are important for workers' safety and their protection from environmental hazards at the workplace. Both Lesotho and Zimbabwe have ratified the Occupational Safety and Health Convention, 1981 (No. 155).

Two other Conventions deal with the protection of workers, local communities and the environment, namely the Chemicals Convention, 1990 (No. 170), and the Prevention of Major Industrial Accidents Convention, 1993 (No. 174). Unlike Lesotho, which has ratified neither, Zimbabwe has ratified both (ILO n.d.).

These three ILO instruments are particularly relevant when identifying decent work deficits in relation to environmental standards in the pharmaceutical industry.

National laws and policies

In both countries, legal norms protecting the environment are mentioned in the national constitution and elaborated in specific acts. Tables 7.1 and 7.2 provide an overview of existing provisions.

▶ Table 7.1. Environmental legislation in Lesotho

Source of law	Description
Constitution of 1993	• Lays down that Lesotho shall adopt policies to protect and enhance the natural environment and to ensure that all citizens are able to enjoy a sound and safe environment adequate for their health and well-being
National Environmental Policy, 1998	• Deals with the management and conservation of natural resources and the promotion of community participation • Calls for the development of guidelines and procedures for environmental impact assessment, audits, monitoring and evaluations to minimize or mitigate adverse environmental impacts
Environment Act 2001	• Provides for the management of the environment and all natural resources, and for related matters • Stipulates that an environmental impact assessment is to be undertaken for all projects and activities indicated in the list attached to the Act, some of which are related to the construction of health facilities and to the treatment and disposal of medical waste • Prohibits the discharge of hazardous substances, chemicals and materials into the environment • Describes the procedures for the acquisition of an effluent discharge licence, a pollution licence and an ionizing radiation licence
Drugs of Abuse Act 2008, together with the 2018 regulations on medical cannabis and the 2019 amendment to the Act	• Requires an environmental impact assessment before a licence may be granted
Labour Code Order, 1992	• Deals with health, safety and welfare at work

Source: Authors' compilation.

▶ Table 7.2. Environmental legislation and policy in Zimbabwe

Source of law	Description
Constitution of 2013	• Aims to ensure that every person has the right to a safe environment that is not harmful to individual health or well-being • Seeks to attain a sustainable environment that is protected from pollution and ecological degradation through reasonable legislation and other measures
Environmental Management Act 2002 (Chapter 20:17)	• Harmonizes approaches to environmental management, compliance and monitoring, and strengthens regulations on environmental impact assessment • Stipulates that waste volumes must be reduced through treatment, reclamation and recycling; violators are liable to imprisonment for a maximum of five years or a fine of up to 5 million Zimbabwean dollars • Prohibits the discharge of hazardous substances and chemicals into the environment; the transport of wastes is permitted only with a valid licence
Effluents and Solid Waste Disposal Regulations (Statutory Instrument No. 6, 2007)	• Regulate the disposal of waste (solid and effluent) through the licensing of industries using the "polluter pays principle", whereby those with highly polluting activities pay the highest annual fees • Establish water quality standards for effluent discharges into the environment
Hazardous Substances and Pesticides Regulations (Statutory Instrument No. 2, 2018)	
Environmental Management (Hazardous Waste Management) Regulations (Statutory Instrument No. 10, 2007)	
Zimbabwe National Occupational Safety and Health Policy, 2014	• Assigns occupational safety and health responsibilities to both employers and employees • Grants workers the right to refuse to undertake unsafe work

Source: Authors' compilation.

Monitoring mechanisms

The Lesotho Environment Authority monitors and audits the activities described in the Environment Act 2001. This institution is responsible for setting all key environmental quality standards pertaining to water, air, waste, soil, noise, ionizing and other radiation, and noxious smells. It also prepares guidelines for responding to environmental disasters and other relevant standards. However, it should be noted that the standards listed above have not been established yet.

In Zimbabwe, the Environmental Management Act of 2002 established the Environmental Management Agency for the execution of its provisions. Different government departments remain responsible for the implementation of parts of the Act that impinge on their respective portfolios (Rajah, Rajah and Jerie 2012).

The Medicines Control Authority of Zimbabwe (MCAZ) also plays a significant role in protecting the environment. Indeed, promoting the attainment of GMP standards improves safety and efficacy in the production of pharmaceuticals, which in turn leads to more secure and often cleaner technology that has fewer negative effects on the environment. Furthermore, the MCAZ monitors the registration of drugs and the circulation of unauthorized medicines, which may cause environmental issues when they are disposed of. This body is also responsible for authorizing importers of pharmaceutical products and for granting export permits.

Environmental policies and environmental management systems in enterprises

The OECD Guidelines for Multinational Enterprises recommend that companies set up an environmental management system for the collection of relevant information on the impact of their activities on the environment and for taking action to mitigate any negative effects. Similarly, the ISO 14001 standard calls for the adoption of an environmental policy demonstrating that an enterprise wishes to improve its environmental performance, together with an environmental management system to implement that policy.

To assess whether an environmental policy and an environmental management system were in place in pharmaceutical retail and wholesale firms in Lesotho, the perceptions of employees were captured using dichotomous questions (with “yes” or “no” alternatives supplemented by “don’t know”), as shown in table 7.3

▶ Table 7.3. Perceptions of employees of retail and wholesale pharmaceutical enterprises in Lesotho regarding the existence of an environmental policy and of an environmental management system (percentage)

Elements of environmental standards	Yes	No	Don't know	No answer given
Enterprise has an environmental management system in place	57.7	7.7	34.6	–
Enterprise has a clear environmental policy	46.1	15.5	38.4	–
Enterprise assigns responsibilities for environmental matters to specific individuals	69.2	11.6	19.2	–
Enterprise periodically monitors and/or measures operations that may have an environmental impact	61.5	11.6	26.9	–
Enterprise reviews its operations and identifies activities that may affect the environment	53.8	15.4	30.8	–

Note: – = nil.

Source: Survey conducted under ILO research project, 2021.

The findings presented in table 7.3 are not very encouraging. About one third of respondents did not know what to reply. Moreover, if an environmental management system is required to implement an environmental policy as set out in the ISO 14001 standard, it is odd that there were more respondents confirming the presence of such a system (57.7 per cent) than those claiming that a clear environmental policy was in place (46.1 per cent). It seems that knowledge of environmental standards is limited among employees in general. This conclusion applies to Zimbabwe as well. A major challenge encountered by Plus Five Pharmaceuticals in that country included lack of awareness and understanding of environmental, safety and health standards.[14]

Fewer than half of all employees interviewed in Lesotho stated that an environmental policy had been adopted. However, on the whole, if one considers the other answers reported in table 7.3, it does look as if the various elements of a proper environmental management system are present. About 70 per cent of the employees surveyed felt that responsibilities for

[14] Interview with a Plus Five Pharmaceuticals manager, 15 July 2021.

environmental matters had been clearly assigned to specific individuals. Of all the elements underpinning environmental standards, this seems to be the one that is most likely to be implemented in retail and wholesale companies in the country.

Two questions that are rather similar receive quite different positive response rates. For over 60 per cent of interviewees, the enterprise where they work periodically monitors and/or measures operations that may have an environmental impact. Fewer employees, just under 54 per cent, consider that their enterprise reviews its operations and identifies activities that may affect the environment.

Disaggregation of the data indicates that the respondents expressing the most positive views are women, employees with over ten years of professional experience and older employees. Interestingly, employees from joint ventures have more positive perceptions than respondents from sole trader companies and the state-owned enterprise.

In Zimbabwe, interviews with managers and key informants reveal that Varichem Pharmaceuticals, Plus Five Pharmaceuticals and Datlabs, which are three major manufacturers, have adopted general environmental policies. None of them, though, is ISO 14001 certified.

These interviews indicate that the adoption of such environmental policies at the company level arises from the need to observe national legislation and the fear of having to pay heavy fines.

It is interesting that, in complying with environmental management measures, all the surveyed pharmaceutical companies reported positive spillover effects. Adhering to environmental policies encouraged the businesses to adopt new technology that is more efficient in terms of energy consumption, avoidance of waste creation, and productivity. For example, Datlabs "had to buy equipment which was not being used in [its] normal testing laboratory and outsource some of the testing which needs specialised equipment … [and install] heating, ventilation and air conditioning and [acquire] processing equipment such as a fluid drier, compression machines and a coating pan".[15]

Similarly, Plus Five Pharmaceuticals has acquired new advanced tanks (with a capacity increase from 800 to 2,000 litres) and changed the formulation of one of its products.[16]

[15] Interview with a Datlabs manager, 17 July 2021.
[16] Interview with a Plus Five Pharmaceuticals manager, 15 July 2021.

Other good practices in reducing environmental pollution include the following:

- Varichem Pharmaceuticals uses a simplified zero liquid discharge wastewater treatment system, whereby the wastewater solvents are stored in tanks and their pH levels are measured so that, if necessary, the solvents can be treated before being discharged.
- All the companies surveyed indicated that they disposed of pharmaceutical products that were faulty or wrongly manufactured before they were released to the next level of the pharmaceutical supply chain. They outsource such disposal activities.
- Varichem contracts with the Harare City Council for disposal of its waste.
- At Datlabs, all waste and malfunctioning products are destroyed using an approved procedure.
- In the event of wrongly processed products at Plus Five Pharmaceuticals, reworks are normally carried out, as is a risk assessment to determine the potential impact of the product on end users.

Occupational safety and health

None of the eight Zimbabwean manufacturers has a department dealing with environmental, safety and health issues. However, Plus Five Pharmaceuticals is in the process of establishing such a department.[17]

Datlabs has a Health and Safety Policy and a Health and Safety Committee and undertakes "annual health audits".[18] This suggests that environmental sustainability, of which occupational safety and health is an important component, is being pursued by the company's senior management.

In the three manufacturing companies whose managers were interviewed, workers' safety is enhanced through the requirement that they wear personal protective equipment such as masks and gloves.

In Lesotho, employees at retail and wholesale pharmaceutical companies were asked whether their employer provided any training on environmental issues related to occupational safety and health. Table 7.4 shows the perceptions of employees and owners/managers captured using a five-point Likert scale.

[17] Interview with a Plus Five Pharmaceuticals manager, 15 July 2021.
[18] Interview with a Datlabs manager, 17 July 2021.

▶ Table 7.4. Perceptions of employees of retail and wholesale pharmaceutical enterprises in Lesotho regarding the provision of training on environmental issues related to occupational safety and health (percentage)

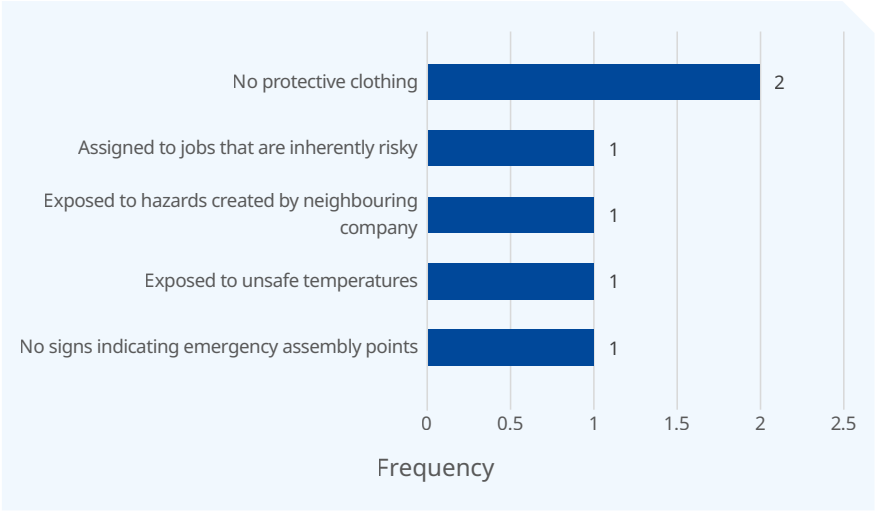
	Perception	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	No answer given
Employees	Employees received training on environmental issues related to occupational health and safety	23.1	42.3	23.1	3.8	3.8	3.9
Owners/ managers	Employees received training on environmental issues related to occupational health and safety	40.0	40.0	20.0	–	–	–

Note: – = nil.
Source: Survey conducted under ILO research project, 2021.

About 65 per cent of employees agree or strongly agree that training on environmental issues related to occupational safety and health is provided at their workplace. More positive perceptions are found among respondents who are female, those with over ten years of professional experience and those employed in joint ventures. An even greater majority of owners/managers (80 per cent) express positive views, although it should be noted that their views on the level of respect for some labour rights and non-discrimination were even more optimistic, their "strongly agree" responses reaching up to 100 per cent.

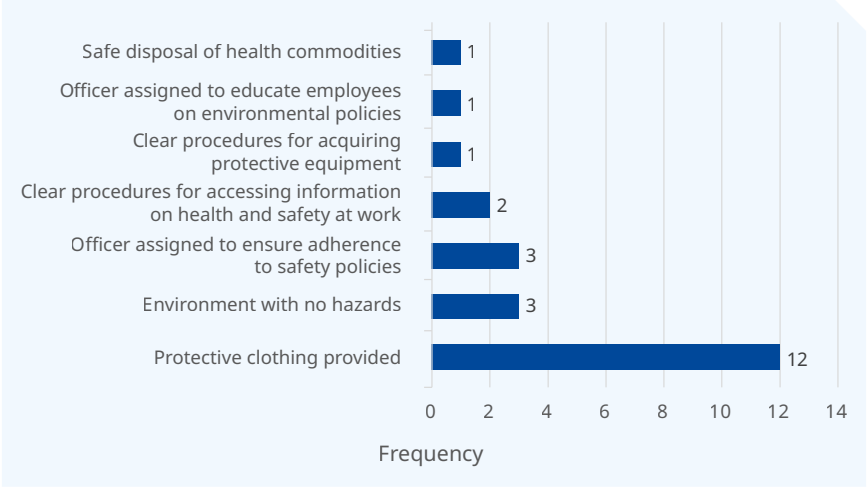
The 25 employees surveyed in Lesotho were invited to provide open comments on unsafe practices at their workplace. Some of them also described the measures adopted to ensure health and safety at work. This information is presented in figures 7.1 and 7.2.

▶ Figure 7.1. Unsafe practices in retail and wholesale pharmaceutical enterprises in Lesotho



Source: Survey conducted under ILO research project, 2021.

▶ Figure 7.2. Occupational safety and health measures adopted in retail and wholesale pharmaceutical enterprises in Lesotho



Source: Survey conducted under ILO research project, 2021.

Interestingly, the provision of protective clothing is referred to in both charts. The Occupational Safety and Health Convention, 1981 (No. 155), states that employers should "provide, where necessary, adequate protective clothing and protective equipment to prevent, so far as is reasonably practicable, risk of accidents or of adverse effects on health". The lack of provision of protective clothing and protective equipment to workers in the pharmaceutical industry in general may indicate that there are some decent work deficits in this regard.

Training workers in environmental protection

In Zimbabwe, the interviews with managers at the surveyed manufacturing enterprises revealed that only Datlabs provides some environmental training for its employees. However, it also emerged that the pharmaceutical companies have backward linkages with Zimbabwean higher education institutions that provide training. This training is mainly on analytical chemistry – a background required for the application of environmental standards to the production of pharmaceuticals.[19]

In Lesotho, to assess the extent to which retail and wholesale pharmaceutical enterprises train their employees in how to minimize the negative impact of their activities on the environment, the perceptions of 25 employees were captured using dichotomous questions (with "yes" or "no" alternatives supplemented by "don't know"), as shown in the table 7.5.

▶ Table 7.5. Perceptions of employees of retail and wholesale pharmaceutical enterprises in Lesotho regarding the provision of training on environmental protection (percentage)

Training in environmental protection	Yes	No	Don't know	No answer given
Enterprise provides training to individuals whose actions may have an impact on the environment	69.2	15.4	11.5	3.9
Enterprise provides training to all employees on operations that may have an impact on the environment	61.5	19.2	19.3	–

Note: – = nil.

Source: Survey conducted under ILO research project, 2021.

[19] Interview with a Datlabs manager, 17 July 2021.

Training is clearly provided to individuals whose actions may have an impact on the environment: this is the view of about 70 per cent of interviewees. Interestingly, it seems less likely that all employees receive training on operations with a potential environmental impact. This is the opinion of about 60 per cent of respondents. One may nevertheless conclude that training on environmental protection is generally provided in Lesotho's pharmaceutical sector.

Respondents with more positive perceptions on both questions tended to be female employees and/or those with over ten years of professional experience. The most positive perceptions regarding the provision of training to all employees were observed among respondents aged 45–54 years and among those working in joint ventures.

Monitoring compliance with national legislation

In Lesotho, the information available on compliance is scanty and focuses on environmental impact assessments. The general opinion of respondents was that the relevant legislation was being enforced properly, particularly with regard to the launching of cannabis cultivation and production activities. One interviewee noted that

> The 2008 [Drugs of Abuse] Act is enforced, specifically the section which states that before any project starts, it must have an environmental clearance certificate. There are some cannabis companies that started operations before the Ministry [of Health] was aware of them. These were asked to undertake an environmental impact assessment and submit the results of that audit.

Similarly, other interviewees reported that the Ministry of Health always referred companies to the Department of Environment (at the Ministry of Tourism, Environment and Culture) so that officials there could assess their compliance with environmental protection requirements, including the requirement to conduct an environmental impact assessment. This suggests that the Environment Act 2001 is being enforced.

In Zimbabwe, the disposal of pharmaceutical waste falls under the purview of the MCAZ, the Environmental Management Agency (EMA) and local authorities. In particular, local authorities are in charge of solid and liquid waste collection and disposal. For pharmaceutical companies located in Harare, these authorities offer the service of collecting expired tablets and incinerating them (an incineration certificate is subsequently issued to the companies). In the case of liquid wastes, some volatile organics may also be burned. The EMA conducts periodical inspections at pharmaceutical-manufacturing companies to check waste disposal processes. The MCAZ

inspects pharmaceutical retailers to check whether medicines are valid and registered.[20] Inspections take place at least once every two years (MCAZ 2016).

There is no record of any pharmaceutical company having been penalized in the past ten years, which suggests that an increased awareness of the danger of hazardous wastes has strengthened respect for the relevant laws and regulations.[21] However, the absence of sanctions against enterprises may also reflect a weak enforcement mechanism.[22]

Another sign of inadequate implementation of existing norms is the ad hoc environmental policies adopted by pharmaceutical companies. Such policies are not necessarily in line with international standards. Significantly, the WHO prequalification for an antiretroviral once granted to Varichem has lapsed because of the company's failure to meet international standards for safe production (UNIDO 2017).

One additional impediment to a well-functioning implementation system is institutional inefficiency. An example of a red-tape issue leading to environmental hazards concerns drug distribution in Zimbabwe. The National Pharmaceutical Company, which is tasked with the procurement and distribution of medicines, needs to obtain approval from the Ministry of Finance and Economic Development to destroy expired drugs in its warehouses. Such approvals are usually delayed, which increases the likelihood that some of those drugs will be sold in the streets, thereby posing a threat to public health (Zimbabwe, Parliament 2019).

Most imported medicines arrive in Zimbabwe via Harare International Airport and the Beitbridge border post. MCAZ inspectors are present to check the condition of imported drugs. There are also other entry points for medicines, such as Bulawayo Airport, where there is no MCAZ inspector (UNIDO 2019). Pharmaceutical products entering the country without undergoing any controls may end up as waste that is disposed of in unsafe and environmentally dangerous ways.

Concluding remarks

The situations described in the preceding sections indicate that decent work deficits linked to lack of compliance with environmental standards in the workplace do exist in both countries.

A rather worrying finding is the widespread lack of awareness of environmental, safety and health standards and policies. Such a conclusion

[20] Interview with an independent pharmaceutical consultant, 7 July 2021.
[21] Interview with an EMA informant, 5 July 2021.
[22] Interview with an independent pharmaceutical consultant, 7 July 2021.

is prompted by the high "don't know" response rate among employees in Lesotho and by the feedback of managers at manufacturing firms in Zimbabwe. This is a key issue that needs to be addressed if pharmaceutical companies, including employers and employees, are to succeed in adopting measures to limit their environmental impact and protect workers' health and that of the general public.

There is not much information on enforcement of the relevant legislation in Lesotho, whereas the corresponding findings for Zimbabwe are very interesting. Despite the doubts raised as to the capacity and efficiency of monitoring institutions, such as the EMA and the MCAZ, big manufacturers are clearly adopting cleaner technologies for fear of having to pay heavy fines, and they seem to be following adequate procedures for waste disposal. This is a very positive finding that points to a high level of enforcement of existing regulations.

What remains unclear is the level of provision of training in occupational health and safety for workers in both countries. In Lesotho, despite employees' positive views on that score, owners/managers do not seem too convinced that training is being provided; their positive response rate is high, but not as high as with other questions. In Zimbabwe, workers are rarely provided with such training. Despite the encouraging finding that some of the major manufacturers in the country intend to adopt measures to foster environmental protection and occupational safety and health, there is scope for further improvement. The Health and Safety Committee established at Datlabs could serve as a model for other companies, particularly if workers' representatives are included in such a body.

8 Medical cannabis production for export

Introduction

The emerging world market for medical cannabis is projected to expand by a compound annual growth rate of over 20 per cent between 2021 and 2026. It was estimated to be worth US$16.47 billion in 2021 and is expected to reach US$46.18 billion in 2026 (Market Data Forecast 2021). The increasing number of countries legalizing the use of medical cannabis, particularly in Europe and North America, favours such a rapid expansion.

The United Nations Single Convention on Narcotic Drugs of 1961 included medical cannabis in its Schedule IV, which lists several deadly, addictive drugs, such as heroin, that have little to no therapeutic effect. It was only in December 2020, after reviewing some recommendations by the WHO on cannabis and its derivatives, that the United Nations Commission on Narcotic Drugs decided to remove cannabis from Schedule IV. Substances listed therein are subject to the strictest control measures and their medical use is discouraged. The decision was far from unanimous: it was adopted by 27 votes to 25, with 1 abstention. The use of cannabis for non-medical and non-scientific purposes remains illegal (UN 2020). The total prohibition of cannabis for medical purposes has always been optional (Putri 2020). Dealing with cannabis, even when it is for medical and research reasons, continues to have highly sensitive political and ethical connotations, which goes some way towards explaining why official policy documents adopted by governments are almost always silent on medical cannabis production, even when it is already taking place.

The declining demand for exports of tobacco, once a major cash crop, is prompting concerned African governments to consider other export options, particularly to generate foreign exchange earnings. Among leading tobacco growers that have traditionally cultivated cannabis in large amounts, albeit illegally, are Zimbabwe and Malawi. Cannabis is also being extensively grown in Lesotho, South Africa, Eswatini and Ghana. It is a more profitable crop than, say, maize or sugar cane (Prohibition Partners 2019a).

Some Southern African countries have adopted legislation allowing the production of medical cannabis. Lesotho was the first to do so and Zimbabwe

the second. Zambia, Uganda, Kenya, the Democratic Republic of the Congo, South Africa and Ghana have followed suit (Kahn 2021). Africa's industry is often ambiguous, in that linkages between production and legality are vague. In Zambia and Uganda, the legislation is not clear and cultivation is permitted without any licence being required (Prohibition Partners 2019b). In Lesotho, as noted in Chapter 5, the Drugs of Abuse Act of 2008 allows cannabis to be legally cultivated for medicinal and scientific purposes.

This chapter describes the origins of the medical cannabis industry in Lesotho and Zimbabwe and its evolution thus far. In the case of Lesotho, where the establishment of firms dealing with the plant for medicinal purposes is at a more advanced stage, it was possible to assess the extent to which companies are complying with environmental and labour standards. The analysis of trends and findings is based on the available national and international literature and on secondary and primary data.

In the case of Zimbabwe, access to representatives of the medical cannabis industry proved extremely difficult; only scanty information could be obtained through interviews with national experts. In this country, medical cannabis production activities started later than in Lesotho. Furthermore, operations were considerably slowed down by the COVID-19 pandemic and the ensuing restrictions.

Despite the challenges, in Lesotho it was eventually possible to survey three companies involved in medical cannabis production. Interviews were conducted with 3 managers and questionnaires completed by 46 employees. Direct exchanges were permitted, including site visits, only thanks to the active cooperation of the companies' lawyers and consultants.

In both countries – especially in Lesotho, which has no pharmaceutical manufacturers – medical cannabis production has essentially no linkages with the national pharmaceutical industry. Medical cannabis is produced only for export. Hence, the analysis of survey data on labour and environmental standards was developed separately from that concerning pharmaceutical manufacturers in Zimbabwe and retail and wholesale operators in Lesotho, and two separate chapters of this book are devoted to those standards.

History and evolution of the industry

Cannabis first reached south-eastern Africa in the tenth century, through traders or travellers coming from South Asia (Putri 2020). Its use in the continent has historically been widespread. Among the ancient Egyptians it was an effective remedy against depression and other psychological illnesses. The crop was used for medicinal and therapeutic purposes over many centuries in ancient civilizations (Gastrow 2003). African traditional healers

routinely use cannabis. In Zimbabwe, the plant is employed in traditional medicine to treat asthma, epilepsy and mental illness (Prohibition Partners 2019a). For some indigenous groups, such as the Tonga people in the same country, cannabis consumption is part of their culture. They use the plant for medicinal purposes, not least to compensate for the inadequate public health facilities that are available in their territory (*Southern Eye* 2014).

It was in the nineteenth century, with the arrival of European colonial powers, that taxes were imposed on cannabis cultivation and trade. Stricter prohibitive measures followed in the twentieth century, even to the extent of stigmatization and marginalization of local users of the substance (Putri 2020).

The term "medical cannabis" refers to the therapeutic use of herbal cannabis and its constituents (Whiting et al. 2015). Bridgeman and Abazia (2017) point out that the cannabis plant contains more than 100 different chemicals, known as cannabinoids. Delta-9-tetrahydrocannabinol and cannabidiol are the main ones used in medicine.

The beneficial effects of cannabis on illnesses relating to cancer, anorexia and neurological disorders are now officially recognized. The World Health Organization drew up some recommendations to remove medical cannabis from Schedule IV of the Single Convention on Narcotic Drugs of 1961, noting that cannabis preparations have positive effects on pain, epilepsy and spasticity associated with multiple sclerosis (WHO 2019).

Despite the fact that medical cannabis was not removed until December 2020 from Schedule IV – where the most strictly controlled substances under the 1961 Convention are listed – in Lesotho the first licences for medical cannabis production were granted in 2017, within the framework of the 2008 Drugs of Abuse Act. In the same year, the Government of Zimbabwe received a request from a Canadian multinational enterprise for a licence to produce medical cannabis for medical and scientific purposes. In both countries, licence applications came from international companies and investors. The need for foreign exchange earnings and export opportunities induced both Governments to adopt specific regulations for this emerging and potentially very profitable industry in 2018.

In Zimbabwe, the decision to legalize the cultivation and production of cannabis for medical and research purposes was received with mixed feelings by different stakeholders. Fear of cannabis abuse, on the one hand, and anticipation of resistance to the new industry, on the other, are two of the reactions that were recorded (Maroveke 2018).

The potential value of medical cannabis production in Zimbabwe for the year 2021 was estimated at approximately US$1.25 billion (Zimbabwe, Ministry of Finance and Economic Development 2020). It has been projected that in its

fifth year of operations, that is, in 2023, medical cannabis production in the country will reach 50,000 tonnes in volume and be worth US$2 billion; tax revenues would amount to US$19 million (New Frontier Data 2019).

Zimbabweans practise illegal cannabis farming mainly in Chipinge, Chiredzi and Nyanga (all in the Eastern Highlands); in Mutoko (in the north-east); and in Binga (in the province of Matebeleland North) (Gastrow 2003). In Lesotho, the principal areas of cannabis cultivation are the high mountain zones in the centre and east of the country, the western foothills region and the Senqu River Valley (Laniel 1998).

The use of medical cannabis is illegal in most African countries. All the same, the region's production of the crop is estimated to be at least 38,000 tonnes a year. Many farmers have turned to the illegal cultivation of this crop as a source of income. In the early 2000s, Lesotho reportedly produced 70 per cent of the cannabis that could be found in South Africa (Prohibition Partners 2019a). Cannabis cultivation in Lesotho depends on seasonal rain and there are normally two harvests a year. Cannabis is intercropped with other food crops, such as maize and beans. Farmers' extended families are usually involved in the harvesting. In some cases, workers are paid for their services at a daily rate (Bloomer 2009).

National contexts and investment

There are several factors that seem to favour or discourage investment in the production of medical cannabis in Lesotho and Zimbabwe. They need to be considered together with other, less specific conditions related to the national investment climate. The following are a few of the specific elements:

- Environmental factors: Lesotho is attractive for investment in cannabis because of its high altitude, pure water and clean air (Uwakonye 2020). Low humidity levels, constant sunshine throughout the year and clean air are climatic characteristics favouring cannabis cultivation in Zimbabwe and in Southern Africa in general (Clémençot 2019). Growing cannabis outdoors exposes the crop to all kinds of environmental effects. Natural light significantly reduces costs compared with greenhouses, but exposure to harsh environmental elements may present challenges. Rain, insects, invasive plants (such as thistle), animals and extreme weather events are all potential crop killers. In Lesotho's highlands, the temperature can drop below zero for periods of three months or longer, which means that artificial heating is required. Furthermore, since Lesotho is 3,000 kilometres from the equator, the days are shorter in winter, necessitating the use of artificial light (Prohibition Partners 2019a). All these factors explain why cannabis is grown mostly in greenhouses, where it is possible to maintain control over

all environmental conditions (Jooste 2019). As discussed in Chapter 10, the use of greenhouse technology neutralizes all environmental effects, but it means that the industry becomes accessible only to foreign investors who can afford expensive and sophisticated equipment. This raises the prospect that thousands of small-scale illegal cannabis growers and tobacco farmers in search of new income opportunities will be excluded from the industry.

- Infrastructure: setting up production centres may turn out to be expensive and lengthy. Lesotho and Zimbabwe are poor countries with very limited resources to invest in infrastructure. Foreign investors and producers must bear the corresponding costs if they wish to start activities. Zimbabwe's irrigation system that was developed for tobacco cultivation could be used on cannabis fields (Prohibition Partners 2019a). However, as noted above, cannabis is usually grown in greenhouses, and existing facilities may prove unsuitable. Constant access to electricity is crucial for greenhouses and for the strict security requirements described below, yet in both countries intermittent electricity is a problem. Some investors, such as Eco Equity in Zimbabwe, have installed solar energy production facilities (Eco Equity n.d.). Technologically advanced cannabis production also relies heavily on the internet. This is especially problematic for companies operating in the mountains of Lesotho, where internet access is limited. One employee from a company in Lesotho explained during an interview:

> The company intends to install a satellite internet system that will allow off site monitoring and automated control of the irrigation, temperature and so on. Backup generators will be used during power outages. We have one 400 kVA backup generator on site already.

- Access to land: in cannabis farming, securing access to suitable land may be difficult. In Zimbabwe, licence holders may choose between state-owned and private land. Most cannabis production sites are located in areas where traditionally maize and tobacco are cultivated. Cannabis production thus competes with the farming of well-established crops by smallholders. Furthermore, most of the farmlands in the country were allocated under the Fast-Track Land Reform Programme of the early 2000s, which makes access by cannabis companies quite complicated.

- Security requirements: in both countries, cannabis production is subject to very strict security measures. In Zimbabwe, these requirements include constant monitoring of the perimeter by visual recording devices and physical barriers to prevent unauthorized access, and constant visual monitoring of premises where cannabis is kept to detect illicit conduct (MCAZ 2018). The MCAZ carries out four types of inspection: pre-licence, initial stage, targeted

and routine inspections. Again, only investors with advanced and expensive technology can successfully enter the medical cannabis industry.

- Quality production: in addition to greenhouse cultivation equipment, it is also very important to maintain a clean environment to obtain an authorization to export to European and North American markets (Clémençot 2019). In Lesotho, all final products must be tested by a certified laboratory before being sold for export use. In both countries, the workplace must be strictly controlled to prevent any risk of contamination. Workers engaged in cannabis farming must wear protective clothing, including gowns, masks and gloves. These requirements confirm that the overhead costs of cannabis production are high.

- Licensing: apart from being expensive in both countries, several licences are required in Zimbabwe, as noted in Chapter 5, and the procedures for obtaining them are complex. If an entity intends to undertake both production and research, it needs to have two licences. Moreover, to import or export cannabis products, additional licences must be obtained. Failure in one licence application entails complications and delays for the others (MCAZ 2018). In Lesotho, the granting of a licence is conditional on having completed an environmental impact assessment (Uwakonye 2020).

- Cannabis levy: the Government of Zimbabwe has introduced a levy on exports. The rates are 10 per cent on finished cannabis oils, 15 per cent on cannabis oils requiring further processing and 20 per cent on dried medicinal cannabis flowers (Zimbabwe, Ministry of Finance and Economic Development 2020). Concerns have been raised about the timing and magnitude of this levy's impositions, which are perceived to be premature given that the industry is still in its infancy in Zimbabwe.

Licences granted and operations

In Zimbabwe, since the first quarter of 2018, when cannabis legislation was introduced, 49 operators had been registered by April 2021, of which 47 were issued with production licences and 2 with licences to conduct research.[23] Precision Cannabis Therapeutics Zimbabwe was the first company to obtain approval for cannabis production in March 2019, almost a year after the adoption of legislation regulating medical cannabis (Prohibition Partners 2019a; Lamers 2019). The quite demanding capital requirements account for the fact that, despite the granting of 49 licences in the period up to April 2021, only five businesses have started activities. Most cannabis production sites are located in the provinces of Mashonaland West (Nyabira farming area), Mashonaland

[23] Interview with a pharmaceutical consultant, 7 July 2021.

Central (Mazowe farming area) and Mashonaland East (Marondera farming area).[24]

▶ Table 8.1. Some licensed cannabis companies in Lesotho

Company	Year established	Type of licence	Joint venture structure	Number of employees	GMP accreditation
Medi Kingdom	2017	Operator's licence and R&D licence	Majority owned by UK funder with local Lesotho partners	n/a	
MG Health (formerly known as Medigrow)	2017	Operator's licence	Medigrow is a joint venture by domestic (39.9%) and foreign investors, including South African ones (61.1%)	55	Granted on 2 March 2021
Verve Dynamics	2017	Operator's licence	Roughly 30% ownership by Aphria, a Canadian cannabis company	n/a	
Daddy Cann	2017	Operator's licence	100% acquired by Canopy Growth (Canada)	n/a	
Eden Pharma	2018	Operator's licence	UK and local partnership	3	Not yet
Pharmaceutical Development Company	2017	Operator's licence	Shares transferred to US-based Corix Bioscience	n/a	
Bophelo Bioscience	2018	Operator's licence	Subsidiary of parent company Halo, which operates in California, Nevada and Oregon, United States	45	Not yet

Note: n/a = data not available.

Sources: Duvall (2019); Uwakonye (2020); Oleinic (2019); Prohibition Partners (2019a).

[24] Interview with an MCAZ representative, 11 July 2021.

Despite the difficulties in accessing land, Eco Equity acquired 2,000 hectares of fields intended for cannabis production in Marondera, while Precision Cannabis Therapeutics Zimbabwe has established itself on a 110-hectare farm near the city of Harare (Lamers 2019). Bhobo (2020) mentions that, in the rural district of Guruve, Canadian firms have fenced off over 10,000 hectares of fields, which reflects how the cannabis industry requires large tracts of land.

In Lesotho, by the end of 2018, only one third of the initial 33 Lesotho-based companies that were initially granted free licences had managed to raise the now mandatory licence fee. Grossly inflated requests for partnership fees somewhat discouraged international investors (Motsoeli 2018). There are currently at least eight registered and licensed businesses in the country (Mpaki 2019). Table 8.1 provides an overview of some enterprises that have started operations.

In Lesotho, licences were first granted in 2017, about two years earlier than in Zimbabwe. Operations are therefore at a much more advanced stage. In both countries, foreign investors predominate, invariably from North America, Europe and Australia. South Africans are also present, although much more so in Lesotho.

As noted in Chapter 3, Lesotho has years of successful experience in attracting foreign investors. Although the country's Companies Act states that foreigners may own 100 per cent of national enterprises, local connections are crucial to enter the market, and partnerships with national licensed producers are recommended (Prohibition Partners 2019a).

As also indicated in Chapter 3, the Government of Zimbabwe favours partnerships between locals and foreign investors. Most companies with a licence have both local and foreign directors; few have local directors only.[25] For example, the executive management of Eco Equity comprises both Zimbabwean and British nationals. In the emerging cannabis industry, there are also partnerships between foreign investors from different countries. Eco Equity (United Kingdom) thus joined DutchGreenhouses (Netherlands) to set up greenhouses, sharing knowledge and the two firms' respective comparative advantages. In Marondera, a joint venture between Delta Tetra (Australia) and Eco Equity (United Kingdom) ensures good manufacturing practice (GMP) certification, since the Australian company has obtained such certification for medical cannabis production. Turning to Lesotho again, of the companies listed in table 8.1, only MG Health, the first enterprise to

[25] Interview with a pharmaceutical consultant, 7 July 2021.

be granted a medical cannabis licence (in 2017, when it was still known as Medigrow), has obtained GMP certification.

Skills and employment creation

The data on employment presented in table 8.1 confirm that the medical cannabis industry is capital intensive and that not many jobs are directly created. Nevertheless, in Lesotho, it would be possible to set up enterprises to fill the existing gaps in local supply of irrigation equipment, greenhouses, generators, farming equipment, nutrients and fertilizers (Prohibition Partners 2019a).

Similarly, in Zimbabwe the crop has the potential to create backward and forward linkages along the entire value chain, benefiting the chemical (fertilizer and pesticide) and pharmaceutical industries. Furthermore, Jin, Jin and Chen (2019) point out that cannabis farming involves – in addition to technical jobs – employment in pruning and training, irrigating, harvesting and post-harvest activities, including manicuring, curing, drying and storing. These jobs do not require high skill levels and can be performed by local people. Duvall (2019) notes that Africans have tended to be engaged as labourers in the cannabis industry.

Eco Equity emphasizes on its website that it works together with experts from all over the world to ensure that the company is at the cutting edge and succeeds in its efforts to provide a new natural cure (Eco Equity, n.d.). The "Draft Guidelines on the Production of Cannabis for Medical and Scientific Use" prepared by the MCAZ state that licensed cannabis producers must engage a quality assurance specialist with the necessary training, experience and technical knowledge to perform the required tasks (MCAZ 2018). Unfortunately, at present only foreign experts qualify for such a highly specialized position.

Official projections of direct job creation are not clear in the Zimbabwean context.[26] Eco Equity (n.d.) reports that it is retraining Zimbabwean employees from other sectors to align their skills with those needed in the cannabis industry. The company will create more than 300 jobs in Zimbabwe, with just below US$1 million in total annual salary payments. With nearly 50 enterprises starting operations, the industry should create an estimated 15,000 jobs at full capacity. On the other hand, an economic analysis by New Frontier Data (2019) concludes that medical and industrial cannabis programmes could create 60,000 to 90,000 jobs over five years, thereby providing employment for displaced workers from declining sectors such as tobacco.

[26] Interview with a pharmaceutical consultant, 7 July 2021.

There are currently more than 140,000 tobacco farmers and more than 1 million people directly dependent on tobacco production in Zimbabwe. For cannabis to offer alternative employment opportunities to those who are set to be affected by the decline in tobacco demand and production, the potential job creation should match the New Frontier Data (2019) projections.

Primary data collected in three medical cannabis firms in Lesotho may help in understanding the characteristics of workers directly employed in the industry. Employment information for the three companies is provided in table 8.1. They are Medigrow (with 55 employees), Eden Pharma (3 employees) and Bophelo Bioscience (45 employees). The total number of employees is therefore 103, of whom 46 were surveyed.

Most workers are men, that is, 56.5 per cent are male and 43.5 per cent are female. It is a rather young labour force, of whom 58.7 per cent are aged 25–34 years and 19.6 per cent are 35–44 years old. The largest group of respondents, 34.9 per cent, have one to two years of professional experience, 25.6 percent have two to three years' experience, and only 16.3 per cent have worked in the cannabis industry for more than three years. These findings highlight just how new the industry is. Interestingly, almost all the employees surveyed were Lesotho nationals: locals accounted for 97.8 per cent of the sample group and South Africans for just 2.2 per cent. The labour force is also quite well educated: 57.1 per cent of the employees surveyed had tertiary education and 28.6 per cent had secondary school qualifications. As Uwakonye (2020) suggests, the new medical cannabis industry may help to alleviate the problem of youth unemployment in Lesotho.

Table 8.2 shows the positions occupied by the surveyed employees. As many as 31.8 per cent are growers, and equal shares of 6.8 per cent are grower assistants and junior growers. Laundry assistants and R&D assistants also constitute each 6.8 per cent of all surveyed workers, a proportion that corresponds to three individuals per occupation.

The profession of grower is a highly specialized one and it is to be hoped that young people in Lesotho can be trained and will be able to retain jobs in that area. It is worth noting that pharmacists are missing from the list of occupations. Their presence could be beneficial for the local population, who could receive cannabis-based medicines through their mediation. Significantly, the 2018 Cannabis Regulations stipulate that pharmacists should be part of the workforce of medical cannabis companies, as they are expected to sign monthly narcotics reports for the Ministry of Health.

▶ **Table 8.2. Positions of employees surveyed in three medical cannabis companies in Lesotho**

Position	Frequency	Percentage
Cleaner	2	4.5
Deputy quality assurance manager	1	2.3
Production worker	1	2.3
Grower	14	31.8
Grower (lead)	1	2.3
Grower assistant	3	6.8
Inventory controller	1	2.3
Junior grower	3	6.8
Contractor	1	2.3
Laundry assistant	3	6.8
Lead for fertigation and integrated pest management	1	2.3
Team leader	2	4.5
Area manager	1	2.3
Plumber	1	2.3
Production intern	2	4.5
Production operator	2	4.5
Quality control assistant	1	2.3
R&D assistant	3	6.8
Security officer	1	2.3
Total	44	100.0

Source: Survey conducted under ILO research project, 2021.

Research and development

As table 8.2 indicates, R&D is a relatively important area in the medical cannabis industry; it already employs a number of people in the private sector.

As discussed in Chapter 4, the public sector in Lesotho plays no part in R&D activities. In Zimbabwe, public research institutions, such as the Scientific and Industrial Research and Development Centre and universities, could take the lead in promoting evidence-based policies that could make the industry sustainable. However, thus far they have remained inactive.

The private sector is more dynamic. The Zimbabwe Industrial Hemp Trust was the first company to be granted a cannabis research licence in the country.

It has an Indian funding partner, NSK Holdings, and a Portuguese technical partner, Symtomax. Despite being active particularly in research on industrial hemp, it is lobbying for clinical trials of medical cannabis and domestic research. The goal is to generate competitive advantages for Zimbabwe in the global cannabis market (Prohibition Partners 2019b).

Labour standards

This section should be read in conjunction with Chapter 6, where respect for fundamental principles and rights at work is discussed in relation to the pharmaceutical retail and wholesale sector in Lesotho. The present chapter deals with medical cannabis production. Thus, the level of application of labour standards in the pharmaceutical industry in Lesotho is compared with that of the recently established cannabis industry. Since operations in Lesotho are at a more advanced stage than in Zimbabwe, it was possible to survey employees only in the first of the two countries.

Freedom of association and collective bargaining

To gauge the level of respect for the right to collective bargaining in the medical cannabis industry in Lesotho, the perceptions of employees were captured using a five-point Likert scale, as was done for workers from retail and wholesale pharmaceutical enterprises in Chapter 6. Table 8.3 compares findings for the new industry and the pharmaceutical sector as a whole. The positive answers "agree" and "strongly agree" have been grouped together, as have the negative answers "disagree" and "strongly disagree".

▶ Table 8.3. Perceptions of employees regarding respect for the right to collective bargaining in the medical cannabis industry and in the pharmaceutical sector in Lesotho (percentage)

	Perception	Strongly agree / agree	Neutral	Disagree / strongly disagree
Medical cannabis industry employees	Right to collective bargaining is respected	55.6	28.8	15.6
Retail and wholesale pharmaceutical employees	Right to collective bargaining is respected	50.0	40.5	9.5

Source: Survey conducted under ILO research project, 2021.

The responses follow similar trends in the medical cannabis industry and in the pharmaceutical retail and wholesale sector, indicating that the right to collective bargaining is by and large respected. However, there is certainly scope for improvement in this area, as positive views are expressed by only about half of the total sample.

Forced labour

To find out whether forced labour is practised in the medical cannabis industry, the perceptions of employees were captured using a five-point Likert scale, as was done for workers from the retail and wholesale pharmaceutical sector. Table 8.4 allows a comparison of workers' views in the new industry and the pharmaceutical sector as a whole. The positive answers "agree" and "strongly agree" have been grouped together, as have the negative answers "disagree" and "strongly disagree".

▶ Table 8.4. Perceptions of employees regarding forced labour in the medical cannabis industry and in the pharmaceutical sector in Lesotho (percentage)

	Perception	Strongly agree / agree	Neutral	Disagree / strongly disagree
Medical cannabis industry employees	Forced labour is practised	4.4	13.0	82.6
Retail and wholesale pharmaceutical employees	Forced labour is practised	15.4	0.0	84.6

Source: Survey conducted under ILO research project, 2021.

The consensus view (over 80 per cent) in both industries is that forced labour is not practised. As defined in the national legislation outlined in Chapter 6, "forced labour" refers to individuals being forced to perform any work or service that is involuntary and carried out under threat or intimidation. Opinions among employees in the retail and wholesale pharmaceutical sector are more negative, in that they subscribe more readily than the other group to the view that forced labour is practised (15.4 per cent versus 4.4 per cent). None of the surveyed workers from that sector expressed a neutral view, whereas 13 per cent of respondents from the medical cannabis industry gave such an answer.

Wages and employment conditions

Table 8.5 contains some information on employment conditions obtained by surveying employees from the medical cannabis industry and the retail and wholesale pharmaceutical sector in Lesotho. A five-point Likert scale was used to capture their opinions.

▶ Table 8.5. Perceptions of employees from the medical cannabis industry and the retail and wholesale pharmaceutical sector in Lesotho as to whether contracts clearly show terms and conditions of employment (percentage)

	Perception	Strongly agree / agree	Neutral	Disagree / strongly disagree
Medical cannabis industry employees	Employees have contracts that clearly show terms and conditions	60.0	20.0	20.0
Retail and wholesale pharmaceutical employees	Employees have contracts that clearly show terms and conditions	69.2	7.7	23.1

Source: Survey conducted under ILO research project, 2021.

The first notable finding is that the share of employees in the retail and wholesale pharmaceutical sector who are of the view that contracts clearly show the terms and conditions of their employment is almost 10 percentage points higher than that of their counterparts in the medical cannabis industry. Furthermore, the proportion of those who believe that contracts are unclear is relatively high, standing at 20 per cent or above in both groups, which suggests that there is room for improvement in this area.

Discrimination in respect of employment and occupation

Several questions were asked to investigate the perceptions of employees from the medical cannabis industry and the retail and wholesale pharmaceutical sector with regard to different forms of discrimination in employment or occupation. A five-point Likert scale was used to record opinions, as shown in table 8.6.

▶ Table 8.6. Perceptions of employees from the medical cannabis industry and the retail and wholesale pharmaceutical sector in Lesotho regarding various forms of discrimination in respect of employment and occupation (percentage)

	Perception	Strongly agree / agree	Neutral	Disagree / strongly disagree
Medical cannabis industry employees	Employees face sexual harassment	2.2	6.5	91.3
Retail and wholesale pharmaceutical employee	Employees face sexual harassment	15.4	3.9	80.7
Medical cannabis industry employees	Women experience discrimination	4.3	8.7	87.0
Retail and wholesale pharmaceutical employees	Women experience discrimination	19.2	0.0	80.8
Medical cannabis industry employees	Employees with a disability experience discrimination	6.5	10.9	82.6
Retail and wholesale pharmaceutical employees	Employees with a disability experience discrimination	17.2	21.2	61.6
Medical cannabis industry employees	Employees receive equal opportunities and treatment	67.4	15.4	17.2
Retail and wholesale pharmaceutical employees	Employees receive equal opportunities and treatment	73.1	18.4	8.5

Source: Survey conducted under ILO research project, 2021.

On the gender-related questions, employees in the medical cannabis industry seem to have more positive views than those in the pharmaceutical sector. The shares of the two groups differ by about 10 percentage points for both positive and negative perceptions. Employees in the medical cannabis industry are more optimistic in saying that there is no sexual harassment in the workplace; pharmaceutical employees, on the other hand, agree much more readily that it does occur. As explained in Chapter 6, sexual harassment

is understood in this context to refer to the conditioning of job benefits, such as salary increases or a promotion, upon inappropriate sexual behaviour.

A similar trend may be observed in the answers to the question of whether women are discriminated against in terms of lower wages and fewer promotion or employment opportunities. It is worth noting that most respondents from the medical cannabis industry are men, whereas women make up the majority of those from the retail and wholesale pharmaceutical sector. This difference may have affected the responses to a considerable extent. However, on the whole, over 80 per cent of respondents in both groups are of the opinion that employees do not face sexual harassment and that women are not discriminated against.

Much more striking are the different perceptions of the two groups with regard to discrimination against workers with disabilities, as reflected in lower salaries and fewer employment or promotion opportunities. The proportion of employees from the pharmaceutical sector who deny that discrimination occurs is roughly 20 percentage points lower than that of respondents from the medical cannabis industry. As noted in Chapter 6, those who feel most strongly that this type of discrimination takes place in the retail and wholesale sector are employees with over ten years of experience. This is mainly because the longer a worker is employed in a given industry, the likelier he or she is to witness instances of discrimination. As observed in an earlier section of the present chapter, employees from the medical cannabis industry have only a couple of years of professional experience on average, since the industry is quite new.

Perceptions regarding equal opportunities and fair treatment are less diverse. Overall, about 70 per cent of respondents from the two groups are of the opinion that employees enjoy equal opportunities and fair treatment with no discrimination on the grounds of personal characteristics at birth, political opinions or social and economic background. This is not an overwhelmingly positive result and suggests that there is room for improvement, particularly in the medical cannabis industry, where perceptions are less optimistic. Indeed, employees from that industry are less in agreement with the statement that equal opportunities and fair treatment occur and more in disagreement with that statement than their counterparts in the pharmaceutical retail and wholesale sector.

Environmental standards

This section should be read in conjunction with Chapter 7, where compliance with environmental standards is discussed in relation to the pharmaceutical retail and wholesale sector in Lesotho. The present chapter deals with

medical cannabis production. Hence, the level of application of environmental standards in the pharmaceutical sector in Lesotho is compared with that of the recently established cannabis industry as far as possible. Since operations in Lesotho are at a more advanced stage than in Zimbabwe, employees were surveyed only in the first of these two countries.

To assess whether employees of medical cannabis companies receive any education and training on environmental, health and safety matters, including environmental impact assessment procedures and environmental technologies, workers' perceptions were captured using a five-point Likert scale. In table 8.7 the positive answers "agree" and "strongly agree" have been grouped together, as have the negative answers "disagree" and "strongly disagree".

▶ Table 8.7. Perceptions of employees from the medical cannabis industry in Lesotho with regard to training in environmental protection and health and safety (percentage)

Perception	Strongly agree / agree	Neutral	Disagree / strongly disagree
Employees receive education and training on environmental, health and safety matters, including environmental impact assessment procedures and environmental technologies	97.8	0.0	2.2

Source: Survey conducted under ILO research project, 2021.

As noted in Chapter 7, to obtain an operator's licence, medical cannabis companies must conduct an environmental impact assessment and receive the corresponding certification. Despite the rather poor institutional monitoring system in place in Lesotho, where there is no national medicines regulatory agency and the Narcotics Bureau has a limited mandate, it seems that inspections are indeed conducted by the Ministry of Health to verify that such assessments are performed. This may be one of the most important factors accounting for the emphasis placed by firms on training on environmental matters. In the survey of employees from the medical cannabis industry, no statement received a positive response rate as high as that in table 8.7, with which almost 100 per cent of respondents agreed.

The survey questions on environmental training for employees in the pharmaceutical retail and wholesale sector considered in Chapter 7 are different from and rather more specific than the question underpinning table 8.7. A proper comparison of responses cannot be made. However, positive answers on the availability of environmental training were given by between 60 and 70 per cent of respondents, which is much less than the share shown in table 8.7.

More information on the medical cannabis industry and environmental standards could be obtained through site visits and by posing open questions to employees.

During a site visit to a fairly big company, MG Health, researchers observed that the text of its environmental policy was displayed at the entrance of the plant. The policy covers waste management, site rehabilitation and soil erosion, biodiversity and wetland management, and also community relations and safety.

On the premises of the plant there was no sign of pollution. The surfaces looked clean and there were no observable sources of polluting emissions. No water overflow was seen around the premises, and the surrounding land was well kept, as reflected in the diversity of flora and fauna. Rubbish bins were visible everywhere.

The company's employees confirmed that they were aware of its environmental policy, noting that they worked in a clean environment with sufficient ventilation to ensure the circulation of fresh air. Furthermore, they explained that there were different bins for different types of waste: organic residuals were not disposed of together with non-organic waste. Specific disposal procedures were followed for oil (diesel or petrol) so as to prevent water and land pollution.

The workers mentioned that they were provided with protective clothing and that they had generally had good hygiene and health and safety practices instilled in them.

Training was mentioned by most of the respondents as the mechanism by which the company educated them on environmental protection. Such training took place every morning during what they referred to as "toolbox meetings". They were also taught about "best practices, such as not killing unharmful insects, animals and plants".

The company cultivates certain plant species, notably rosemary and lavender, in the surrounding area. Their flowers produce a strong scent that repels insects that are harmful to the cannabis plant.

MG Health recycles its wastewater, which is ultimately used to irrigate the nearby fields. The owners of neighbouring lands are able to benefit from that water when grazing their animals.

The information collected during this site visit indicates that MG Health does take the implementation of its environmental policy seriously.

The two other medical cannabis companies that were visited in Lesotho did not have the text of any environmental policy on open display. Nevertheless, no signs of air, water or land pollution were observed. On-the-job training

was used at both to instruct workers in environmental protection measures, including the use of irrigation systems that prevent the nutrients used in the greenhouses from being washed out into nearby water sources and soil; and on the benefits of cultivation in enclosed facilities, which, alongside the use of organic nutrients, helps to protect the environment.

Concluding remarks

The first, very important conclusion that must sadly be drawn is that the emerging medical cannabis industry leaves small-scale growers behind, making their illegal subsistence farming activities even more precarious. An active role in the sector is too costly for them, and securing employment in the companies driving the industry's expansion requires skills that farmers do not have. Unfortunately, as medical cannabis production progresses, more land will be taken away from such farmers for the installation of greenhouses. Farmers will have decreasing land at their disposal for their traditional subsistence crops, including maize and tobacco. Efforts should be made, especially through government measures, to strengthen forward and backward linkages with the medical cannabis industry and promote economic activities in which low-skill jobs for small-scale farmers can be created. Instead of foreign workers being recruited, locals should be retrained to work both in the medical cannabis industry itself and, above all, in its value chain.

Both countries are attracting a sizeable number of foreign investors. Lesotho's successful experience in this field makes it look like a more promising option than Zimbabwe. The numerous licensing requirements in Zimbabwe and the levy system that is currently in force risk putting the country at a disadvantage relative to neighbouring countries venturing into medical cannabis production. This aspect deserves special attention, given that several other African countries are entering the medical cannabis market and may cause Zimbabwe to lose its privileged position as a first mover.

Foreign direct investment can increase knowledge endowments, thereby encouraging development. However, Lesotho in particular, where research institutions are weak and the labour force generally has low skill levels, must be careful not to become trapped in a "value-adding curve", in which low-wage labour is used to add value in global production chains that are controlled from outside the country (World Bank 2007).

The Government of Zimbabwe could consider broadening its role from a regulator to a promoter of R&D and possibly production. This should be done through public–private partnerships in the medium to long term. The Government already has at its disposal several capable research centres. These institutions could explore initiatives such as local certified seed production

and harness the potential for engaging with small-scale farmers, something that would help to make use of indigenous knowledge systems.

Of concern in Zimbabwe is the passive attitude of the local pharmaceutical sector, a key player in the cannabis value chain. The Government should seek to engage this strategic domestic industry, with local production of cannabis-based medicines for both domestic and export markets as the ultimate objective. The country needs to participate in as many stages of the cannabis value chain as possible to ensure maximum benefits, including job creation. The focus should be not on the export of semi-processed cannabis by licensed producers, but on medicine exports from the local pharmaceutical industry. Cannabis producers should be able to count on internal demand from the local pharmaceutical industry as well as on export demand. A well-developed value chain would broaden the Government's revenue base, as it would then be receiving not only income from export levies and foreign currency receipts, but also tax revenues from value chain players.

Although the young population in Lesotho constitutes a promising labour pool, it must be recognized that not many direct jobs can be created in the medical cannabis industry. It is therefore important to establish linkages with domestic firms that can provide goods and services to support that industry. The emphasis should be on those products that the local economy can deliver, such as basic equipment, and on relatively low-skilled services such as pruning, irrigating, harvesting and drying.

Compliance with labour and environmental standards in the medical cannabis industry could be assessed only in Lesotho, where such production is at a quite advanced stage. As far as the application of fundamental principles and rights at work is concerned, there is essentially no difference from the levels of compliance recorded in the retail and wholesale domestic pharmaceutical sector. Despite the small sample size used for the retail and wholesale pharmaceutical industry, it became clear from analysis of the survey results that there is room for improvement in three areas. First, only about 50 per cent of respondents from both the medical cannabis industry and the domestic pharmaceutical sector agree or strongly agree that the right to collective bargaining is respected. Second, 60 per cent of the employees surveyed in the medical cannabis industry and 70 per cent of those surveyed in the pharmaceutical sector consider that contracts clearly outline the terms and conditions of employment. This finding is particularly striking in the case of the emerging medical cannabis industry, where one would expect higher standards and a greater prevalence of good practices. The third area of concern is that of equal opportunities and fair treatment: about 70 per cent of all respondents believe that employees enjoy such conditions. Even in this case, opinions are more negative among the workers surveyed in the medical cannabis industry.

It is not possible to draw conclusions as to whether multinational enterprises or foreign investors respect labour standards to a greater or lesser extent than national firms. It is worth noting that, both in the retail and wholesale pharmaceutical sector and in the medical cannabis industry, joint ventures between local and foreign partners are the dominant type of enterprise. Furthermore, international players come from too many different countries to allow one to speculate on nationality-based differences in behaviour.

The research findings suggest that the medical cannabis industry takes more account of environmental standards than does the domestic pharmaceutical sector. Surveyed employees from the latter sector revealed a lack of understanding of environmental, safety and health standards and policies. Although around 60 per cent of them claimed that training in environmental protection was provided, which presents a seemingly positive picture of the pharmaceutical sector, the example of MG Health in Lesotho's medical cannabis industry is much more convincing when it comes to environmental management. At this company considerable efforts are undertaken to systematically train workers and make them fully aware of the company's environmental policy. The two other medical cannabis companies surveyed do not seem to have reached a similar level of environmental standards. However, it should be noted that they started their activities one year after MG Health, which may explain the delay in bringing their environmental policies up to scratch.

9 Knowledge, skills and employability

Introduction

Knowledge and innovation are playing an increasingly significant role in economic growth worldwide. Decades ago, Robert Solow understood that improvements in living standards depended largely on knowledge (Solow 1957). Greenwald and Stiglitz (2013) conclude that, in order to close the knowledge gap between rich and poor countries, development strategies should focus on learning. According to Stiglitz, a "learning society" lies at the heart of a knowledge economy. That is why the focus should always be on the effects of policies on technological change and on how it is brought about by learning as well as by R&D (Stiglitz 2017).

Some threshold indicators that were proposed in the early 2000s may be cited to illustrate the increasing importance of knowledge in world economies. For example, it was observed at the time that sustainable economic growth in a country required a literacy rate of at least 40 per cent and a telephone density of no less than 30 per cent (World Bank 2007). The literacy rate of all adults aged 15 and above in Zimbabwe was 88.7 per cent in 2014. For Lesotho, the corresponding rate was 76.6 per cent in the same year (World Bank n.d.(a)). In 2019, there were 74.5 mobile/cellular telephone subscriptions per 100 inhabitants in Lesotho; the rate for Zimbabwe was 90.1 subscriptions per 100 inhabitants (ITU n.d.). Given that both Lesotho and Zimbabwe are very poor countries, their performance on those two indicators corresponds to more than double the proposed thresholds, indicating that knowledge is a very strong component of development.

Intensive human capital formation, achieved by expanding and transforming education and training systems, is at the root of Asian economies' success. A higher-skilled labour force helps enterprises to move on to higher-value-added economic activities (Lin and Vu 2017). Such a rewarding development model could be pursued by African countries as well.

Well-functioning and effective education and innovation systems are essential elements of successful knowledge economies. Many jobs in the pharmaceutical industry are linked to R&D and require high skill levels. The expansion of the pharmaceutical retail and wholesale sector in Africa is generating demand also for qualified individuals graduating from tertiary education. UNIDO (2016) reports

that the pharmaceutical industry needs highly skilled university graduates with expertise in areas ranging from sciences, technology and engineering to management and law.

The health workforce is one of the six building blocks of a strong healthcare system in which countries should invest to achieve the objective of universal equitable access to good-quality healthcare (WHO 2013). The pharmaceutical sector is knowledge intensive and, in particular, R&D intensive. Some advanced economies spend relatively large shares of their annual GDP on R&D. For example, the United States and Japan invest 0.3 per cent of their GDP in such activities, while Switzerland and Belgium spend as much as 0.6 per cent. The public sector tends to fund basic research, whereas private companies focus on specific research and product development. The contribution of the private sector reaches 30 per cent and 29 per cent of total business enterprise expenditure on R&D in, respectively, Switzerland and Belgium, two countries with a large pharmaceutical industry (OECD 2018). It is recommended that human capital formation should continue to be supported, because in the pharmaceutical industry innovation depends on human as much as on physical capital (Muratoglu 2017).

A report by the International Pharmaceutical Federation points out that pharmaceutical education and training generally correlate with a country's level of economic development (FIP 2013). This implies that countries with weak performance on economic indicators have the least capacity to invest in the development of human capital for the pharmaceutical industry. Stiglitz (2017) notes that learning is a key element of developmental transformation, adding that poor countries should be able to benefit from the dissemination of knowledge from advanced economies as well as from the diffusion of knowledge within their borders.

Todorovic et al. (2002) argue that pharmaceutical education and training are centred either on models that are more patient oriented or on ones that are more geared towards R&D. The first type places greater emphasis on biomedical subjects, while the second is more concerned with the natural sciences. Both Lesotho and Zimbabwe tend to follow the first type of model, although there are aspirations to strengthen the second, particularly in Zimbabwe.

The pharmaceutical sector has very different characteristics in the two countries. Accordingly, the national education and training systems differ remarkably and reveal country-specific weaknesses. In general, it seems that in Southern Africa there is a pronounced lack of a pharmaceutical workforce with the specific skills and abilities required to work within an industrial set-up (SEATINI and CEHURD 2014). The following sections highlight strengths and weaknesses of the pharmaceutical education and training systems in Lesotho and Zimbabwe.

Some primary data were collected to fill existing information gaps. In Lesotho, 30 graduates from each of the two existing pharmaceutical training institutions were

surveyed, mainly through online questionnaires; a response rate of 43 per cent was achieved. The directors of the two pharmaceutical training programmes were also given a questionnaire. In Zimbabwe, with a view to understanding skills needs in the industry, three major manufacturers were asked to complete online questionnaires. The heads of training institutions and key informants provided additional information through interviews.

Pharmaceutical higher education and training institutions

In Lesotho, there are only two accredited pharmaceutical training institutions. Their principal characteristics are reported in table 9.1.

▶ Table 9.1. Pharmaceutical training institutions in Lesotho

Institution	Programme	Level of study	Duration
National University of Lesotho	Bachelor of Pharmacy (Honours)	Undergraduate	5 years
National Health Training College	Diploma in Pharmaceutical Technology	Diploma	3 years

Source: Authors' compilation.

The Bachelor of Pharmacy degree programme at the National University of Lesotho (NUL) was established in 2002. Students are allowed to take required courses from other programmes at the same university. The first cohort of nine students graduated from the course in 2007. The number of enrolled students has been increasing over time. According to the Human Resource Development Plan for 2003–13 of the Pharmaceutical Directorate of the Ministry of Health, 213 pharmacists would be needed by 2013. This estimate proved to be too high, which explains why graduates sometimes migrate to neighbouring countries to find a suitable job. Others continue their studies in South Africa, where they can enrol in a master's degree course.

The National Health Training College (NHTC) is a public tertiary educational institution that was established in 1989. Its Diploma in Pharmaceutical Technology programme prepares graduates to work under the direction of a trained and licensed pharmacist.

The education and training programmes available in Lesotho are patient oriented, and there seems to be little scope for the acquisition of R&D skills.

As table 9.2 indicates, the supply of pharmaceutical training in Zimbabwe is quite rich. The range of training programmes is reasonably broad and they offer skills that can also be used in research and innovation.

▶ Table 9.2. Pharmaceutical training institutions in Zimbabwe

Institution	Programme	Level of study
University of Zimbabwe, Department of Pharmacy and Pharmaceutical Sciences	Bachelor of Pharmacy (Honours)	Undergraduate
	Master's in Pharmaceutical Toxicology	Postgraduate
	Master's in Pharmaceutical Technology	Postgraduate
	Master's in Applied Pharmaceutical Science	Postgraduate
University of Zimbabwe, Department of Chemistry	Bachelor of Science (Honours) in Pharmaceutical Chemistry	Undergraduate
National University of Science and Technology	Bachelor of Science (Honours) in Chemical Technology	Undergraduate
Harare Institute of Technology	Bachelor of Science (Honours) in Pharmacy	Undergraduate
Africa University College of Health, Agriculture and Natural Sciences	Bachelor of Medical Laboratory Sciences	Undergraduate
Biotechnology Research Institute (at the Scientific and Industrial Research and Development Centre)	Herbs training	Executive Certificate
African Institute of Biomedical Science and Technology	Master of Science in Genomics and Precision Medicine	Postgraduate
	Master of Science in Pharmaceutical Medicine	Postgraduate
	Postgraduate Biomedical Technology Certificate	Postgraduate
Harare Institute of Public Health	Dispensary Assistant	National Certificate
	Purchasing and Supply	National Certificate
	Health Information Management and Medical Records	National Certificate
	Health Services Management	National Certificate
	Information Technology	National Certificate

Institution	Programme	Level of study
Medicines Control Authority of Zimbabwe	Training in quality and bioequivalence dossier evaluation	Executive Certificate
	Training in targeted spontaneous reporting (pharmacovigilance)	Executive Certificate
	Training in surveillance of adverse events following immunization	Executive Certificate

Source: Authors' compilation.

University programmes have a four-year duration. All the other training courses are shorter.

The University of Zimbabwe's Department of Pharmacy and Pharmaceutical Sciences, more commonly referred to as the "School of Pharmacy", was established in 1974. It was meant to produce skilled graduates to work for the two pharmaceutical companies that existed in the country at the time: CAPS Pharmaceuticals and Datlabs. More recently, in 2002, the African Institute of Biomedical Science and Technology was founded as a private research and education centre to promote pharmaceutical discoveries.

The number of students enrolled in the University of Zimbabwe's School of Pharmacy rose from a total of 10 in the 1970s to 25 in the 1990s and about 60 in the early 2000s. The School currently has over 100 students. The Harare Polytechnic College admits 30 new students every year.

Pharmaceutical education in Zimbabwe is clinically oriented; the Harare Institute of Technology and the University of Zimbabwe's School of Pharmacy are the leading training providers. With support from the United Nations Industrial Development Organization, the School of Pharmacy intends to introduce specialized postgraduate programmes on formulation science and industrial pharmacy and pharmaceutical toxicology. These new programmes will equip students with the knowledge and skills to discover and produce new drugs, particularly in the field of complementary medicine, where Zimbabwe may have a comparative advantage. This will be in line with the recommendations of the United Nations High-level Commission on Health Employment and Economic Growth and the WHO Global Strategy on Human Resources for Health (FIP 2017).

Moreover, following extensive stakeholder consultations, the Department of Chemistry at the University of Zimbabwe introduced a new programme relevant to the pharmaceutical sector, namely the technology-oriented Bachelor of

Science (Honours) degree in Pharmaceutical Chemistry, comprising pharmacy and chemistry modules. The programme is designed to fill existing gaps in pharmaceutical education and training with regard to the design, synthesis and formulation of drugs. The new modules are offered in addition to training in skills relevant to the manufacture and sale of pharmaceutical products. The chemistry component covers organic chemistry and organic molecular analysis and teaches students to manufacture drugs using computational methods of drug discovery. Computational chemistry involves chemical modelling, which facilitates the formulation of new chemicals that are currently not available in the Zimbabwean context. This is made possible by using a database of processes submitted by biochemistry specialists. Students identify the relevant processes and model accordingly.[27] The newly introduced training modules on the design, synthesis and formulation of drugs will ensure a steady supply of graduates who are able to respond to the emerging needs of medical cannabis production in the country.

Gender gaps in pharmaceutical training programmes

In Lesotho, the group of surveyed graduates of the Pharmaceutical Technology diploma programme at the NHTC showed an equal gender distribution (50 per cent men and 50 per cent women), whereas 80 per cent of the graduates of the Bachelor of Pharmacy degree programme at the NUL were male. It seems that women are in a similar position to men only when it comes to access to the profession of pharmacy assistant, and not the more powerful one of pharmacist.

Not all the pharmacists interviewed made their sex known (the interviews were conducted online and anonymously); out of the total sample, 58.3 per cent indicated that they were men, and 8.3 per cent that they were women. Sadly, some respondents were employed as pharmaceutical technicians despite holding an honours degree in pharmacy. Among these, 8.3 per cent indicated that they were male and 16.7 per cent that they were female.

No female respondent was self-employed or operated her own retail pharmacy, compared with 7.7 per cent of male respondents.

In Zimbabwe, on undergraduate programmes such as the Bachelor of Science (Honours) in Pharmaceutical Chemistry, female students reportedly achieve the best marks, and they usually have fewer family responsibilities at that age.[28]

[27] Interview with the coordinator of the Bachelor of Science (Honours) in Pharmaceutical Chemistry programme at the University of Zimbabwe, 15 May 2021.
[28] Interview with the coordinator of the Bachelor of Science (Honours) in Pharmaceutical Chemistry programme at the University of Zimbabwe, 15 May 2021.

Although the pharmaceutical sector in the country is still male dominated, resolute attempts are being made to correct gender gaps in enrolment in education and training programmes. In 2017, women made up 50 per cent of registered students at the University of Zimbabwe's Faculty of Medicine, which hosts the School of Pharmacy (ZIMSTAT 2020). Table 9.3 shows the participation of women in study programmes that are closely related to the pharmaceutical industry. Data on students' sex are not available for the training programmes listed in table 9.2.

▶ Table 9.3. Female participation in selected training programmes in Zimbabwe

Institution	Programme	Total enrolment	Percentage of women
Masvingo Polytechnic College	Chemical Engineering	77	39.0
	Applied Chemical Technology	4	0.0
Bulawayo Polytechnic College	Applied Chemical Technology	10	60.0
	Applied Biological Technology	8	50.0
Harare Polytechnic College	Chemical Engineering	88	44.3
	Pharmaceutical Technology	79	59.5
	Applied Chemical Technology	36	58.3
	Bachelor of Technology in Applied Chemical Technology	27	40.7

Source: Adapted from ZIMSTAT (2020).

Involving stakeholders in the establishment of education and training institutions

Creating partnerships has proved to be an effective strategy for ensuring that training programmes are up to date and meet the needs of industry and the students themselves (ILO 2003).

In Lesotho, setting up the Bachelor of Pharmacy programme at the NUL involved broad-based consultations with the Ministry of Health, the National Drug Service Organization, Tripharm (a major pharmaceutical wholesale firm) and some community pharmacies. Staff from the Biology and Chemistry degree programmes at the Faculty of Science and Technology at the NUL were also consulted.

Private entities have often initiated partnerships with training institutions and public authorities (ILO 2003). The University of Zimbabwe's School of

Pharmacy was established through a collaboration between the public and the private sectors. The Pharmaceutical Society of Zimbabwe and other private stakeholders donated the funds to set up the degree programmes there.[29]

Another successful partnership is that between the MCAZ and the School of Pharmacy of the University of Zimbabwe which led to the construction and furnishing of a laboratory at the School tasked with establishing a national drug quality and bioequivalence surveillance programme (UNIDO 2016).

Collaborations are also taking place with foreign partners. For example, the Harare Polytechnic College has signed memoranda of understanding with several foreign institutions, including Zhuhai College of Science and Technology (China), the Gujarat Arts and Science College (India) and the Namibia University of Science and Technology, for capacity-building and exchange programmes.[30]

Adequacy of skills provided by training institutions

As noted in Chapter 3, many new pharmacies have begun to spring up in Lesotho in recent years. Although this is a positive phenomenon, in that pharmaceutical services are being brought closer to the population, some have raised concerns about the staff at those pharmacies not being properly qualified and lacking the requisite skills (Moremoholo 2016). A survey among graduates and the directors of training programmes was therefore organized to identify any deficiencies in the skills provided by the two national pharmaceutical education and training institutions.

The skills deemed important for pharmacists graduating from the honours and diploma programmes were determined through a rigorous literature review. They include professional communication, creative problem-solving and strategic thinking, business skills and awareness of industry trends, core skills, and an understanding of legal and regulatory matters.

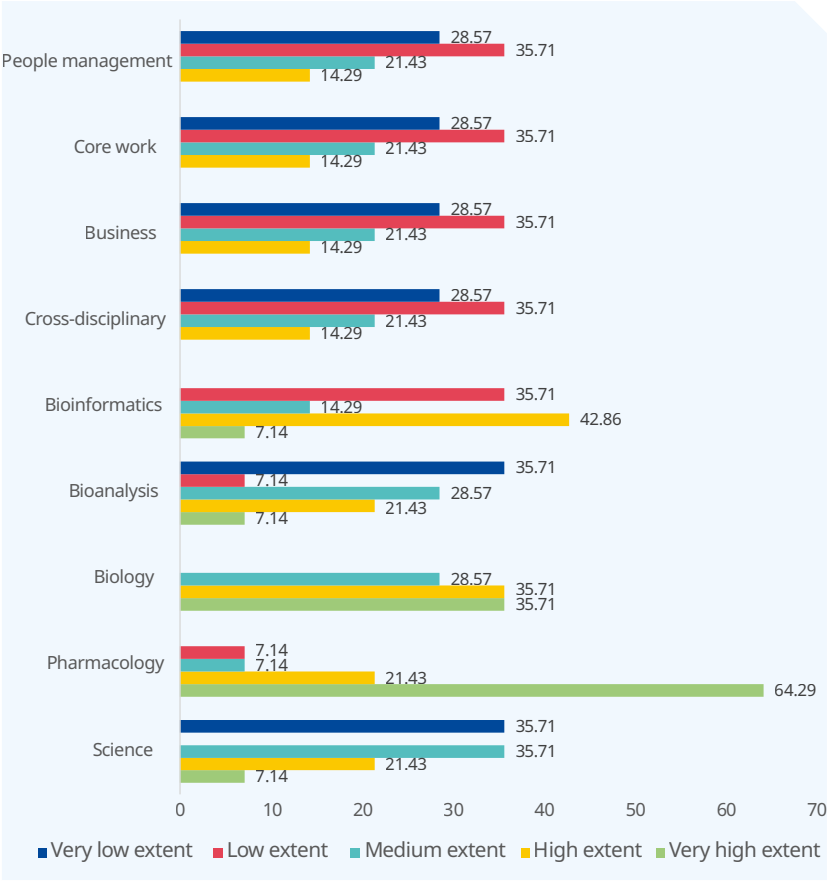
A total of 30 graduates from each training programme received the questionnaire. Fully completed questionnaires were submitted by 26 individuals. The directors of the two training programmes also filled in a questionnaire, which was different from that used for the graduates.

Figure 9.1 provides a snapshot of the perceptions of graduates of the Bachelor of Pharmacy (Honours) programme at the NUL with regard to the skills that the programme equipped them with. In total, 14 responses were received.

[29] Interview with an administrator at the University of Zimbabwe's School of Pharmacy, 20 May 2021.

[30] Interview with the Principal of Harare Polytechnic College, 21 May 2021.

▶ Figure 9.1. Perceptions regarding the skills provided by the Bachelor of Pharmacy (Honours) programme at the National University of Lesotho (percentage)



Note: Data analysed using the Stata 15.1 software.
Source: Survey conducted under ILO research project, 2021.

Figure 9.1 indicates that pharmacology and biology are the subjects covered best in the study programme. There are four areas where there is clearly room for improvement. The first is cross-disciplinary skills, including clinical pharmacy, compliance and regulatory affairs, blended and converging skills, and green technology. The second is business skills, ranging from legal and fiscal matters to finance, leadership and entrepreneurship. The third area concerns skills that are key to the pharmaceutical profession, including the compounding and dispensation of medications as prescribed

by doctors and dentists, and the reviewing of doctors' prescriptions to ensure accuracy, to ascertain the ingredients required and to assess the medications' suitability for patients. Finally, the fourth set of skills that is not sufficiently covered by the existing Bachelor of Pharmacy programme at the NUL is management, including teamwork, communication, creativity and problem-solving.

▶ Table 9.4. Perceptions among selected pharmaceutical companies in Zimbabwe regarding gaps in the training provided by national institutions

Occupation	Gaps identified?			Comments
	Datlabs	Varichem	Pharmanova	
General manager	No	No	–	General management courses available
Chief executive officer	No	No	–	General management courses available
Director	No	No	No	Institute of Directors Zimbabwe offers courses
Pharmacist	No	No	Yes	Continuing education programmes available
Chemist	No	No	–	Shortage of laboratory equipment
Chemical engineer	No	No	–	Skills honed by on-the-job training Shortage of laboratory equipment
Technician level	No	No	–	On-the-job upgrading of skills
Human resources management	No	No	–	Institute of People Management of Zimbabwe offers continuing education programmes
Marketing	No	No	–	Marketers Association of Zimbabwe offers continuing education programmes
Health and safety and environment	No	No	–	National Social Security Authority upgrading
Artisan	No	No	–	On-the-job training

Note: – = no answer provided.
Source: Survey conducted under ILO research project, 2021.

According to the director of this degree programme, chemistry-related skills are well covered, whereas pharmacology, biology, bioanalytics,

bioinformatics, cross-disciplinary skills and management skills are not. The views of graduates and the programme director do not differ greatly, because pharmacology, which graduates felt was covered best, includes elements of toxicology, biology, chemistry and physiology. This ties in with the observations of Desselle, Hohmeier and McKeirnan (2019), who argue that pharmacists and technicians need to be provided with at least basic pharmacology skills because they act as a link between patients and caregivers and play an important role in the healthcare team, as also emphasized by Schafheutle, Jee and Willis (2015).

The perceptions of holders of the Diploma in Pharmaceutical Technology from the NHTC were also assessed. According to 10 of the 14 respondents, both core and management skills had not been adequately covered in their training programme. The director of the programme expressed a similar view.

In Zimbabwe, three major manufacturers were surveyed to identify weaknesses in the pharmaceutical education and training system. These companies are active in drug production, storage, distribution and marketing, but are hardly involved at all in drug extraction or discovery. Table 9.4 presents some of the survey findings.

Interestingly, the skills provided by training institutions are deemed adequate by both Zimbabwean companies across all occupations, but not by Pharmanova, an Indian multinational, which may suggest that foreign enterprises apply higher standards. Pharmanova was the only company to state that there was a shortage of pharmacists and chemists. Another survey finding is that, for all three enterprises, the current number of employees and managers is sufficient: none of them reported any vacant position or an area requiring additional staff support. The national supply of graduates seems to meet the companies' needs for all the occupations listed in table 9.4, with the aforementioned exception of pharmacists and chemists. One company remarked that pharmacists were retail oriented; it would evidently prefer their training to be more geared towards production and manufacturing.

The lack of skills related to environmental standards is another shortcoming of the education and training system in Zimbabwe. Such skills can be acquired only through comprehensive analytical chemistry courses.[31] Improved knowledge of environmental standards would certainly advance efforts to meet WHO prequalification requirements and GMP standards (UNIDO 2016).

Another skills gap that is perceived to be a major obstacle to research and the discovery of new medicines has to do with inadequate capabilities for the design, formulation and synthesis of drugs.[32]

[31] Interview with a manager at Datlabs, 17 July 2021
[32] Interview with an independent pharmaceutical consultant, 7 July 2021.

Weaknesses and areas for improvement in education and training systems

According to table 9.4, skills gaps in Zimbabwe occur especially in relation to pharmacy and chemistry. The factors militating against quality training in these fields and others include:

- inadequate facilities;
- emigration of experienced qualified lecturers; and
- lack of coordination.

Facilities are inadequate in that laboratory equipment and lecture rooms, for example, are not commensurate with the high and ever-increasing numbers of students.[33] Table 9.4 suggests that poor laboratory practices are also an issue for the companies surveyed. Government funds that could be used to equip laboratories and improve the learning environment are limited. The Harare Polytechnic College relies largely on its own initiative to cope with financial constraints. Students there must purchase their own laptops. Some institutions use alternative ways of accessing software because they cannot afford software licence subscriptions. Laboratories are poorly maintained because there are not enough qualified laboratory technicians and assistants.[34] The lack of fully equipped and well-functioning laboratories is a major impediment also to the development of skills in the areas of drug extraction and discovery.

An additional factor that accounts for the poor quality of pharmaceutical training in Zimbabwe is the emigration of experienced academic personnel to countries offering higher salaries. As a result, the increasing student numbers are not matched by a commensurate rise in the number of lecturers.[35] The country lacks PhD-level scientists specialized in process chemistry and other areas that are relevant to primary pharmaceutical manufacturing and drug discovery (UNIDO 2011b).

The lack of coordination is another challenge. Pharmaceutical learning institutions should be complementary and not compete with one another (ZEPARU 2013). However, the University of Zimbabwe's School of Pharmacy and the Harare Institute of Technology offer the same model of pharmaceutical training.[36] Overlaps in training courses and programmes are widespread and contribute to the ineffectiveness of pharmaceutical education in the country.

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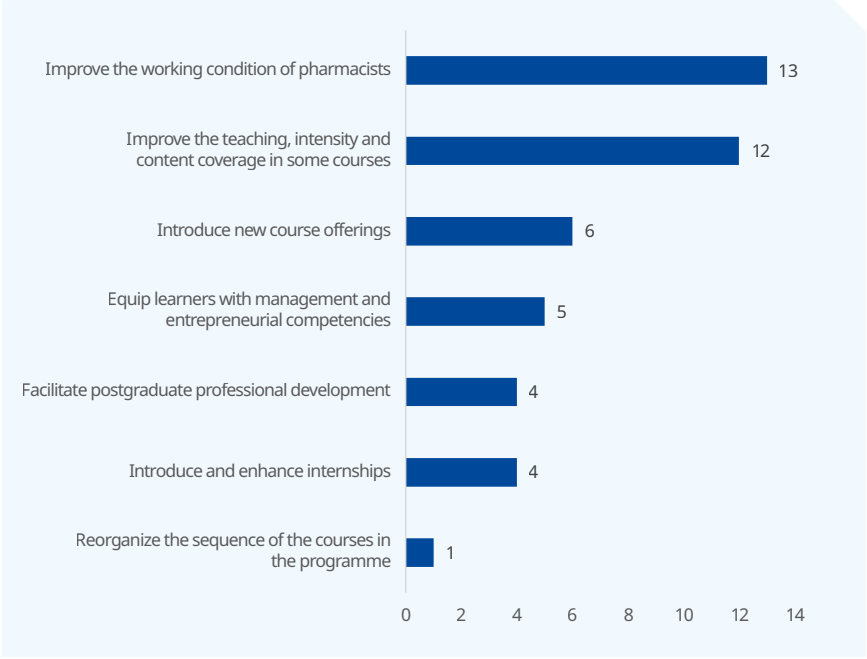
[33] Interview with an administrator at the University of Zimbabwe's School of Pharmacy, 20 May 2021.
[34] Interviews with a key informant, 10 May 2021.
[35] Interview with an administrator at the University of Zimbabwe's School of Pharmacy, 20 May 2021.
[36] Interview with a key informant, 10 May 2021.

Even where there is an element of complementarity, expectations remain unmet. For example, the Bachelor of Science (Honours) degree programmes in Pharmaceutical Chemistry and Chemistry at the University of Zimbabwe are complementary, but sadly the latter has been suspended.[37]

In Lesotho, graduates were asked an open question about the weaknesses of their training programmes and areas for improvement. A total of 14 graduates provided responses. These are depicted in the figure 9.2, which shows the various areas for improvement and the frequency with which they were mentioned.

▶ Figure 9.2. Areas for improvement in pharmaceutical training programmes in Lesotho according to graduates



Source: Survey conducted under ILO research project, 2021.

Some areas for improvement are similar to those identified for Zimbabwe and are addressed in specific sections below. Other areas have to do with the pharmacist's profession, such as "working conditions", and do not belong in a chapter on education and training. The remaining ones are discussed below:

[37] Interview with a key informant, 10 May 2021.

- Improve teaching, intensity and content of some courses: according to some graduates, pharmaceutics and pharmaceutical chemistry should be taught in greater depth. The Bachelor of Pharmacy (Honours) programme at the NUL is perceived as being too clinically oriented. Moreover, communication skills should be fostered in order to improve relations with patients.
- Introduce new courses: new courses on the processing of insurance claims, injection training and other more practical activities were proposed, as was information-technology-supported training on dispensing and pharmacy management.
- Introduce or further promote internships: graduates suggested that internships be introduced as part of the Bachelor of Pharmacy (Honours) programme at the NUL, which currently does not offer any. In addition, the six-month internship currently available to students of the Diploma in Pharmaceutical Technology programme at the NHTC should be extended to a whole year.
- Facilitate postgraduate professional development: graduates would like to have lifelong learning opportunities – that is, opportunities to participate in formal and informal learning activities designed to help them to further develop and maintain their skills and practical experience.
- Rearrange the sequence of courses: it was suggested that core pharmaceutical courses be offered during the first year of the training programme in order to better familiarize students with the pharmacist's profession.

Entrepreneurship and management

It appears to be beyond any doubt that both in Lesotho and in Zimbabwe pharmaceutical education and training programmes do not equip students with entrepreneurial and management skills.

In Lesotho, students have pointed out that such skills would help them to venture into business after completing their studies. Pharmaceutical training programmes do not currently offer courses on entrepreneurship and management. However, self-employment may well be the preferred career path for some graduates, even if they are at present not properly prepared to pursue that option. The heads of training institutions support this idea, since hospitals and clinics do not have many jobs to offer to pharmacists. The NUL has modified its syllabus and introduced a course on general entrepreneurship for all its students from the academic year 2021/22 onwards.

In Zimbabwe, students are trained mainly to become government employees or to work for existing pharmaceutical companies; they are not equipped with the skills that would enable them to start their own pharmaceutical retail or production enterprise.[38] Graduates have limited capacity to identify entrepreneurial opportunities that could make their pharmaceutical skills more profitable. This failure to promote entrepreneurship may to some extent account for the weak innovative capacity in Zimbabwe's pharmaceutical industry in general.

However, it is worth mentioning one positive example of pharmaceutical students' entrepreneurship: Varichem Pharmaceuticals was founded by graduates of the University of Zimbabwe's School of Pharmacy.[39]

Research and drug discovery

In Lesotho, the Bachelor of Pharmacy (Honours) programme at the NUL allocates very limited resources to research, while the Diploma in Pharmaceutical Technology programme at the NHTC has no research funding at all. Undertaking research is therefore extremely difficult; there are reportedly not even sufficient resources to cover publication fees.

Interestingly, the NUL has an innovation hub whose aim is to link laboratory-level work or research work to business incubation and market feedback. This means that products that have been cleared from preparation in laboratories are produced on a small scale and brought to market so that the start-ups are subsequently able to establish facilities for mass production. However, this hub is not being used to its full capacity.

Students and heads of pharmaceutical training institutions in Lesotho suggest that linkages between training programmes and other pharmacy institutions, universities and public research centres should be strengthened.

In Zimbabwe, pharmaceutical research is weak for several reasons, one principal factor being the education and training system. The focus there has always been on the clinical aspects of patient care, whereas drug development has been neglected. Only basic notions are imparted in this subject area.[40]

Owing to the poor research skills of Zimbabwean graduates, national manufacturers are unable to identify stable formulations that could lead

[38] Interview with the Chief Executive Officer of the company Magic Pharmacy, 22 May 2021.
[39] Interview with an administrator at the University of Zimbabwe's School of Pharmacy, 20 May 2021.
[40] Interview with the coordinator of the Bachelor of Science (Honours) in Pharmaceutical Chemistry programme at the University of Zimbabwe, 15 May 2021.

to the production of new ingredients. They can only devise new ways of combining and encapsulating existing ingredients to deliver generic drugs.[41]

Training institutions are inadequately funded by the Government and have limited income-generating capacity. For example, on the Bachelor of Science (Honours) in Pharmaceutical Chemistry programme at the University of Zimbabwe, actual chemicals would be needed for the synthesis phase in the discovery of a new drug, but the institution does not have the necessary financial resources to buy them. Moreover, pilot testing may require the production of new medicines in large quantities, and most training centres are unable to bear the ensuing financial burden.[42]

However, there is one ongoing research project that is generating high expectations. Led by Africa University's College of Health and Agricultural Sciences, this project involves the development of a cough drop based on a herbal plant to treat COVID-19 symptoms. *Lippia javanica* – known locally as *zumbani* – is the name of this plant, which has long been used in traditional medicine. This and other similar projects should be pursued with the objective of developing patented products.

Concluding remarks

Distinct gaps and areas for improvement have been identified in the education and training systems of both countries. Some positive elements have also emerged, which could be used to facilitate change.

Each country's needs are different. In Lesotho, it would seem that the focus of education and training institutions on the clinical side of the pharmaceutical profession is appropriate – as long as the emerging field of medical cannabis is ignored. Specific gaps in the existing training programmes have been identified. In the case of entrepreneurship and management skills, the gap is to be filled through the introduction of a tailored new course at the NUL. Similar solutions could be adopted to tackle other deficiencies in existing programmes.

The presence of medical cannabis manufacturers in the country does not seem to have led to the development of training programmes with a focus on pharmaceutical production skills. This issue should be addressed promptly.

A different approach would be required for R&D, which is currently neglected. Investing in this area would enable some students to become research scientists and would also open up new opportunities for industrial

[41] Interview with an independent pharmaceutical consultant, 7 July 2021.
[42] Interview with the coordinator of the Bachelor of Science (Honours) in Pharmaceutical Chemistry programme at the University of Zimbabwe, 15 May 2021.

development nationwide. The recent establishment of medical cannabis production facilities in the country could benefit Lesotho's technological development if suitable research centres were in place. This would be an appropriate time for the NUL innovation hub to become fully operational.

In Zimbabwe, there is a pressing need to enhance research capacity in the pharmaceutical sector. The principal stakeholders, including education and training institutions and pharmaceutical companies, are agreed on this. Vigorous coordination efforts are necessary, particularly by the Government and the relevant ministries. It is to be hoped that the newly adopted strategy to support the development of the pharmaceutical industry will fill that gap.

Another interesting finding from the research undertaken for this book is that the still very tentative presence of foreign companies in Zimbabwe seems to be encouraging the adoption of higher standards. This process is likely to continue as the recent policy measures to promote foreign investment are implemented.

Women are still under-represented in the pharmaceutical sector in Lesotho and Zimbabwe. While vigorous attempts have been made in Zimbabwe to rectify the situation at least with regard to enrolment in training programmes, no other measure has been taken so far. This aspect requires far greater attention in both countries.

10 Knowledge, technology and innovation

Introduction

Solow (1957) argues that economic growth is determined by exogenous factors such as technological progress. Knowledge is a fundamental resource for the creation of jobs and economic growth. It is equally important in supporting basic technology and traditional innovation, and in driving advanced technologies that allow a country to participate in the global economy (World Bank 2007).

Multinational enterprises and international partnerships play a significant role in technological progress and knowledge transfer, particularly in poor countries. However, public support is necessary for the diffusion of basic technologies and for advanced research activities, especially to protect and enhance indigenous knowledge assets (World Bank 2007). Stiglitz (2017) highlights the important role of governments in promoting learning and innovation. State support is particularly important for tailoring technologies to local needs, for facilitating knowledge transfer and for leapfrogging earlier stages of technology.

Sub-Saharan African countries are lagging behind in their efforts to establish a knowledge-based economy. However, investment in relevant industries is on the rise (Ojanperä et al. 2017; Phale et al. 2021). Although innovation capacity in the region is low, Blankley and Booyens (2010) have observed that technological globalization and the efforts made by African governments to collaborate with advanced economies may enhance local competitiveness.

African countries in general invest very little in R&D; none of them earmarks more than 1 per cent of GDP for such activities. Most of the funding comes from the public sector, since private enterprises rarely promote innovation (Primi 2015).

A knowledge-based economy relies on knowledge-intensive and high-value-added manufacturing, manufacturing-related services and exportable services (Yue 2001). Oluwadare (2015) adds that knowledge economies depend on investment in new technology, high-technology industries and highly skilled labour.

Promoting productive employment is another challenge in the region. Globalization has facilitated technology transfer; technological change leads to

productivity gains and higher development levels. However, until 2000, labour in sub-Saharan Africa moved from more productive to less productive activities such as services or informal work. The trend seems to have reversed since then, with structural change resulting in some productivity growth (McMillan, Rodrik and Verduzco-Gallo 2014).

This chapter describes the technology levels achieved and the challenges experienced in the pharmaceutical manufacturing industry, including the main manufacturing companies in Zimbabwe and the main enterprises involved in medical cannabis production in Lesotho. The analysis of trends and findings is based on available national and international literature and on secondary and primary data.

In the case of Zimbabwe, access to major manufacturers proved to be extremely difficult; only scanty information could be obtained through interviews with national experts and some firms' managers.

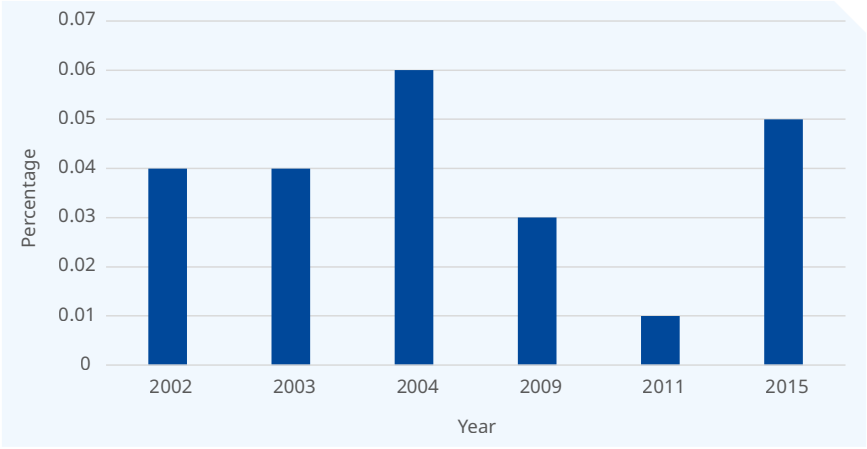
Despite the challenges, in Lesotho it was possible to contact companies involved in medical cannabis production and three of them were eventually surveyed. Interviews were organized with 3 managers and questionnaires completed by 46 employees. Direct exchanges were permitted, including site visits, only thanks to the active cooperation of the companies' lawyers and consultants.

▶ Table 10.1. Researchers per million inhabitants, by world region (1996–2013)

	1996	2000	2010	2011	2012	2013
World	784.7	803.5	1 022.8	1 050.4	1 069.6	1 083.3
Arab States	406.9	394.7	382.5	397.1	409.5	416.3
Central and Eastern Europe	2 209.5	1 950.9	1 975.3	2 002.8	2 030.5	2 049.9
Central Asia	580.5	476.0	480.3	484.9	557.0	583.9
East Asia and the Pacific	653.6	720.5	1 168.9	1 231.3	1 274.3	1 311.8
Latin America and the Caribbean	281.1	284.8	459.3	464.4	469.2	467.9
North America and Western Europe	2 685.0	3 024.4	3 757.3	3 843.7	3 904.5	3 952.0
South and West Asia	144.4	112.9	170.1	169.3	170.3	171.2
Sub-Saharan Africa	65.8	71.2	89.5	90.6	91.7	91.4

Source: Osakwe and Moussa (2017).

▶ Figure 10.1. Research and development expenditure as a share of GDP in Lesotho, 2002–15 (percentage)



Source: Global Economy (n.d.).

R&D, scientific publications and patents

As already pointed out, Africa devotes little funding to research. Table 10.1 shows the number of researchers per million inhabitants for each region of the world. It may be seen that sub-Saharan Africa performs worse than other geographical areas.

Gross domestic expenditure on R&D as a share of GDP is one of the most important indicators of a country's potential for innovation and growth. To verify that expenditure on research really is used for innovation and not for regular scientific and technological activities, the concept of "R&D intensity" has been applied here. This refers to the rate of creation of value-added scientific knowledge and can be assessed by considering the number of patents and scientific publications in a country (Hansen et al. 2002). As figure 10.1 shows, the resources allocated to R&D in Lesotho are very limited, ranging from 0.04 per cent of GDP in 2002 to 0.05 per cent in 2015.

According to Graff and Pardey (2019), most sub-Saharan African patent registrations occur at South Africa's National Intellectual Property Management Office in Pretoria; the African Regional Intellectual Property Organization (ARIPO), whose office is in Harare; and the African Intellectual Property Organization, headquartered in Yaoundé. A few patents are registered through the World Intellectual Property Organization. The countries of origin of the inventions are predominantly European countries and the United States. South Africa performs better than all other sub-Saharan African countries.

Table 10.2 displays the number of patents registered by Lesotho and Zimbabwe between 1970 and 2010. Even allowing for the fact that Zimbabwe's population is roughly seven times greater, it is clear that Lesotho performs rather poorly in terms of patents granted to its nationals. It has been observed in other chapters of this book that Zimbabwe has stronger research capacity and research institutions. Biological patents, for which the table presents data, are linked closely to the pharmaceutical sector. Interestingly, despite the arguments made in the international literature that private enterprises tend not to promote innovation (Primi 2015), the large majority of biological patents in Zimbabwe are assigned to domestic firms, most of which are private. Eight pharmaceutical manufacturing companies have registered medicines with the Medicines Control Authority of Zimbabwe (MCAZ): Zimpharm, CAPS Pharmaceuticals, Plus Five Pharmaceuticals, Datlabs, Graniteside Chemicals, Gulf Drug Company, Pharmanova and Varichem Pharmaceuticals. The registration of medicines in Zimbabwe requires a principal, who holds the intellectual property rights, the dossier and the formulations; an applicant requesting marketing authorization from the MCAZ; and a manufacturer with facilities certified by the MCAZ as compliant with good manufacturing practices (GMPs) to produce the drugs. However, only a few manufacturers in Zimbabwe have the capability to develop their own product formulations (UNIDO 2017); one of them is Plus Five Pharmaceuticals, which according to its brochure (2018) has successfully developed 12 human medicines and 1 veterinary drug.

▶ Table 10.2. Patent filings by Lesotho and Zimbabwe (1970–2010)

Country of invention	Total inventions, 1980–2010 (WIPO count)	Biological inventions, 1970–2010 (InSTePP count)	Biological inventions assigned to a domestic organization or firm, 1970–2010 (InSTePP count)	Share of biological inventions assigned to a domestic organization or firm (%)
Lesotho	5	0	0	–
Zimbabwe	261	9	7	78

Note: InSTePP = International Science and Technology Practice and Policy; WIPO = World Intellectual Property Organization.
Source: Graff and Pardey (2019).

In 2001, ARIPO received 55 applications from Lesotho, only one of which came from a resident national. The result of all those applications was 11 patents, none of which was granted to a resident national (Wekundah 2012). Between 2011 and 2015, one patent was granted to a Lesotho national, most likely a non-resident (Osakwe and Moussa 2017). During the period 2015/16–2017/18, institutions of higher learning submitted 14 applications to the competent national office to register inventions in Lesotho. Only one patent request was

in the area of chemistry, which is the closest field to pharmaceuticals (Lesotho, Council on Higher Education 2020).

In Zimbabwe, a National Intellectual Property Policy was finalized in 2015 and subsequently officially adopted. The policy aims to protect intellectual property and promote research for the development of new medicines. However, further efforts would seem to be necessary. It has been reported that the regulatory system should play a more important role in promoting the registration of new drugs. Zimbabwe has about five times the population of Botswana, yet Botswana has over 5,000 registered medicines, while Zimbabwe has fewer than 2,000.[43] The limited number of pharmaceutical patent applications in Zimbabwe is also a reflection of the poor skills in drug manufacturing and discovery with which the national education and training system equips students (see Chapter 9).

Table 10.3 compares the performance of sub-Saharan Africa in the field of scientific publications with that of the African continent as a whole and the world.

▶ Table 10.3. Number of scientific publications, world, Africa and sub-Saharan Africa, 2004 and 2014

	2004	2014
World	1 209 471	1 279 425
Africa	20 786	33 282
Sub-Saharan Africa	11 933	18 014

Source: Mafoti (2019).

Zimbabweans publish a relatively high number of scientific papers. Nevertheless, only a few patent applications are filed by residents and even fewer are granted (UNIDO 2011b).

Table 10.4 shows the number of publications issued by higher education institutions in Lesotho between 2015 and 2018. It is not clear how many of them were scientific publications. In any case, not only is the number of such publications low, but very few of them are likely to have led to patents.

▶ Table 10.4. Number of publications issued by higher education institutions in Lesotho, 2015–18

2015–16	2016–17	2017–18
58	67	56

Source: Lesotho, Council on Higher Education (2020).

[43] Interview with an international pharmaceutical consultant July 2021

Scope of the present analysis

As noted in Chapter 3, the pharmaceutical-manufacturing industry in Zimbabwe focuses on secondary production (processing of finished dosage forms, such as tablets, capsules or injections, from raw materials or intermediate products) and tertiary production (packaging and labelling of finished products from primary and secondary sources). Active pharmaceutical ingredients manufactured as part of primary production are imported. Only four of the country's eight pharmaceutical companies are large generic manufacturers. The other four are small, engage in trading and have a narrow product range.

▶ **Table 10.5. Medical cannabis companies surveyed in Lesotho**

	Eden Farma Lesotho	Bophelo Bioscience	MG Health
Year of establishment	2018	2017	2017
First year of operations	2019	2018	2018
Location	Thaba-bosiu, Ha Seeiso, Metolong (Maseru District)	Tsa Kholo, Mafeteng District	Marakabei, Maseru District
Ownership structure	Partnership	Subsidiary of parent company Halo, which operates in California, Nevada and Oregon, United States	Publicly listed company (originally founded by James Mather, the company was listed in 2018); joint venture with Toronto-based Supreme Cannabis Company
Current operational activities	Cultivation	Cultivation	Cultivation, extraction, processing and manufacturing
Number of employees	3	45	55
Market	n/a	United States	Canada, United States and other international markets
Countries of origin of members of Board of Directors	South Africa, Lesotho	Lesotho, United States	South Africa, United Kingdom and Canada
GMP accreditation	Not yet	Not yet	Granted on 2 March 2021

Note: n/a = not available
Source: Survey conducted under ILO research project, 2021.

Medical cannabis production in Lesotho consists of five phases and they all take place within the country: cultivation, manufacturing, distribution, transportation and retail (Samli 1985). Most manufacturing firms have licences that allow them to actively engage in all five phases. Since the industry is new, only cultivation and manufacturing were considered in the research project underlying this book.

It is in the light of national manufacturing capacity that technology is considered in the present chapter. Tables 10.5 and 10.6 provide an overview of the enterprises that were surveyed in the two countries.

▶ Table 10.6. Pharmaceutical-manufacturing companies surveyed in Zimbabwe

	Datlabs	Plus Five Pharmaceuticals	Pharmanova
Type of operations	It has two factories in Bulawayo and a sales and marketing division in Harare; it manufactures, markets and distributes a wide range of pharmaceutical and personal care products	It is part of a vertically integrated group comprising a manufacturing plant in Bulawayo, a pharmaceutical wholesaler in Harare and a retail pharmacy in the Ascot suburb of Bulawayo	It supplies its products to clinics, hospitals, pharmacies and retail outlets in the country
Year of establishment	1954	1996	1970
Number of employees	159 (in Bulawayo)	116	50
Ownership	Subsidiary of the South African Adcock Ingram group	Zimbabwean	Multinational with headquarters in India
GMP certification	No	No	No

Note: n/a = not available

Source: Survey conducted under ILO research project, 2021.

Significance of GMP certification

As tables 10.5 and 10.6 show, only one company – in Lesotho – has obtained GMP certification.[44] Thanks to that accreditation, Lesotho is among the 20 countries in the world to have GMP certification for medical cannabis production. Proof of meeting such standards is particularly important when it comes to exporting. MG Health is at present the only African company that can export medicinal cannabis as an active pharmaceutical ingredient to the European Union. It is also the only company in Lesotho with a large machine that can be used to extract compounds from harvested cannabis flowers to produce cannabis oil and other products. This reflects the way in which GMP certification requires and promotes the acquisition of advanced technology. Unless local manufacturers receive financial and technological support, compliance with standards may become a significant barrier to entering the international market for enterprises whose finances are not as strong as those of MG Health (Banda et al. 2016).

In Zimbabwe, none of the eight registered pharmaceutical-manufacturing companies has been GMP certified by the WHO. Two of them are close to complying with the necessary requirements; all the others have unsuitable facilities. One enterprise, Varichem, once received WHO prequalification for the production of an antiretroviral, but that has since lapsed (Zimbabwe, Ministry of Industry and Commerce 2021). The eight manufacturers have received a national GMP certification from the MCAZ, which is valid only domestically.

The African Continental Free Trade Area offers Zimbabwe an excellent opportunity to export its medicines. However, standards that are recognized outside the country must be met if it is to be able to access international – even if only regional – markets. The ZAZIBONA initiative is also promising. It aims to establish uniform medicines control and registration rules for pharmaceuticals in Zambia, Zimbabwe, Botswana and Namibia. The starting point is product registration with the MCAZ.

Technology transfer

The concept of "technology transfer" has no single definition. The context in which such transfer takes place and the type of technology used must be taken into account. Broadly speaking, technology transfer is the process whereby technology is shifted from one location to another in order to be applied to a final product (Varley 1994). It can occur within a country, from one sector or firm to another, or the transfer may be from one country to another (UNCTAD 2012). It has also been defined as the passing on of know-how to an enterprise that is thereby enabled to manufacture a specific product (Devapriya and

[44] For more information about GMP certification, see Chapter 5.

Ganesan 2002). Technology transfer requires a lasting relationship between two enterprises over a certain period of time so that the beneficiary enterprise can deliver the product at the desired level of quality and cost efficiency (Tong 2001). The transfer is not only of the knowledge but also of the capacity to master and further develop the technology acquired so that the recipient is able to autonomously produce a given product (Chesnais 1986).

Technology transfer also serves the purpose of adapting know-how to local needs and ensuring its dissemination and assimilation within a country or between countries (Samli 1985). Several mechanisms can facilitate technology transfer, including joint ventures, licences, franchises, patents, technical publications, and experts (Meissner 1988; Eaton and Kortum 1999). The stakeholders involved are many and include enterprises, governments, donors, universities, business organizations and research societies (Samtani 2010; Chung 2001). The more complex the technology to be transferred is, the closer the linkages should be between the two entities involved so that the transfer is effective (Adeoba 1990).

Sung and Gibson (2000) conclude that "technology transfer"and "knowledge transfer" have similar meanings. There are many different channels through which knowledge can flow from one entity to another, such as seminars, observation visits, training, trade press, professional associations, labour mobility, and networks (Bozeman 2000). The same channels can be used to transfer technology.

Technology transfer can boost the provision of pharmaceutical products (Berger et al. 2010). In Zimbabwe, Plus Five Pharmaceuticals has benefited from technology transfer for the production of 12 human medicines and 1 veterinary drug, which it is manufacturing under licence. Additionally, in 2018 it was in the process of finalizing a technology transfer agreement with a leading multinational pharmaceutical company for the production of an essential tropical medicine for local and regional markets (Plus Five Pharmaceuticals 2018).

It is worth noting that, particularly in the cannabis industry, technology transfer and knowledge transfer encompass not only also equipment, but also a much broader range of elements comprising whole systems and their constituent parts, including know-how, goods and services, equipment, and organizational and managerial procedures (Tébar Less and McMillan 2005).

Primary data collected from the three medical cannabis companies surveyed in Lesotho advance understanding of whether and how technology transfer is taking place in the industry. The total number of employees in the three companies is 103, of whom 46 were surveyed.

The majority of these workers are men: they made up 56.5 per cent of the sample. It is a rather young labour force, in which 58.7 per cent are aged 25 to 34 years, and 19.6 per cent are aged between 35 and 44 years. In terms of professional experience, the largest group are those who have worked for one to two years in the medical cannabis industry (34.9 per cent of respondents), followed by those with two to three years of experience (25.6 per cent); only 16.3 per cent have worked in this field for more than three years. This pattern reflects the fact that the industry is very new. Interestingly, almost all the employees surveyed were Lesotho nationals: these made up 97.8 per cent of the sample, compared with just 2.2 per cent who were South Africans. The labour force is not only comparatively young but also well educated: 57.1 per cent have tertiary education and 28.6 per cent have secondary school qualifications as their highest level of educational attainment. As argued by Uwakonye (2020), the emerging medical cannabis industry may help to alleviate the problem of youth unemployment in Lesotho.

The perceptions of employees regarding knowledge transfer were captured using a five-point Likert scale. In table 10.7 the positive answers "agree" and "strongly agree" have been grouped together, as have the negative answers "disagree" and "strongly disagree".

▶ Table 10.7. Perceptions of employees of medical cannabis companies in Lesotho regarding the knowledge transfer methods applied at these companies (percentage)

Method	Strongly agree / agree	Neutral	Disagree / strongly disagree
Learning by doing	91.1	8.9	0.0
Formal training	51.1	26.7	22.2
Informal training, (experience sharing, peer-to-peer, face-to-face interactions)	66.7	24.4	8.9
Documentation, manuals	75.6	15.5	8.9
Best practices, lessons learned	77.3	15.9	6.8
Information technology	56.8	27.3	15.9

Source: Survey conducted under ILO research project, 2021.

An overwhelming majority of the employees surveyed, namely 91.1 per cent of the total, reported that they learned how to perform new tasks by doing them. The managers interviewed confirmed that most workers were trained on the job. Internships are offered to some students from the National University of Lesotho (NUL), Lerotholi Polytechnic and various South African universities. These interns are subsequently often recruited by the companies that trained them.

▶ Table 10.8. Perceptions of employees of medical cannabis companies in Lesotho regarding the attitude of managers/supervisors with respect to knowledge-sharing (percentage)

Attitude	Strongly agree / agree	Neutral	Disagree / strongly disagree
Managers/supervisors willingly share knowledge and skills	77.3	11.3	11.4
Managers/supervisors make an effort to transfer knowledge and skills	82.2	8.9	8.9
Managers/supervisors have the ability to transfer knowledge and skills	82.2	6.7	11.1
Managers/supervisors are capable of sharing knowledge and skills	82.2	11.1	6.7
Managers/supervisors are able to accommodate needs of subordinates for knowledge/skills transfer	73.3	15.6	11.1
Managers/supervisors have a history of successful knowledge/skills transfer	65.9	27.3	6.8
Managers/supervisors show subordinates ways to develop their skills	88.9	4.4	6.7
Managers/supervisors clearly explain tasks and responsibilities to make it possible for subordinates to perform their job	86.7	6.6	6.7
Managers/supervisors help subordinates to apply acquired knowledge and skills in their day-to-day activities	86.7	8.9	4.4
Subordinates are able to acquire knowledge and skills communicated to them in a different language	75.6	13.3	11.1

Source: Survey conducted under ILO research project, 2021.

Similar shares of employees stated that they acquired new knowledge by considering best practices and lessons learned from past experiences (77.3 per cent) and by reading manuals and documentation (75.6 per cent). A manager mentioned that workers were encouraged to read literature about cannabis provided by the enterprise, which explained various concepts that they were expected to apply when going about their jobs.

Interestingly, as can be seen in table 10.7, formal training is the method least used to impart knowledge. In this regard, it is worth noting that a senior manager at MG Health stated that the company planned to set up a training academy for local cannabis farmers (Prohibition Partners 2019b). The same company also seems to have asked the NUL to provide training for its staff on pharmacy and agriculture. For unknown reasons, this training was ultimately not delivered.[45]

Workers were also asked to express their views on the attitude of their managers/supervisors with respect to sharing knowledge. Table 10.8 presents these perceptions, which were captured using a five-point Likert scale. The positive answers "agree" and "strongly agree" have been grouped together, as have the negative answers "disagree" and "strongly disagree".

The attitude of managers/supervisors with respect to sharing and transferring knowledge is highly appreciated by employees. Over 85 per cent of them concur that their managers/supervisors show them ways of developing their skills, clearly explain tasks and responsibilities and help them to apply acquired knowledge and skills in their day-to-day activities. Furthermore, over 80 per cent of employees believe that their managers/supervisors have the ability to share and transfer knowledge and skills and are making an effort to transfer what they know to their subordinates.

A local manager reported that knowledge transfer occurred mainly through reading and the provision of teaching for employees. He had recruited an expatriate expert from a medical cannabis firm to train his workers, but the knowledge transfer experiment had failed, as foreigners did not seem to be interested in training locals. His company had experienced difficulties in attracting foreign investors other than from South Africa, where the level of expertise in medical cannabis is not as high as that found in companies from North American or European countries. The two other companies surveyed are able to benefit from the expertise of expatriates who are on their staff.

Despite the above-mentioned challenges, the positive survey results are crucial because knowledge-sharing and knowledge transfer generate new ideas, increase workers' motivation and improve operational efficiency (Liu 2016). In addition, they stimulate growth and innovation. However, the sharing

[45] Interview with an expert, 22 July 2021.

and transfer of knowledge should be aligned with an enterprise's strategy and objectives (Reiche 2011).

The employees of the three medical cannabis companies surveyed in Lesotho were also asked to express their opinion on the various forms of support that they received for knowledge and skills transfer (see table 10.9).

▶ Table 10.9. Perceptions of employees of medical cannabis companies in Lesotho regarding the support provided by these for knowledge and skills transfer (percentage)

Support	Strongly agree / agree	Neutral	Disagree / strongly disagree
Company facilitates on-the-job training through coaching, mentoring and job rotation	81.8	9.1	9.1
Company allows time off work for training	65.9	11.4	22.7
Company sets aside a budget for training	37.2	53.5	9.3
In the company there is high acceptance of using previously shared knowledge	84.1	6.8	9.1
Managers and subordinates are allowed to use knowledge and skills acquired during off-the-job training	64.4	17.8	17.8
Company rewards managers who transfer knowledge and skills to subordinates	26.7	46.6	26.7

Source: Survey conducted under ILO research project, 2021.

Perceptions on specific forms of support provided by medical cannabis companies for knowledge and skills transfer are less optimistic than those expressed on, say, the attitude of managers/supervisors towards such transfer processes as reported in table 10.8. Over 80 per cent of surveyed workers feel that their enterprise fosters on-the-job training through coaching, mentoring and job rotation and also by accepting the use of previously shared knowledge and skills. Around 65 per cent stated that they were given time off work for training and that they were allowed to use in their work the skills and knowledge acquired during off-the-job training. More negative views were expressed on whether companies set aside a specific budget for training. It seems that employees were not sure what to answer, opting for a "neutral" response

in 53.5 per cent of cases. Similarly, workers do not seem to be sure whether managers are actually rewarded for sharing knowledge with their subordinates: 46.7 per cent of respondents chose "neutral" as their answer.

Equipment

The pharmaceutical industry is very capital intensive and highly productive. The findings of a worldwide survey of pharmaceutical equipment covering 489 companies reveal that the budget for new machinery grew by about 70 per cent between 2013 and 2015. The striving to reduce costs and increase productivity is an important factor accounting for the growing need for new equipment. Interestingly, 69 per cent of firms that buy new machinery engage in equipment investment recovery, selling obsolete or redundant machinery. Outsourcing to service providers with advanced capabilities and equipment is on the rise (Walker 2016).

In Zimbabwe, machinery is obsolete and prone to frequent breakdowns (Bloom et al. 2011). The technological upgrade of the pharmaceutical sector in the country requires a comprehensive improvement of manufacturing and service technologies. Unfortunately, the stagnation of the economy, which is beset by liquidity challenges and persistent balance-of-payment deficits, makes it difficult to import equipment, leading to continuous underproduction (Muvoti 2013).

Zimbabwe has the technology to preserve cold-chain products that must be kept frozen all the time, such as insulin for diabetes, biological medicines like Avastatin, injectables such as Humira and Streptase, and glaucoma eye drops, which are temperature sensitive. There are cold rooms for medicines and well-designed ways of transporting these from one facility to another. The National Pharmaceutical Company, which is in charge of procurement and distribution, has a fleet of 29 vehicles, including 8 cold-chain vehicles, which facilitate the distribution of medicines throughout the country.[46]

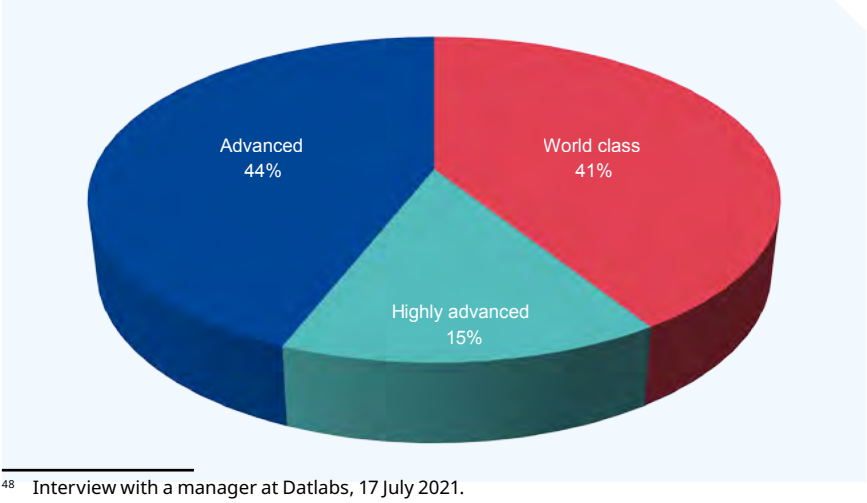
A manager from Pharmanova in Zimbabwe reported that they were still using pre-1980 machines. Even though its equipment was compliant with twenty-first-century requirements, the company clearly lagged behind in terms of technology. The old machines entailed high maintenance costs as a result of constant breakdowns and the need for spare parts that were no longer on the market and required customized engineering. The repeated breakdowns sometimes affected product quality negatively. The company was gradually acquiring new machinery from China and India; equipment from Germany would have been better but also more expensive.[47]

[46] Interview with a chemical expert, 14 July 2021.
[47] Interview with a manager at Pharmanova, 25 July 2021.

Following an inspection by the MCAZ, another Zimbabwean enterprise, Datlabs, had to purchase new equipment to comply with national regulations. Over the past few years, the company upgraded its heating, ventilation and air-conditioning systems and purchased automated pharmaceutical tablet press machines and processing equipment, including a fluid drier, compression machines and a coating pan. The output that was previously turned out in five days now takes three hours to produce. Drying processes that required three days can now be completed in 20 minutes. Increased automation made some employees redundant. However, those workers were not laid off: they were instead assigned new tasks within the factory.[48] The practice of not dismissing redundant employees may mean that this company is not very efficient, but it certainly helps to maintain jobs at higher productivity levels than in the jobs that dismissed workers would have to take up, most likely in the informal economy (McMillan, Rodrik and Verduzco-Gallo 2014). A study commissioned by McKinsey reveals that only one third of the pharmaceutical companies surveyed worldwide have initiated reskilling efforts for employees made redundant by automation. Few executives can anticipate the impact of digitalization on the labour force skills that will be required in the future (Dukart et al. 2020).

In Lesotho, the employees surveyed were asked to rate the overall quality of their enterprises' production equipment. As can be seen in figure 10.2, the largest share of respondents, 44 per cent, consider that the machinery used is highly advanced.

▶ Figure 10.2. Perceptions of employees regarding the quality of medical cannabis production equipment in Lesotho



[48] Interview with a manager at Datlabs, 17 July 2021.

Source: Survey conducted under ILO research project, 2021.

More details were captured through interviews on various aspects of technology as presented below. It should be noted that some enterprises make use of more sophisticated technology than others. They tend to be larger firms with greater access to foreign investment from North America and Europe. Furthermore, as observed in Chapter 7, advanced technology is cleaner, since inputs can be dosed more precisely (for instance, water for plants).

- Testing of cannabis: the testing of cannabis for safe consumption and potency is very important. The higher the tetrahydrocannabinol (THC) content in cannabis, the more valuable the product. Some enterprises, such as MG Health, have their own research laboratories where they test the THC and cannabidiol levels of cannabis plants. Only the strains obtaining the best laboratory results are planted. Companies that do not have research laboratories outsource the testing of their final products to MG Health.

- Greenhouse technology: the advantage of growing cannabis in greenhouses is that the grower can control the concentration of carbon dioxide in the air, the moisture level and even how well the soil conducts electricity (Bahji and Stephenson 2019). However, high upfront costs (including building the structure, equipment, water, electricity and other utilities) are the major downside of growing cannabis indoors. Greenhouses are used for most of Lesotho's cannabis cultivation. The managers interviewed confirmed that the main advantage offered by greenhouses is the ability to control the conditions under which the plant is grown, taking into account specific needs at any given point. Greenhouses harness the power of the sun, provide a warm climate and protect gardens from harsh environmental conditions. They also allow year-round cultivation, climate control and an adequate exposure to sunlight. In one of the companies surveyed, the greenhouses reportedly have a "wet wall" cooling system, which monitors humidity as more moisture is introduced. Automated technology stops the system once a certain humidity threshold has been reached. In a different company, greenhouses are not automated, which also has some advantages: when plants have specific problems, those can quickly be identified and resolved.

- Lighting in greenhouses: cannabis plants need wide-spectrum light. Light intensity and quality play a key role in controlling yield, cannabis flowering, and cannabidiol and THC content. High-pressure sodium bulbs have long been used in cannabis cultivation (legal and illicit) because they are relatively cheap. In addition, they help to achieve a very predictable crop yield. However, such bulbs consume a lot of electricity, have a

relatively short lifespan and generate a large amount of heat, which often requires a climate control system and thus further increases costs (Chouvy 2019). Following advances in technology, light-emitting diode (LED) based lighting systems have been introduced. LED bulbs last longer than high-pressure sodium ones, allow electricity to be saved and do not cause excessive heating. On the minus side, LED systems entail greater upfront expenditure, though the long-term cost savings outweigh the overall expenses. One surveyed enterprise uses LED lights. They are very expensive, but they allow the company to save money on temperature control. Another company has installed automated black-and-white curtains, which facilitate heat retention, shading and cooling effects, control of day length or blackout, and monitoring of light intensity and temperature.

- Irrigation technology: cannabis plants need water and nutrients. Selecting the right irrigation system is therefore very important for the quality of the harvest. One company surveyed uses a drip-watering system, as it is precise and the water goes directly to the plant's roots. Another company relies on a similar irrigation system, but also has boreholes to provide water, which is tested at the source and before being used. A third company plants medicinal cannabis in a nutrient-water solution and an inert growing medium instead of in nutrient-rich soil.

- Drying cannabis: this is an important production phase after harvesting, because it removes the moisture, improving the flavour and aroma. It also eliminates the chlorophyll, helping to bring out the terpene profile. One company has a drying room with air-conditioning and microprocessor-controlled humidifiers and dehumidifiers. Another company uses a system requiring a large amount of electricity for fans. Plants are dried by being hung on a clothes line; the process takes several days. A third company hires part-time workers for harvesting and then uses lots of electricity for ventilation to dry the harvest.

- Tracking during cultivation: collecting accurate data throughout the cultivation phase makes it possible to improve efficiency and quickly identify and solve problems. One company keeps a production logbook, in which detailed information about every part of the cultivation process is recorded. For instance, temperature and humidity levels are recorded at set times during the day. Some buyers request such data. The recording in the logbook is performed manually.

Factors accounting for different technology levels in Lesotho and Zimbabwe

Certain factors may explain the striking difference between Zimbabwe's continued reliance on older technologies and Lesotho's successful adoption of new, advanced technologies:

- Import substitution industrialization policies: the history of Zimbabwe, which was called Rhodesia until 1980 and was subject to political sanctions by the United Nations and the international community, favoured the adoption of such policies in the country. The period after independence from the United Kingdom in 1965 witnessed the creation of a solid pharmaceutical sector that was second only to that of South Africa (Banda, Wangwe and Mackintosh 2016). However, the unstable economic situation of Zimbabwe over the past decades has caused stagnation in all economic sectors, including the pharmaceutical sector, which has hung on to old equipment.

- Dependence on imports: the poor performance of the Zimbabwean pharmaceutical industry and its unsuccessful attempts to upgrade capabilities have made the country heavily dependent on donations and imports of pharmaceuticals. This has in turn undermined the competitiveness of national manufacturers. Active pharmaceutical ingredients and excipients must be imported, which makes domestic production of drugs very expensive.

- Indigenisation and Economic Empowerment Act: this law was adopted in Zimbabwe in 2008 and was amended only ten years later. It has discouraged foreign investment, which is usually a driver of technological innovation. In countries such as Ethiopia and Kenya, joint ventures have been sufficient to promote expansion of the pharmaceutical industry (Simonetti, Clark and Wamae 2016; Gebre-Mariam, Tahir and Gebre-Amanuel 2016). Even in its original version, the Indigenisation and Economic Empowerment Act did allow joint ventures with up to 49 per cent of foreign capital.

- An export-oriented new industry in Lesotho: the manufacture of medical cannabis in Lesotho is a new industry largely dominated by foreign investors with highly advanced technology.

Communication and access to the internet and electricity

In Lesotho, power supply and the internet are not reliable, and medical cannabis companies located in the mountains face serious challenges. One manager pointed out:

> The company intends to install a satellite internet system that will allow off-site monitoring and automated control of the irrigation, temperature and so on. Backup generators will be used during power outages. We have one 400 kVA [kilovolt ampere] backup generator on site already.

In medical cannabis production, reliable means of communication are key. Owing to the nature of this activity, employees must be readily available no matter where they are; interrupted or postponed calls due to bad services or signals are not acceptable. One medical cannabis company surveyed in Lesotho relies on walkie-talkie transceivers for internal communication. In another, managers use mobile phones for that purpose.

In Zimbabwe, there is a national policy document on information and communications technology (ICT) which focuses on ICT literacy (Isaacs 2007). Much more is needed to develop an ICT base for economic growth and industrialization. With regard to the pharmaceutical sector in particular, the Government, through the Ministry of Health and Child Care, has initiated a project financed by the Global Fund to Fight AIDS, Tuberculosis and Malaria with a view to deploying an electronic logistics management information system for monitoring and controlling the procurement of medicines.

Inadequate power supply besets Zimbabwe as well, undermining economic development (Muvoti 2013). Intermittent electricity from the national grid due to load shedding and plant outages is a major challenge for the pharmaceutical sector and the new medical cannabis industry. Despite the rural electrification programme launched in 2002, some production sites located in remote areas do not have access to electricity.

Brain drain

Both Lesotho and Zimbabwe are faced with "brain drain", that is, the problem of many qualified professionals leaving a country, which hinders the development of national research capabilities and technological progress. The scarce employment opportunities in Lesotho and the greater availability of education and training programmes at all levels in South Africa prompt many students to leave the country for its larger neighbour. As for Zimbabwe,

its unstable economic situation has forced many researchers to emigrate in search of better jobs and wages (Van Vuuren 2012).

Diaspora communities have the potential to become a valuable resource. Close technology and business linkages could be created with emigrants from Lesotho and Zimbabwe. In a similar way, Taiwan Province of China, Ireland and Israel all provided incentives to encourage their highly educated nationals living abroad to return to their home country and help build new industries (World Bank 2007).

The diaspora's technological skills can be harnessed by creating networks that enable institutions in home countries to benefit from relocated expertise (Brinkerhoff 2008). National policies to maintain contacts with expatriate workers are very important in this regard. Emigrants can prove extremely useful to their home country when they function as "bridges" facilitating access to foreign markets, attracting investment and offering their expertise. Knowledge of policy, management and marketing is the diaspora's main resource. Digitalization is a powerful facilitator of knowledge transfer through expatriates. Chinese and Indian engineers living and working abroad are able to contribute significantly to development in their home countries thanks to virtual media (World Bank 2007).

Concluding remarks

The situation in the two countries as regards technology is quite different. In Zimbabwe, there is more domestic knowledge at the heart of the pharmaceutical sector, but obsolete equipment. In Lesotho, there seems to be little or no local knowledge of medical cannabis, but extremely advanced technology, at least in companies backed substantially by foreign investors.

As noted in Chapter 7, new technology is cleaner, and this is certainly true of the sophisticated equipment of some medical cannabis firms in Lesotho. The national regulatory system in Zimbabwe and inspections by the MCAZ are certainly inducing pharmaceutical manufacturers to renovate their equipment and thus environmental protection is improving in that country as well.

There is scope for the Governments of both countries to step up their intervention in such areas as communications, information technology and electricity. Basic infrastructure is urgently needed if entrepreneurs are to succeed in developing and expanding their economic activities. At present, only companies benefiting from sizeable foreign investment can afford satellite connections or solar power facilities; many local businesses are being left behind.

From the findings presented in this chapter, particularly in relation to Lesotho, it appears that knowledge and technology transfer does occur within enterprises. There seem to be difficulties in transferring knowledge between enterprises – especially from companies dominated by foreign investors to local ones, a finding consistent with the available literature (World Bank 2007). More efforts are required to find ways of transferring knowledge to local entrepreneurs. The pharmaceutical industry in Kenya provides interesting examples in this regard: some companies there have introduced compulsory training courses for all employees, for which expatriate trainers are sometimes recruited, and in a few cases employees have been sent abroad to learn new skills, particularly to India. Knowledge flows also arise from initiatives organized by national industrial associations (Simonetti, Clark and Wamae 2016). The successful Ethiopian experience of technology transfer through joint ventures is also very instructive. In one company, Chinese employees were gradually replaced by Ethiopian staff who had been properly trained by their foreign colleagues (Gebre-Mariam, Tahir and Gebre-Amanuel 2016). Successful technology transfer has also been achieved in Brazil (Aragão, Guinarães and Loureiro 2016). In both Ethiopia and Brazil, intervention by the national government was key.

The case of Plus Five Pharmaceuticals in Zimbabwe and its technology transfer interactions with a multinational company is interesting, in that it involved an essential tropical medicine that was to be produced for local and regional markets. This supports the idea that Zimbabwe should concentrate its efforts on the production of tropical and traditional drugs for local and intraregional markets, as suggested by some authors focusing on African countries (Leipziger and Yusuf 2015; UNECA 2014; Fortunak et al. 2016). Indeed, Zimbabwe was one of the ten leading intra-African exporters during the period 2015–17 (UNCTAD 2019).

It seems that neither Government has explored the possibility of establishing close linkages with diaspora communities. As argued in this chapter on the basis of other countries' experiences, such a strategy could be very fruitful.

Conclusions

The findings presented in the ten chapters of this book allow some conclusions to be drawn on the main issues raised in the Introduction. Clearly, the medical cannabis industry does not create many new jobs, although they are jobs that offer relatively decent working conditions. The reason for this low job-generating potential is that the value chains, including small-scale informal growers, are not part of the emerging industry. New companies are being set up, largely with foreign funding, and cultivation is part of their activities but very few existing cannabis growers are recruited and most informal cultivation remains illegal. The fees for a medical cannabis licence are too costly for small-scale cannabis growers. Another negative aspect of the new industry is that land that would otherwise have been used by poor indigenous farmers to grow maize and tobacco is being taken away from them and assigned to the new medical cannabis enterprises. In general, the number of jobs created by cannabis production for medical use is simply not comparable to that generated by tobacco farming in the past.

From the point of view of export-led industrialization, medical cannabis would seem to be promising, since there are major foreign investors offering access to the profitable markets in North America and Europe. The problem in this case is that the industry remains in the hands of foreign companies that do not have linkages with domestic entrepreneurs. Exports may therefore secure a few jobs and a certain amount of revenues and foreign exchange for the host country, but they do not contribute much to its economic development, where improved knowledge and capabilities are key. Lesotho has a more favourable investment climate than Zimbabwe, where the lack of macroeconomic stability and the need for numerous and costly licences may deter foreign investment. However, even in Zimbabwe a considerable number of operators have already been registered.

The medical cannabis industry remains distinct from the pharmaceutical sector. This is equally true of Lesotho, where there are only pharmaceutical retail and wholesale enterprises, and of Zimbabwe, where there are big manufacturers. A notable finding has to do with the manufacture of active pharmaceutical ingredients (APIs). In sub-Saharan Africa, pharmaceutical primary production is carried out only in Ghana and South Africa, where APIs are manufactured in extremely small amounts that do not even meet domestic needs. Primary production is very expensive and requires

sophisticated skills. Paradoxically, APIs for cannabis-based medicines are produced in Lesotho, but only for the European and North American markets. Sophisticated knowledge and costly equipment may be available in sub Saharan Africa, but they are not currently being used to make products to meet the region's needs.

The pharmaceutical sector and the medical cannabis industry both offer relatively decent work, although some deficits have been observed. In particular, freedom of association is upheld insufficiently, the regulatory framework for collective bargaining and industrial action is weak, and unfair remuneration is widespread. Women are in less favourable positions than men in both countries. The labour standards situation is similar in the pharmaceutical sector and in the new medical cannabis industry in Lesotho. The findings related to environmental standards present a different picture. In the pharmaceutical sector in both countries, there is a clear lack of awareness of environmental, safety and health standards and policies, and training on occupational safety and health is normally not provided. The medical cannabis industry in Lesotho seems to apply much higher environmental standards – at least in the company whose operations are at the most advanced stage, since it has a proper environmental management system in place and provides training in environmental protection, health and safety. In general, decent work seems to be found most frequently in large companies and state-owned enterprises.

The findings on specific areas presented in the various chapters point to other significant issues. In sub-Saharan Africa, import substitution industrialization policies have often been used to remedy the current situation of dependence on imported medicines. The COVID-19 pandemic has further highlighted how the provision of drugs can easily be disrupted. Together with import substitution policies to protect the domestic industry, national strategies to foster the pharmaceutical sector are being adopted. Zimbabwe is a good example of a country pursuing both approaches. Specializing in sophisticated products like pharmaceuticals is challenging for poor countries, because of the significant requirements in terms of investment and knowledge, but it can be extremely rewarding for national development if successful.

Some sub-Saharan African countries such as Zimbabwe have a comparative advantage in traditional medicines, in particular those used to treat tropical diseases that are endemic in the region. Some intraregional markets are being developed and they are a promising destination for exports. The manufacture of traditional drugs can promote the creation of jobs, not least through the formalization of activities that are normally illicit, such as medical cannabis farming.

Zimbabwe has a quite comprehensive pharmaceutical regulatory framework. In this country, traditional medicine is supported by specific regulations that give it a legal status. The same framework does not seem to apply to medical cannabis, which can be legally recognized only through very expensive licences that traditional cannabis growers cannot afford. In Lesotho, the situation of cannabis growers is similar to that in Zimbabwe. The pharmaceutical regulatory framework is very weak there in general. Thus, Lesotho has no national medicines regulatory agency.

Among all the pharmaceutical manufacturers in both countries, only the largest medical cannabis company in Lesotho has obtained WHO good manufacturing practice (GMP) certification. A company meeting the requisite standards has officially proved that it manufactures drugs of good quality which can be exported to anywhere in the world. Complying with GMP standards requires substantial investments that most pharmaceutical companies in sub-Saharan Africa cannot afford. National GMP systems based on lower standards than those pertaining in WHO certification have been introduced, enabling exports to regional markets.

Training and education needs are different in the two countries. In Lesotho, the focus on the clinical side of the pharmaceutical profession is appropriate, if one sets the emerging medical cannabis industry to one side. Research and development work is neglected; the National University of Lesotho (NUL) has an innovation hub that is not fully operational. In Zimbabwe, there is a broad consensus among stakeholders that national research capacity must be strengthened. The drive for improvements in this country, where pharmaceutical education and training institutions are considered to be strong, seems to reflect the still very tentative presence of foreign companies, which demand a very high level of qualifications from local employees.

Considerations regarding technology are closely linked to the skills that are available in the two countries. In Zimbabwe, despite the recognized domestic knowledge of pharmaceuticals, the equipment in research institutions and manufacturing companies is obsolete, hindering development of the pharmaceutical sector. In Lesotho, the recent high levels of investment in the medical cannabis industry have led to the introduction of quite advanced machinery, although there is very little or no local knowledge of this type of medicine. In both countries, new technology has proved to be cleaner and better for the environment. In Zimbabwe, the need to purchase new equipment to comply with regulatory requirements is helping to strengthen environmental protection. In Lesotho, knowledge and technology transfer seems to occur within companies, whereas difficulties have been noted in knowledge transfer between companies, especially from those dominated by foreign investors to local ones.

In both countries, the infrastructure for telecommunications, information technology and electricity is very weak, which considerably inhibits the development of the pharmaceutical sector, including the medical cannabis industry. At present, only companies benefiting from substantial levels of foreign investment can afford satellite internet connections or solar power installations, while local businesses are left behind.

Drawing on the above conclusions, we may present some policy implications and suggestions for action.

Fostering national development through medical cannabis

The medical cannabis industry can contribute greatly to national development, as long as control over production and exports does not remain entirely in the hands of foreign investors. Particularly worrying is the case of Lesotho, where the emerging industry seems to be totally disconnected from local enterprises and education, training and research institutions. The Government there should play a much stronger role by introducing conditions that would encourage foreign investors to collaborate with domestic businesses, and by supporting, through funding and policies, the enhancement of the research capacity of the NUL and other relevant institutions. Local firms should also receive government support so that they can offer their services to foreign investors. Special incentives could be granted to enterprises engaged in specific economic activities, sectors and subsectors that have linkages with the medical cannabis industry.

The situation in Zimbabwe is different and requires strong government interventions in other areas, not least because there is scope to integrate medical cannabis production into the existing pharmaceutical manufacturing sector, which is already quite robust. Macroeconomic stability needs to be achieved quickly so as not to deter foreign investors. In addition, licensing requirements and the system of import levies should be improved, especially so that Zimbabwe does not lose the advantage of its “first mover” status in attracting foreign investors relative to the several other African countries that are legalizing medical cannabis production. Public–private partnerships should be promoted so that the existing quite strong public research centres and private production facilities can collaborate in fields such as local certified seed production and indigenous knowledge systems. Furthermore, domestic pharmaceutical firms could become much more involved in the medical cannabis industry through participating in all levels of the value chain. These local firms must be proactive and initiate technology transfer agreements with the new, foreign-dominated medical cannabis companies.

Supporting the pharmaceutical sector

This subsection is relevant above all to Zimbabwe, since Lesotho does not have any pharmaceutical manufacturing companies, except three in the medical cannabis industry, and its Government does not seem to be interested in further developing the domestic pharmaceutical sector. However, because of the important contribution of the sector to human welfare, it is crucial that Lesotho adopt the Medicines and Medical Devices Bill, which was drafted in 2013 and provides, inter alia, for the establishment of a national medicines regulatory agency.

Zimbabwe has recently adopted a national strategy for the development of this sector. The country has a long-standing tradition of import substitution policies for medicines. One hopes that its experience will be beneficial for the expansion of the new medical cannabis industry. It is important that adequate financial support be earmarked for efforts to achieve the clear objectives listed in that strategy. Public funding in Zimbabwe is a major problem. A very useful approach would be for international donors to finance parts of the country's strategy to develop the pharmaceutical sector, rather than simply providing medicines, which despite the good intentions invariably results in distortions of the domestic market.

Pharmaceutical companies must themselves make efforts to identify partners, including foreign ones, that could them help to strengthen their capacity, in particular when it comes to complying with WHO GMP standards. Without such GMP certification, they can only access local and regional markets.

As described in Chapters 2 and 10, some enterprises in sub-Saharan Africa have concluded technology transfer agreements with multinationals to produce essential tropical medicines for local and regional markets. This is a promising path for the development of the national pharmaceutical industry in Zimbabwe. Similar initiatives could be encouraged by special government incentives.

Traditional medicine is an area in which Zimbabwe seems to enjoy a comparative advantage at the regional level. Its research centres have conducted advanced investigations leading to the discovery of new drugs. The Government can further support traditional medicine by cooperating with neighbouring countries on the harmonization of rules for exports, and by providing adequate funding for Zimbabwe's research institutions. Incentives could also be created for the production of specific medicines, such as drugs to treat neglected tropical diseases that are endemic and have not attracted the attention of the global pharmaceutical industry.

Creating decent jobs

It has been argued that one of the main positive features of the new medical cannabis industry will be the formalization of many jobs. Sadly, though, it appears that only very few informal small-scale cannabis growers are formally recruited by medical cannabis companies. If linkages with local enterprises are established, new employment opportunities could arise in low-skill activities, such as pruning, irrigating, harvesting and drying. Governments can promote the creation of such linkages by setting conditions that must be met by foreign investors. However, foreign investors should also actively consider concluding contracts with local enterprises, as called for in the Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy.

Traditional medicine is a good option within the pharmaceutical sector for the creation of jobs. Zimbabwe is a leading country in this regard, since it formally recognized traditional healers as long ago as 1980. Other countries should follow its example.

Evidence shows that, in both countries, decent work prevails in the formal, conventional pharmaceutical industry. However, some deficits have been identified. The regulatory framework for collective bargaining and for upholding the right to strike should be completed and corrected where necessary, in line with ILO guidance. In Zimbabwe, problems hindering collective bargaining could be addressed by the National Employment Council, with the agreement of all the parties involved. Good collaboration between national stakeholders and satisfactory mutual relations will be key factors in the successful development of the pharmaceutical sector. Cooperative industrial relations would certainly also help to resolve some issues such as unfair remuneration. Frequent and thorough inspections by the competent authorities could improve the situation considerably. It is very important to build these institutions' capacity and secure more funding for them.

According to the OECD Guidelines for Multinational Enterprises, companies are expected to provide their workers with information on environmental standards and occupational safety and health. In addition, they must provide adequate training in these areas. The findings presented in this book indicate that pharmaceutical firms in both countries should make special efforts in relation to this aspect of decent work, which seems to have been neglected thus far.

Promoting skills, knowledge and technology

Although still in its infancy, the medical cannabis industry in Lesotho seems to be growing quite rapidly and successfully. To avoid missing this opportunity for national development, the country must take immediate action to build the necessary skills and knowledge so that its citizens can become actively involved in the industry. Training in pharmaceutical production skills must be introduced in the pharmaceutical courses offered by the NUL or through dedicated training programmes at other institutions. Furthermore, national research capacity must be strengthened by increasing the level of funding, setting up new research centres and developing the NUL innovation hub.

Zimbabwe has several strong research centres. However, improved coordination and funding are required. The Government should intervene, through the relevant ministries, to streamline these centres' capacities and help them to acquire specialized equipment. With regard to innovation, patent registration procedures should be enhanced and licence fees lowered to encourage the introduction of new ideas and products in the pharmaceutical market.

To promote the transfer of knowledge from foreign-owned enterprises to local ones, the Governments of both countries could set conditions that need to be met by foreign investors, following the examples of, say, Ethiopia and Kenya.

The obsolete machinery used by most Zimbabwean pharmaceutical manufacturers must be replaced. Although the need to comply with national regulations has proved to be an effective stimulus, government incentives could further facilitate that process.

Providing basic infrastructure

As noted above, telecommunications, information technology and electricity supply services in both Lesotho and Zimbabwe are unreliable. Only companies backed by substantial foreign investment can afford satellite internet connections and solar power facilities, for example. Providing such basic infrastructure should be a priority for both Governments. In addition, public–private partnerships could be promoted in which private enterprises benefiting from foreign capital can partly finance the local public provision of the aforementioned services.

In June 2021, the International Labour Conference adopted a resolution on a human-centred recovery from the social and economic crisis caused by the COVID-19 pandemic. The resolution calls for

> Urgent and coordinated action ... to ensure that all people have timely, equitable, affordable and global access to quality, safe and effective COVID-19 vaccines, treatments and preventive measures, such as health technologies, diagnostics, therapeutics and other COVID-19 health products. (ILO 2021, 3)

Promoting the pharmaceutical sector in two poor countries such as Lesotho and Zimbabwe would be in line with this call to action. This book and its recommendations are intended to contribute to achieving this important objective.

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