The Transition of Regulatory Services from Drug Regulatory Unit to Botswana Medicines Regulatory Authority: An evaluation of the changes in regulatory services from the industry's perspective

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Declaration

I declare that *The Transition of Regulatory Services from Drug Regulatory Unit to Botswana Medicines Regulatory Authority: An evaluation of the changes in regulatory services from the industry's perspective* is my own work, that it has not been submitted before for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged as complete references.

Signed:  Date: 29 May 2023

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Keywords

National Regulatory Authorities, Drug Regulatory Unit, Botswana Medicines Regulatory Authority, World Health Organization Global Benchmarking Tool, Regulatory systems, Regulatory functions, Service delivery

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Abstract

Background

The Drug Regulatory Unit (DRU) was established by the Ministry of Health (MoH) to enforce the Drugs and Related Substances Act of 1992 in line with the Botswana National Drug Policy (BNDP) adopted in 2002 and the National Health Policy (NHP) to attain health for all. However, as with many National Regulation Authorities (NRAs) in low and middle-income countries, the DRU had major challenges in inefficient legislation and regulation to address the supply of substandard and falsified medicines, and financial and human resource constraints to maintain and sustain regulatory oversight. The Government of Botswana through the MoH restructured DRU into a semi-autonomous regulatory body, Botswana Medicines Regulatory Authority (BOMRA). To aid the NRAs in building and strengthening regulatory systems' capacity to regulate medicinal products effectively and efficiently, the World Health Organization (WHO) has generated a Global Benchmarking Tool (GBT) for member states. As of December 2019, a total of 26 countries underwent formal benchmarking while 54 countries including Botswana completed self-assessments using the WHO-GBT. Despite this self-assessment, there might be a need to assess the efficiency of the regulatory service delivery of BOMRA from the industry's perspective.

The study aimed to assess and compare the changes in the regulatory system for the WHO-recommended regulatory functions and service delivery following the transition of DRU to BOMRA from the industry's perspective.

Method

Extant data analysis was conducted to establish the basis of the transition of DRU to BOMRA and to tease out the similarities and differences in the scope of the WHO-recommended regulatory functions. The WHO GBT for Evaluation of National Regulatory System of Medical Products Revision VI was adapted as a data collection tool. A cross-sectional survey

using a five-point Likert scale questionnaire adapted from BOMRA Customer Service Standards was used to assess the regulatory service delivery as perceived by the employees from pharmaceutical companies that have received regulatory services in Botswana from the former DRU and the current BOMRA.

Null hypothesis:
There is no significant difference in service delivery between DRU and BOMRA following the transition

Results
The findings indicated more legal provisions to enforce the WHO-recommended regulatory functions by BOMRA (M = 93.81%; SD = 14.96) than DRU (M=40.00%; SD = 26.46). Most (~88%) improvement was observed in the legal provisions to enforce the Market surveillance and control (MC), followed by Pharmacovigilance (VL) (80%), Laboratory access and testing (LT) (75%), Regulatory inspections (RI) (54%), Clinical Trials Oversight CT (35%), Licensing of establishments (LI) (23,5%), and Registration and Marketing Authorization (MA) (21,7%).
It was shown that BOMRA had more (M = 89.33%; SD = 14.09) guidelines on the WHO-recommended regulatory functions than DRU (M = 68.00 %; SD = 30.49). No change was observed in the guidelines to enforce LI (100%) between DRU and BOMRA after the transition. Most (72%) improvement was observed in MC, followed by VL(25%) and RI (25%). The least improvement was observed in the required guidelines to enforce MA (9%). No improvement was observed in the required guidelines to enforce CT (89%) between BOMRA and DRU after the transition.

A significant difference [(t (11) = 2.82; p = 0.016); (z = 2.38; p = 0.017)] was observed in service delivery between DRU and BOMRA in terms of the 'General Administrative Services Response Time'. However, a non-significant trend was observed in the 'Technical Services Timelines' i.e. 'Registration Assessment Process' services timelines [(t (11) = 1.20; p = 0.26; (z = 1.09; p = 0.28)], 'Pharmacovigilance & Clinical Trials' services timelines [(t (11) = 1.20; p = 0.072); (z = 1.09; p = 0.057)], 'Registration of Human Medicines' services timelines [(t (11) = 1.15; p = 0.28); (z = 1.02; p = 0.31)], 'Variation for Human Medicines' services timelines [(t (11) = 1.82; p = 0.097); (z = 1.80; p = 0.072)], 'Exemption for Registration' services timelines [(t (11) = 1.13; p = 0.28); test (z = 0.95; p = 0.34)] , 'Inspection Services of

Manufacturers' timelines' [(t (11) = 1.45; p = 0.18); (z = 1.34; p = 0.18)] and 'Import/Export Control Services' timelines [(t (11) = 0.418; p = 0.68); (z = 0.53; p = 0.60)] between DRU and BOMRA following the transition. No change was observed in the 'Inspection Services of Distributor/Retailer' timelines [(t (11) = 0.0; p = 1.00); Z = 0.0; p = 1.00)], following the transition.

Conclusions

The study showed an improvement in the legal framework and scope of regulatory functions in line with the GBT for strengthened regulatory system capacity following the transition of DRU to BOMRA. However, the study lacked sufficient power to draw reliable conclusion about the null hypothesis.

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Chapter 1 – Introduction, Aim, and Objectives

1.1 Introduction

According to the World Health Organization (WHO) (2010a), service delivery, health workforce, health information systems, financing, governance, and equitable access to essential medicines form elements of the six core components of the health system. Therefore, responsive and efficient health systems with effective service delivery are crucial to ensure social and financial risk protection and healthy lives for all (World Health Organization, 2007a; United Nations, 2018). Subsequently, as entities accountable for the regulation of medicines, the National Regulatory Authorities (NRAs) are responsible to ensure equitable access and availability of affordable, quality-assured medicines for all as enshrined by the Sustainable Development Goal (SDG) 3 (World Health Organization, 2021f). Hence, to attain universal health coverage (UHC) and the desired health outcomes, the national regulatory systems must be robust across the lifecycle and supply chain of medical products. The global capacity strengthening of the regulatory systems has been emphasized as a public health priority by the World Health Assembly's Resolution 67.20 (WHA67.20) largely due to advancements in health technology, epidemiology, and the complexities of the globalization of sourcing and supplying medical products (World Health Organization, 2015; Pan American Health Organization, 2020).

To have robust regulatory systems, the NRAs must ensure that the regulatory systems are stable, well-functioning, and perform regulatory functions covering the scope of work indicated in the WHO's Global Benchmarking Tool (GBT) for Regulatory Systems (Khadem Broojerdi *et al.*, 2020). Robust regulatory systems apply globally accepted standards and principles that ensure compliance, flexibility, impartiality, transparency, and consistency in the control and regulation of medical products (World Health Organization, 2016a). Robust regulatory systems create a conducive environment for all stakeholders which ensures that medical products are manufactured, registered, imported, exported, distributed, and sold appropriately; promoted and advertised in a fair and balanced manner; prescribed, dispensed, and used rationally; continuously monitored and evaluated for public safety once in the market and adherence of good pharmaceutical processes of clinical trials. As such, contributing to the UHC through the protection of public health by providing oversight across the whole lifecycle and supply chain of medical products.

There are varying regulatory oversight and regulatory systems capacities within the member states countries. An effective and efficient regulatory system capacity is found in about 50 of the 194 member states. Some regulatory system capacity is present in 44 countries and 100 member states countries have minimal regulatory systems capacity (World Health Organization, 2019c). Nevertheless, many NRAs in low and middle-income countries (LMICs) have major challenges of insufficient regulatory system capacity for effective and efficient medicine regulation (Roth *et al.*, 2018), thus hampering the efforts of timely access to affordable quality-assured medical products in these countries.

The (World Health Organization, 2017b) reported that up to 90% of the population in the LMICs buys medicines through out-of-pocket payments. Thus, leading to greater inequalities in access to medicines, financial hardship, and adverse health consequences for the poor and vulnerable populations. Since government spending in these low-resource countries is more (44%) than the out-of-pocket share (39%) (World Health Organization, 2019b), equitable access to quality healthcare services for all is affected, and consequent progress towards achieving UHC. The financial burden on individual households and health systems is exacerbated by the inefficient legislation to address the importation and distribution of unlicensed or unregulated medical products in the LMICs, where 10% of medical products are substandard or falsified (SF) (World Health Organization, 2018b). Given the expensive and out-of-pocket payments, poor individuals would opt for alternative easily accessible, and sometimes cheaper unregistered products available in the unregulated/unlicensed informal markets. As the prevalence of SF medicine is stated to be higher in the unlicenced markets (Almuzaini, Choonara and Sammons, 2013), poor individuals face the long-term financial burden of ineffective treatments.

The challenges of scarce or limited financial and human resources, outdated and limited regulatory framework to register medicines and manage drug control activities in the LMICs further hinder the progress towards achieving UHC and the desired health outcomes. In Botswana, a weak regulatory system and the accumulation of a considerable backlog of applications for the registration of medicines affected product market entry and posed a great challenge to the equitable access and availability of medicines (Botswana Ministry of Finance and Development Planning, 2017). Consequently, the government of Botswana (GoB), restructured the Ministry of Health's (MoH) Drugs Regulatory Unit (DRU) to form a semi-autonomous regulatory body, Botswana Medicines Regulatory Authority (BOMRA).

It is hence assumed that the DRU, operating within the MoH did not have the autonomy on the financial resources, human resources, and decision-making required to operate effectively. It is contrarily assumed that an autonomous or semi-autonomous body has the decision-making autonomy, a sustainable funding base, adequate human resources, and clear functions, roles, and responsibilities to effectively execute its mandate. Effectiveness, efficiency, impartiality, flexibility, and clarity are fundamental good regulatory practices of strengthened regulatory systems in achieving the desired health outcomes (World Health Organization, 2016a).

Following the transition of the NRA in December 2018, from DRU to the establishment of BOMRA with defined legal scope, functions, roles, and responsibilities; it is assumed that there will be transparency and independence of the allocated budget, sustainable funding mechanisms, and fees collected for rendered regulatory services. It is assumed that there will be autonomy in decision-making and accountability to facilitate flexibility in responding proportionately to health emergencies and changes in the regulatory environment. It is also assumed that there will be freedom of expenditure towards appropriate facilities and infrastructure, training, and development of workforce as well as appealing incentives to attract and retain a competent workforce for efficient delivery of services.

It is then assumed in this study, that there will be an increased regulatory capacity and scope of regulatory functions in line with the GBT and improved perceived service delivery. However, the changes that have been made and their impact on service delivery from an industry perspective have not been assessed.

1.2 Aim

This study aims to assess and compare the changes in the regulatory system for the WHO-recommended regulatory functions and service delivery following the transition of DRU to BOMRA from the industry's perspective.

Null hypothesis:

- There is no significant difference in service delivery between DRU and BOMRA following the transition.

1.3 Objectives

1.3.1 To compare the similarities and differences in the scope of the WHO-recommended regulatory functions between the former DRU and the current BOMRA

1.3.2 To assess the changes in the service delivery of the implemented regulatory system as perceived by the employees of pharmaceutical companies registering and marketing medical products in Botswana

1.3.3 To highlight and recommend areas of focus for service delivery improvement for both employees of pharmaceutical companies registering and marketing medical products in Botswana and BOMRA

The study results will contribute to the theoretical knowledge base about autonomous or semi-autonomous regulatory bodies, and promote public awareness, trust, support, and recognition of the changes in the legal framework, core regulatory functions, and service delivery following the transition. For BOMRA and employees of pharmaceutical companies registering and marketing medical products in Botswana, the results will offer a perspective of the efforts made towards a functional regulatory system and facilitate further development and stakeholder cooperation.

Chapter 2 – Literature review

2.1 Access to quality-assured medicines

Access to quality-assured medicines is fundamental in ensuring health and well-being for all in line with the SDGs, UHC, and the global health agenda as outlined in Chapter 1. However, according to the (World Health Organization, 2018c) up to two billion people world-wide do not have access to essential medical products. Many WHA resolutions, WHO global action plans and United Nations declarations epitomize aspects of the need to promote access to affordable quality-assured medical products to improve the well-being of all and prevent health deterioration. Accordingly, global partners and stakeholders have committed efforts including policy reforms to improve access and availability of affordable, quality-assured medical products. Furthermore, the influx and surge of SF medicines in the global markets, and the subsequent negative impact on public health safety and financial costs over the last few decades have impelled the acceleration of strengthening health system capacities and health service delivery (Ozawa *et al.*, 2018; Newton and Bond, 2019).

While global sourcing of medical products has improved access to medical products, poor practices, and unethical activities such as poor manufacturing, packaging, storage, procurement, and distribution practices along with poor traceability through the distribution channels have become opportune. Weaknesses in or lack of core regulatory functions and poor regulatory oversight to safeguard the supply chain's integrity may result in undetected SF medical products in the market. Without regulatory system capacity NRAs are unable to prevent the circulation of SF medical products, implement systems to detect those already circulating, and rapidly alert the public for protection and aversion of fatalities when detected (World Health Organization, 2017c).

Inadequate procurement practices in tender systems/donor organizations, lack of transparency/stakeholder coordination, or weak quality assurance systems may result in the procurement and distribution of medical products from unregulated/unlicensed manufacturers/suppliers. On the other hand, high demands, shortages of medical products, and out-of-stock due to panic buying during outbreaks support the trade-in of SF medical products. Hence, the current increase of SF medical products in the LMICs.

A systematic review by (Mosoro *et al.*, 2020) reported a 3.14% –32.2% prevalence of poor-quality dexamethasone, an essential corticosteroid in the LMICs. A reported higher prevalence in the public sector and at the point of care indicates hindrances to the SDG goal of reducing neonatal mortality to at least as low as 12 per 1,000 live births, among other health benefits of dexamethasone. Other case studies on drug quality reported major problems with antibiotics and antimalarial drugs in Africa and Southeast Asia (Almuzaini, Choonara and Sammons, 2013; Institute of Medicine, 2013; Kelesidis and Falagas, 2015).

Furthermore, a recent systematic review of essential medicines in the LMICs estimated 19.1% antimalarials and 12,4% antibiotics SF from the overall 13.6% declared prevalence (Ozawa et al., 2018). The study affirmed the highest prevalence in Africa and Asia with 18.7% and 13.7% respectively. Asia is said to be the largest region manufacturing counterfeit drugs, with India as the leader (Singh, 2017). In 2016, nearly half of the world's cases of multidrug-resistant tuberculosis (MDR-TB) were in India, China, and the Russian Federation (World Health Organization, 2021e). The high prevalence of SF in Africa is observed despite the Global Monitoring and Surveillance System for SF medical products in 96% of member states in the region (World Health Organization, 2021d).

In addition, the coronavirus pandemic has increased the proliferation of SF medical products and other health products. Alerts on FS chloroquine and hydroxychloroquine in Central and West Africa were issued (World Health Organization, 2021d). Substandard remdesivir, FS covid-19 vaccines, and personal protective equipment (PPE) kits were reported in India (University of Oxford, 2020a, 2020b). There were also numerous reports of FS covid-19 vaccines and large quantities of FS medical products and PPE that have been seized worldwide, especially in the LMICs (INTERPOL, 2018, 2021b; University of Oxford, 2020b; UNODC, 2020). In Botswana, more than 1700 counterfeit goods including medical products were seized (INTERPOL, 2021a).

Given the lack of robust regulatory systems to address SF medical products in the LMICs and the varied prevalence of drug resistance worldwide, ineffective, and detrimental treatments threaten global health and the economy. The (World Health Organization, 2017a) approximated a 10.5% failure rate in all medical products used in LMICs at an estimated cost of US$30 billion. The latest estimates of the economic burden of SF medical products in these countries range from $10 billion to $200 billion (Ozawa *et al.*, 2018). If diseases cannot be treated, millions of lives will be lost, and health systems will be overburdened and bankrupt.

A report by the (World Bank, 2017), presented a high-impact antimicrobial scenario of a loss of more than 5% of low-income countries' annual GDP and global healthcare costs annual increase range from $300 billion to more than $1 trillion by 2050. With constraints and limited resources, the LMICs rely on importation for accessing medical products. In the past decade, the Tanzania Medicines and Devices Authority (TMDA) suspended at least 6 marketing authorizations (MA) and recalls from 80 medical device manufacturing sites inspected, mostly in China and India (SCoMRA IV, 2019).

Hence, the need to strengthen regulatory systems, procurement, and supply chain to assure the quality and safety of medical products in the LMICs. Charged with the responsibility of ensuring public health, the MoH in Botswana responded to this need through the restructuring of DRU to BOMRA to ensure the availability of quality-assured medical products.

Since service delivery is the direct output of the inputs into the health system, increasing inputs into the delivery system would improve the delivery of service and accelerate universal access to quality health services (World Health Organization, 2010b). Adequate competent human resources, effective procurement practices, sustainable financing, and integrated health information systems are essential inputs of an effective health system.

(Ozawai *et al.*, 2020) presented a scenario of annual savings ranging from $8.3 million to $598 million when 10% SF antimalarials are replaced with quality-assured antimalarials in four sub-Saharan African countries with a prevalence range of 10.3% to 22.1%. Furthermore, substantial investment in supply chain training and effective procurement policy greatly improved warehouse and distribution practices for quality-assured medical products in Tanzania (Primary Health Care Performance Initiative, 2018; World Health Assembly, 2019).

Ensuring quality-assured medical products is fundamental to improved health service delivery and reduced overall healthcare costs while strengthening global health and economic safety. The capability of the Food and Drug Authority (FDA) of Ghana to respond to the COVID-19 pandemic further demonstrates the value of investing in strengthening the regulatory system. A stable, well-functioning regulatory system enabled regulatory strategies that ensured the timeous availability of much-needed affordable quality-assured PPE and hand sanitizers in Ghana (World Health Organization, 2020).

To support UHC with financial protection and promote confidence in the delivery system, well-functioning regulatory systems must have a legal framework, infrastructure and perform core regulatory functions covering the scope of work indicated in the WHO's GBT.

2.2 WHO GBT

The WHO began benchmarking regulatory systems through a set of specific indicators for vaccines in 1997 (World Health Organization, 2022). In 2014, an improved and unified benchmarking tool was developed to assess vaccines and medicines following the World Health Assembly's Resolution 67.20 (WHA67.20) in recognizing inefficient regulatory systems as barriers to attaining desired health outcomes (World Health Organization, 2015).

The WHO describes a regulatory system in terms of the enabling legal system, processes, resources, and regulatory functions across the medical product life cycle (World Health Organization, 2021c). Regulatory functions are described in the GBT as components of a regulatory system. There are eight core regulatory functions covering the whole product life cycle. For medical products, the common regulatory functions are Registration and Marketing Authorization (MA), Pharmacovigilance (VL), Market Surveillance and Control (MC), Licensing Establishments (LI), Regulatory Inspections (RI), Laboratory access and Testing (LT) and Clinical Trials Oversight (CT). NRA Lot Release (LR) is a non-common regulatory function for vaccines (World Health Organization, 2021b).

Each regulatory function is evaluated through sub-indicators grouped under the main indicator across nine categories; Legal provisions, regulations, and guidelines; Organization and governance; Policy and strategic planning; Leadership and crisis management; Transparency, accountability, and communication; Quality and risk management system; Regulatory process; Resources (human, financial infrastructure, equipment, and information management systems) and Monitoring progress and assessing impact. Thus enabling the evaluation of the regulatory system across some or all regulatory functions (World Health Organization, 2021c).

The functionality, capability, and overall maturity of the regulatory system to ensure autonomous and competent oversight across the whole product life cycle is based on the level of implementation of each sub-indicator for each regulatory function and is scored on a scale of 1 to 4 (World Health Organization, 2021c). A regulatory system performing at an advanced level of performance and continuous improvement is scored at a maturity level (ML) 4. A stable, well-functioning regulatory system is scored at ML3. The ML2 and ML1 regulatory

systems indicate a reactive approach of partial performance of essential regulatory functions and the presence of some elements respectively. (World Health Organization, 2021f). Globally, the ultimate target for the regulatory system is ML4 and the minimum target is ML3.

While 50 member states countries have an effective and efficient regulatory system capacity, no NRA in Africa functions at an advanced ML4. However, Tanzania and Ghana achieved stable, well-functioning regulatory systems ML3 for medical products and vaccines (non-producing) in November 2018 and April 2020 respectively (World Health Organization, 2019a, 2020; Khadem Broojerdi *et al.*, 2020). Depending on the intended objective, the countries may perform self-assessments or request formal benchmarking. As of December 2019, a total of 26 countries underwent formal benchmarking while 54 countries including Botswana, which aims to reach ML3 by 2024, completed self-assessments via GBT (SCoMRA IV, 2019; Guzman *et al.*, 2020; Khadem Broojerdi *et al.*, 2020).

Thus, through the GBT's indicator-based systematic approach, NRAs can assess regulatory inputs such as the legal framework, organizational structure, available resources, processes, and desired outputs to determine the regulatory system's capacity to perform core regulatory functions (World Health Organization, 2021c). Identified weaknesses and gaps in the regulatory systems can be addressed and adopted as priorities to improve the institutional development plans in meeting the country's needs and desired goals (World Health Organization, 2021f). Thus, supporting the achievement of UHC through facilitating access to quality-assured medical products.

Furthermore, the GBT can be adapted to employ essential and appropriate activities applicable to the specific regulatory system, its status and the countries' context. So, member states with constrained resources can focus on essential basic regulatory functions and rely on the capabilities of networks of advanced and matured bodies for quality assurance of medical products (World Health Organization, 2021c).

The GBT therefore, facilitates and promotes good regulatory practices, transparency, regulatory reliance, and harmonization (World Health Organization, 2021c). Thus, strengthening the capacity of the regulatory system to drive and safeguard timely access and availability of quality-assured medical products in the ever-changing regulatory environment.

2.3 Regulatory Environment

Every country is responsible for ensuring equitable access to affordable, quality health services for all its citizens for the attainment of good health as mandated by the WHO SDG3. Therefore, the government has a critical role in developing strong policies and effective legislation to ensure the health and safety of the public and safeguard the regulatory environment.

2.3.1 Regulatory Legislation and Policies

The legal and regulatory framework which provides the mandate to regulate medical products should reflect the government's political will and the commitment essential to ensure sustainable access and availability of quality-assured medicines (World Health Organization, 2018a). To achieve the desired objective, the development and implementation of all aspects of regulatory oversight should be based on good regulatory principles including legality, consistency, independence, impartiality, proportionality, flexibility, and clarity (World Health Organization, 2016a; Khadem Broojerdi *et al.*, 2020). Thus, a robust regulatory system with a strong legal basis across the lifecycle and supply chain of medical products is crucial to achieving policy objectives.

The legislation should be clear, comprehensive, and explicit in establishing regulatory institutions (NRA, NQCL, etc.,) authorizing, and providing the powers to control medical products used in the country, the scope of the medical products to be regulated (human medicines, veterinary medicines, etc.,), the required regulatory activities and the core regulatory functions (MA, PV, etc.,) to be performed (World Health Organization, 2021f). The legal framework should explicitly provide a clear organizational structure, line of authority, roles, and responsibilities to the different regulatory institutions performing regulatory functions to ensure a comprehensive and efficient regulatory system (World Health Organization, 2021a). Delegation of clear roles and responsibilities avoids conflict of authority, facilitates accountability, and promotes good governance. In turn, good governance promotes transparency and safeguards the efficient use of resources. There should be a clear legal basis for the provisions of sustainable financial resources, adequate competent human resources, appropriate infrastructure, independent regulatory decisions, and sanctions to

ensure consistency and impartiality.

Furthermore, taking cognizance of advancements in technology, epidemiology, and the complex global supply chain of the medical product, the legislative framework should adapt accordingly to maintain relevance and flexibility to respond promptly and appropriately to changes in the evolving regulatory environment (World Health Organization, 2007c). Due to the complexities of the regulatory environment and the required expertise, the regulatory framework should enable cooperation and collaboration with regional and international institutions including information/work-sharing, convergence, harmonization, recognition, reliance, and for mutual benefit. To protect and address public needs, the regulations should be current and consistent with the legal framework and publicly available for transparency into the regulatory process and decisions (World Health Organization, 2010c, 2021a).

Accordingly, many countries have updated their medicine legislation and regulations in response to the regulatory advancements. For example, in South Africa (SA), the Medicines and Related Substances Act (MRSA) of 1965 enforced by the Medicines Control Council (MCC), was amended by the Amendment Act of 2008 & 2015 and enacted in 2017. This, allowed the establishment of the South African Health Products Regulatory Authority (SAHPRA) in February 2018 to regulate medical devices and the licensing of manufacturers and importers of active substances (Saidi and Douglas, 2018). In Tanzania, the Pharmaceuticals and Poisons Act of 1978 enforced by the Pharmacy Board, and the Food (Control of Quality) Act of 1978 enforced by the Food Control Commission were amended and merged into the Tanzania Food, Drugs and Cosmetics Act, Cap 219 of 2003. The latter was again amended and renamed Tanzania Medicines and Medical Devices Act which enabled the establishment of TMDA to regulate medicines, medical devices, and diagnostics (Tanzania Medicines and Medical Devices Authority, 2020).

In Botswana, the MoH is responsible for the overall oversight and provision of health services including the formulation of policies, regulations, standards, and guidelines within the public sector (Ministry of Health, 2011). The regulation of medicines and related substances was enforced through the repealed Drugs Act of 1991 (Republic of Botswana, 1991). During the National Development Plan (NDP)7 1991 – 1995, DRU was established under the MoH to enforce the Drugs and Related Substances Act (DRSA) of 1992 in line with the Botswana National Drug Policy (BNDP) adopted in 2002 and the NHP to attain health for all (Ministry of Health, 2002). The statutory obligations of the DRU under the Act were to ensure that all

drugs, including habit-forming drugs and related substances imported, manufactured, exported, distributed, sold, and used in Botswana met approved standards of safety, quality, and efficacy (Ministry of Health, 2002).

However, as with many NRAs operating within the MoH in the LMICs, DRU had major challenges of insufficient regulatory frameworks to establish and sustain regulatory oversight. The legislation was inefficient in addressing the importation and distribution of SF medical products. There was inadequacy in the regulations to control traditional medicines. Furthermore, the legislation lacked provisions for sustainable sources of funding. DRU depended on government funding and had financial and human resource constraints to register medicines and manage drug control activities (Ministry of Health, 2011). These challenges affected the DRU's effectiveness to carry out the government's mandate and hampered the progress of the MoH towards UHC and the NDP's goal to ensure healthy lives and promote well-being for all citizens.

Consequently, the GoB and the MoH through the Integrated Health Service Plan (IHSP), the revised NHP, and the NDP identified priority areas of focus to streamline and align planning, management, financing, monitoring, and evaluation to strengthen the health delivery system (World Health Organization, 2009). The emphasis was placed on sustainable financing, effective integrated health information systems, human resources development, and customer satisfaction. Thus, during the NDP10 2009 – 2016, the DRSA of 1992 was repealed, and the MRSA was enacted by Parliament in 2013. To meet the desired outcomes and impact, the GoB through the MoH subsequently embarked on restructuring the DRU to establish BOMRA, a semi-autonomous regulatory body through the implementation of an effective regulatory framework including regulations, governance, roles and responsibilities, regulatory policies, guidelines, and procedures.

In December 2018, the regulatory functions that were carried over by the DRU and the National Drug Quality Control Laboratory (NDQCL) were transferred to the newly established BOMRA (Botswana Ministry of Health, 2018). Under the Act, BOMRA is mandated to regulate the manufacture, import, export, distribution, sale, and dispensing of medicine and related substance and perform all the core regulatory functions (Republic of Botswana, 2013).

The review and amendments of the legislation demonstrate the political will of the GoB to

adapt and respond to the emerging needs of the evolving regulatory environment in line with international norms and standards like many other countries. However, to ensure effective enforcement of the legislation and implementation of the regulatory policies, NRAs need strong support and commitment from the government and MoH.

2.3.2 NRA Structure and Governance

NRAs in every country are responsible to protect public health by ensuring the availability of quality-assured medical products in the market. The legal framework that determines the organizational structure, regulatory scope, functions, and activities of the NRAs should provide an enabling environment for the effective functioning of the NRAs. For effective regulatory oversight NRAs should be competent, impartial, transparent, and independent. Independent regulatory agencies are defined as independent public bodies authorized to regulate specific aspects of the industry without taking any instructions or being put under any pressure (OECD, 2017; European Union, 2019). Autonomous NRAs are legally empowered to make binding decisions to consistently enforce the regulatory framework for public protection without undue political, ministerial, governmental, or special interest groups/individual interventions (World Health Organization, 2016c; European Union, 2019). Thus, NRA independence fosters stable and credible governance and promotes public trust and confidence (OECD, 2017).

The global trends indicate that regulatory authorities for health products are mostly reviewed every five years to align with the changes in the regulatory landscape (Government of South Africa, 2008). With the evolving regulatory environment, the emerging model is that of autonomous regulatory authorities or unitary bodies with their management structure of separate but interrelated pillars and overall responsibility and accountability for medicine regulation in the country (Government of South Africa, 2008). These include among others, the Australian Therapeutic Goods Administration (TGA), and the recently established SAHPRA and TMDA (Roth *et al.*, 2018). Furthermore, the WHO and the African Union Model Law on Medical Product Regulation also promote autonomous NRAs for effective regulation of medical products (World Health Organization, 2010c; The Access and Delivery Partnership, 2017).

NRA independence promotes good governance, accountability, impartiality, and transparency in the regulatory processes. Studies conducted in the LMICs have shown that NRAs functioning as departments under the MoHs lacked legal powers to manage financial, human, and infrastructural resources (World Health Organization, 2010c, 2010a; Ndomondo-Sigonda *et al.*, 2017; Roth *et al.*, 2018). Without full operational dependence and budgetary constraints, the NRAs had insufficient funding, high workforce turnover, and an inadequate quantity and quality workforce required to effectively carry out their mandate. Moreover, the allocation of resources by the MoH exposes the NRA to biased decision-making, which may adversely affect regulatory activities and the NRAs' effectiveness (World Health Organization, 2010a).

On the other hand, operational and financial independence protects the NRAs against undue influence and political intervention (OECD, 2017; European Union, 2019). Safeguards from undue influence ensure that the NRAs act in the best interest of the public and institute effective and efficient delivery of services. In addition to sound organizational structure, clear roles and responsibilities, the provisions for sources of funding and budget independence empower the NRA to acquire and allocate the resources appropriately for effective regulatory impact. According to the (World Health Organization, 2010a), various financial sources are required for sustainable funding of the NRAs. However, NRAs such as the TGA, the Medicines Control Authority of Zimbabwe, and the Medicines Evaluation Board of the Netherlands, which have full autonomy over the acquired fees for services rendered provide a sustainable source of funding (Roth *et al.*, 2018; Ndomondo-Sigonda *et al.*, 2020). Therefore, the NRAs' operational and financial independence to ensure efficient use of the funds is more pertinent than the sources of funding.

With the legal power to operate independently, collect and allocate fees without government interference, NRAs can establish the applicable human resources needs, relevant recruitment procedures, and appropriate fees for regulatory services offered. Thus, facilitate the availability of adequate and sustainable resources essential for effective functioning. Sustainable funding, budget independence, and an adequate quantity of competent workforce are critical for NRAs to carry out the defined functions and duties required to assure the provision of affordable quality-assured medical products (Roth *et al.*, 2018; European Union, 2019; Ndomondo-Sigonda *et al.*, 2020).

With sufficient and sustainable funding, the NRAs can offer appealing incentives to attract

and retain adequate competent staff. Staff competency and motivation are key in ensuring a well-functioning quality management system for all regulatory functions and activities. Competent staff with consistent, impartial, and independent behaviour strengthens the NRAs' independence and ensures efficient delivery of regulatory services. Therefore, to ensure organizational efficiency recruitment procedures should be transparent in terms of qualifications/experience, remuneration/incentives, and staff appointment/dismissal (World Health Organization, 2016c; European Union, 2019).

Furthermore, funds can be allocated towards appropriate facilities, information management systems specific, and relevant staff training and development. Given the advancements in the regulatory environment, continuous development is essential in strengthening the NRAs' technical capacity and staff motivation. (Roth *et al.*, 2018) suggest the allocation of external investments to the development of infrastructure, scientific tools, information systems, and staff. Thus, driving and spurring efficient service delivery to achieve the desired outcomes according to the quality policy and organizational mission.

Moreover, the allocation of resources should be risk-based to address identified high-risk regulatory activities and value-added tasks to ensure continuity of quality service delivery (World Health Organization, 2016a, 2016b; Roth *et al.*, 2018). Thus, facilitating agility and flexibility in responding proportionately to health emergencies and changes in the regulatory environment without compromising the provision of quality-assured medical products and quality service delivery (World Health Organization, 2016a; Roth *et al.*, 2018).

Therefore, strong governance and independent leadership accountable for performance and outcomes are key for the effective fulfilment of the NRAs' mandate.

2.3.3 Transparency and accountability

The WHA67.20 recognized regulators as an essential part of the health workforce contributing to better public health outcomes and the need for enhancing good governance which includes accountability and transparency in decision-making for improved availability of affordable, quality-assured medical products (World Health Organization, 2015). Therefore, as part of good governance, independent NRAs should be accountable for the actions taken and

decisions made in the execution of their responsibilities.

Accountability fosters responsible behaviour and safeguards the NRA's effectiveness in fulfilling its statutory obligations. One principle of good regulatory practices and a key component that ensures the accountability of independent NRAs is transparency. Transparency in regulatory requirements, operations, procedures, decisions, and outcomes enhances regulatory compliance and promotes the NRA's credibility (OECD, 2017; World Health Organization, 2021a). Thus, benefiting all stakeholders.

There should be a monitoring and evaluation framework to assess the efficiency of the NRA's governance and performance in achieving the desired outputs and outcomes (World Health Organization, 2007c, 2010b; Roth *et al.*, 2018). While driving accountability, monitoring the effects of NRA's governance and performance also ensures integrity and ethical behaviour. For example, to ensure the appropriate use of funds, the NRAs should submit annual accounts for independent audits and publish audit reports (European Union, 2019). Furthermore, with the monitoring of regulatory performance, NRAs can adopt a risk-based approach and make adjustments/optimizations as required based on their regulatory system's capacity. Therefore, ensuring continuous improvement of the quality management system.

NRAs should provide accurate and current regulatory information to the relevant stakeholders through appropriate communication tools and channels. For example, notices in terms of the Act can be published in the official government gazette while daft Bills for comments, a list of registered medical products, regulations, complaints, annual reports, and stakeholder engagements can be published on the NRAs official website. Stakeholder engagements facilitate dialogue, enhance understanding, and provide opportunities for contributions and collaboration (OECD, 2017).

Thus, transparency in regulatory operations and decisions improves stakeholder relationships and promotes public trust and confidence in the NRA (World Health Organization, 2021f). Moreover, transparency and public disclosure of regulatory information such as sanctions/penalties and complaints/appeals process and criteria for the appointment of NRA's board and key staff members safeguard against undue influence (OECD, 2017; European Union, 2019). Thus, ensuring the public and stakeholders that the NRA's decisions are

evidence-based.

Comparing and contrasting the legal and regulatory framework of the former DRU and the current BOMRA will provide an understanding of the scope of the regulatory functions offered for effective regulatory systems. Furthermore, the perspective of the employees of pharmaceutical companies registering and marketing medical products in Botswana will indicate the impact of the consequential changes on the delivery of services.

Chapter 3 – Methodology

3.1 Study design

The study aimed at assessing and comparing the changes in the regulatory system for the WHO-recommended regulatory functions and service delivery following the transition of DRU to BOMRA from the industry's perspective.

Extant data analysis was conducted to establish the basis of the transition of DRU to BOMRA and to tease out the similarities and differences in the scope of regulatory functions of the NRA. Acts, regulations, guidelines, reports, books, journals, various publications including presentations from the Pharmaceutical Industry Associations, and websites were reviewed to meet the study objectives. The WHO GBT for Evaluation of National Regulatory System of Medical Products Revision VI (World Health Organization, 2021f) was employed for quantitative assessment of the changes in the regulatory functions. Consequently, the database search using the keywords resulted mostly in publications from the WHO.

Quantitative and qualitative methods were found suitable approaches to achieving the aim of the study. A cross-sectional anonymous online survey using a five-point Likert scale questionnaire (Appendix 5) adapted from BOMRA's Customer Service Standards_BOMRA/CEO/PR/P08/A01 (Appendix 4) was conducted to meet the quantitative outcome of the aim of the study. The survey was used to qualitatively assess the regulatory service delivery as perceived by the employees from pharmaceutical companies that have received regulatory services in Botswana from the former DRU and the current BOMRA. Online surveys are convenient, easily distributed, and accessible. The Likert scale was chosen as an easy-to-complete data collection tool that would expeditiously offer a reasonable measure of the respondent's perceptions.

3.2 Study population and sample size

The target population of interest for the study was pharmaceutical companies that have received regulatory services in Botswana from the former DRU and the current BOMRA as identified from BOMRA's human medicines register database. A random sample size of 155 with a 95% confidence level was calculated for the small population size of 180 using the normal approximation to the hypergeometric distribution. However, due to the detailed nature

and focus of the study, expediency, and ease of accessibility, non-probability convenience sampling was chosen. Fifty (50) employees in Botswana and South Africa submitting regulatory applications on behalf of the pharmaceutical companies registering and marketing medicine in Botswana were used for the study. Data collection could be easily done with non-probability sampling despite the introduction of bias.

3.3 Data collection tool

The scope of focus for the study was the WHO-recommended regulatory functions performed on human medicines by DRU and BOMRA after the restructuring of the NRA for a strengthened and effective regulatory system. Thus, the WHO GBT for Evaluation of National Regulatory System of Medical Products Revision VI was adapted and used as a data collection tool.

Each regulatory function was evaluated under the main indicator of 'Legal provisions, Regulations, and Guidelines' and the applicable sub-indicators. For this study, this main indicator is only referred to as legal provisions and applies to the Act and the Regulations. The rationale for this approach is that the Act and Regulations form the legal basis of the legislation while the guidelines are non-statutory advisory documents for the interpretation of the legislation (World Health Organization, 2007b, 2018d).

The study focused on the existence of the legal provisions on the regulatory functions only and did not evaluate their implementation. The focus for applicable guidelines was on their existence as being published and accessible (Appendix 2). The sub-indicators for the Registration and Marketing Authorization were adapted based on the requirements of the application for the registration or MA process. Adapted sub-indicators are indicated with an asterisk for distinction (Appendix 1). The NRA Lot release for vaccines fell out of the scope of the study and was therefore excluded. Given that Botswana is still aiming at reaching ML3, any sub-indicator with ML4 was excluded from the study. Furthermore, as the basis of the study was on publicly available information, the other eight main indicators and their sub-indicators fell out of scope and were excluded.

To assess the changes in the regulatory service delivery from the industry's perspective, indicators from a range of services presented in the Customer Service

Standards_BOMRA/CEO/PR/P08/A01 offered by BOMRA were used. A five-point Likert scale questionnaire was formulated into an online survey using Google Forms. The questionnaire was made up of two parts and took about five minutes to complete. The first part contained demographic information. The second part contained the 'General Administrative services Response Time' and 'Technical Services Timelines' subdivided into nine sections of twenty-five questions posed on the former DRU and the current BOMRA. The services that were out of the scope of the study were excluded from the questionnaire since the study focused on human medicines. The online survey was piloted to establish its clarity and ease of understanding. A weblink to the survey was distributed via e-mail to five archetypal individuals.

It was pointed out that it was not clear when responding if either DRU/BOMRA or DRU & BOMRA was selected when responding to a multiple-choice question "Please indicate if you have made regulatory submissions to *DRU/ *BOMRA/ *DRU & BOMRA". The survey was amended, and the question was split into two Yes/No multiple-choice questions. Participants were asked to;

1. Please indicate if you have made regulatory submissions to DRU. Yes/ No. If yes was selected, then the questions on the interactions with DRU came up. If No was selected, then the questions were skipped.
2. Please indicate if you have made regulatory submissions to BOMRA. Yes/No. If yes was selected, then the questions on the interactions with BOMRA came up. If No, was selected, then the questions were skipped.

In addition to the provided Participant Information Sheet downloading web link, it was recommended that the information also be included before the downloading web link in the Informed Consent section. The questionnaire was submitted to the Humanities and Social Sciences Research Ethics Committee for ethical clearance (Appendix 8).

3.4 Data collection

To establish the presence of the legal provisions of each regulatory function as outlined in the WHO GBT the 1992 Drug Regulatory Unit's Drugs and Related Substances Act, Drugs and Related Substances Regulations & Guidelines, and the 2013 Botswana Medicines Regulatory Authority's Medicines and Related Substances Act Medicines and Related Substances Regulations & Guidelines were evaluated in a stepwise approach. The evidence statements

indicating the presence of the legal provisions for the regulatory functions within the scope of the study were highlighted. The tables of legal provisions with three columns were created for each regulatory function. The seven common regulatory functions were placed in the first columns and numbered 1 to 7. DRU and BOMRA were placed in the second and third columns respectively. The sub-indicators were placed in the first column under the regulatory function and sub-numbered accordingly. It should be noted that the WHO GBT stipulates the regulatory functions when numbering the indicator and corresponding sub-indicators. For example, MA01 for the legal provisions of MA and MA01.01; MA01.02, etc for the applicable sub-indicators.

Where detected, the highlighted evidence statements were copied as direct quotes under the applicable sub-indicators in the respective DRU and BOMRA columns and presented in italics. It was specified in a row above the statements whether the statements were from the Act, the Regulations, or both. The statements from the regulations were indicated with an R. Any part phrase of the evidence statements that were inapplicable or out of scope were crossed out with a double-strikethrough. The crossed-out part phrases were excluded from the tables. For further analysis, similar statements were organized systematically next to each other to identify variances. The statements were reviewed, paraphrased, and collated in normal text into one representative evidence statement where possible. The sections, sub-sections, and paragraph numbers from each statement were maintained. A fourth column was included in the tables for comments on the findings. The identified trends were used to expand on the results of the findings.

Where no evidence statement was found, it was indicated as 'Absent'. It should be noted that for benchmarking a computerized GBT (cGBT) is employed. The findings of the assessment of the sub-indicators are scored as; Not implemented (0%), Ongoing implementation (25%), Partially implemented (75%), Fully implemented (100%), No data available (0%), and Not applicable where the sub-indicator does not apply to the regulatory system (World Health Organization, 2021c).

To determine the ML of each regulatory function the algorithm is used to calculate the cumulative implementation of the sub-indicators and the overall maturity of the regulatory system (World Health Organization, 2021c). For the study, each sub-indicator was scored 1 with each evidence statement scored as a fraction of that 1. The presence of the legal

provisions for each regulatory function was scored out of the total number of the sub-indicators. The findings are presented in the results section.

The applicable guidelines on the regulatory functions indicated in the WHO GBT were presented in tables of three columns for each regulatory function. The regulatory functions were placed in the first column and numbered 1 to 7. DRU was placed in the second column and BOMRA was placed in the third column. The sub-indicator guidelines and specified guidelines from the 'evidence to review' were listed in the first column under the applicable regulatory function. The guidelines on 'Laboratory testing' were excluded as they fell out of the scope of the study. A 'tick' was assigned where the applicable guideline existed. 'Not published' was allocated when no evidence of the guideline was available. The guidelines were not evaluated in detail due to time constraints. Each tick was assigned a score of 1 and a cross meant a 0 score. The number of guidelines present for each regulatory function was scored out of the total number of the listed guidelines. The findings are presented in the results section.

For an assessment of the changes in service delivery of the NRA following the transition of DRU to BOMRA, an invitation e-mail for participation in the study was distributed to the members of one of the Pharmaceutical Industry Associations in South Africa. Although this was biased towards one association, the members were from different pharmaceutical companies registering and marketing medical products in Botswana. The prospective participants from Botswana were referrals from colleagues. The e-mail included the title, description, and purpose of the study. The target date to complete the survey and the weblink to the anonymous online survey were provided. No identifiable information was collected in the survey to maintain the participants' anonymity. The information sheet and informed consent form (Appendix 7) were embedded within the survey. The information sheet could be downloaded via a link for record keeping. Participation in the study was voluntary and participants could decline or withdraw without any implications.

The survey was open for completion from November 2021 to February 2022. No responses could be accepted after the set period. The responses from the survey came in slowly and at a low rate. Most pharmaceutical companies shut down operations for the December holiday period in South Africa. This could have been an attributing reason coupled with the workload after the holiday period to get production ongoing. Reminder e-mails were sent in January and

every other week afterward until the survey closed to reduce non-response errors.

The Likert-scale responses (Appendix 6) were assigned a score value of 1 (strongly disagree) to 5 (strongly agree) for quantitative analysis. It should be noted that since the target population is involved in some and not all of the activities, an option of 'N/A' with a 0 score had been added. The option reduced the central tendency bias as respondents did not have to select the 'neutral' option for the activities that they are not involved in. The data were analysed as outlined in the "Data analysis" section.

3.5 Data analysis

For the study design, both descriptive and inferential statistics were used to analyse the sets of scores of the NRA before and after the transition. Descriptive statistics included measures of central tendencies and dispersion. Central tendency measures included the mean and the median. Measures of dispersion included the standard deviation and variance. The overall frequency scores were used to summarize findings of the legal provisions and guidelines on the WHO-recommended functions.

To test the study hypothesis, the responses from the survey were exported from Google Forms to Statistical Package for the Social Sciences (SPSS®) through Excel® after a cleaning process for coding and analysis. Due to the small sample size of the study and violations of reliability and normality, both parametric and non-parametric tests were adopted for more accuracy and robustness in terms of inferential statistics (Field, 2013). Thus, the paired samples t-test and the Wilcoxon signed rank test were conducted to determine whether there was a difference in service delivery of the NRA before and after the transition. Tables were used for ease of data presentation and interpretation.

3.6 Ethical considerations

The approval (Reference number: HS21/8/16) to conduct the study was granted by the Humanities and Social Sciences Research Ethics Committee of the University of the Western Cape. The participants' involvement in the study, the protection of personal information, possible risks and benefits for participation, voluntary participation and withdrawal from participation, and the intention of the study were explicitly outlined on the participant's information sheet and the informed consent form for the prospective participants. It was also

explained that once the survey has been submitted, the participants' responses would not be excluded from the study as it would be impossible to identify given the anonymity of the survey.

The study offered no direct benefit to participants, other than the results which may or may not lead to improved regulatory service delivery from BOMRA. Approval from BOMRA was not required as the study involved publicly available information.

Chapter 4 – Results and Discussion

4.1 Results

A review of the Drug Regulatory Unit's Drugs and Related Substances Act & Drugs and Related Substances Regulations and Botswana Medicines Regulatory Authority's Medicines and Related Substances Act & Medicines and Related Substances Regulations was done to assess and compare the changes in the regulatory system for the WHO-recommended regulatory functions as outlined in Chapter 3. The results of the review are presented in this chapter.

4.1.1 The assessment of the changes in the regulatory system for the WHO-recommended regulatory functions following the transition of DRU to BOMRA

The presence of the legal provisions for each regulatory function was scored out of the total number of the sub-indicators. The findings are presented in Table 1 below.

Table 1: Summary table of DRU vs BOMRA legal provisions to enforce the WHO-recommended regulatory functions

Regulatory Function	DRU	BOMRA
1. Registration and Marketing Authorization (MA)	(9/12) 75%	(11.6/12) 96.7%
2. Pharmacovigilance (VL)	(1/5) 20%	(5/5) 100%
3. Market surveillance and control (MC)	(0.5/4) 12.5%	(4/4) 100%
4. Licensing of establishments (LI)	(3.06/4)76.5%	(4/4) 100%
5. Regulatory inspections (RI)	(1.84/4) 46%	(4/4) 100%
6. Laboratory access and testing (LT)	(0.5/2) 25%	(2/2) 100%
7. Clinical Trials Oversight (CT)	(2.5/10) 25%	(6/10) 60%
	M = 40.00%; SD = 26.46	M = 93.81%; SD = 14.96

The findings of the number of present guidelines to enforce the WHO-recommended regulatory functions are presented in Table 2 below.

Table 2: Summary table of DRU vs BOMRA guidelines on WHO-recommended regulatory functions

Regulatory Function	DRU	BOMRA
1. Registration and Marketing Authorization (MA)	(6/11) 55%	(7/11) 64%
2. Pharmacovigilance (VL)	(3/4) 75%	(4/4) 100%
3. Market surveillance and control (MC)	(1/7) 14%	(6/7) 86%
4. Licensing of establishments (LI)	(3/3) 100%	(3/3) 100%
5. Regulatory inspections (RI)	(3/4) 75%	(4/4) 100%
6. Clinical Trials Oversight (CT)	(8/9) 89%	(8/9) 89%
	M = 68.00% SD = 30.49	M= 89,33% SD = 14.09

4.1.2 The assessment of the changes in service delivery from the industry's perspective following the transition of DRU to BOMRA

Null hypothesis:
There is no significant difference in service delivery between DRU and BOMRA following the transition.

The survey was conducted as outlined in Chapter 3 to collect demographic information of employees from pharmaceutical companies that have received regulatory services in Botswana from the former DRU and the current BOMRA. The responses were used to assess and compare the changes in the regulatory service delivery as perceived by the sample. The null hypothesis of the study was tested, and the results are presented in this chapter.

The overall survey response rate was 60% (30/50) which is 15,9% more than the reported 44.1% mean response rate of online surveys (Wu, Zhao and Fils-Aime, 2022). However, two respondents declined to participate, and two participants withdrew from participation. Three of the respondents' data were incomplete. Thus, resulting in a non-response error and a decrease in the sample size. One respondent's scope of work was vaccines only and out of the scope of the study. These responses were excluded. Although 86% (19/22) of the respondents had made submissions to BOMRA, 37% (7/19) of those had not made submissions to DRU

and were therefore excluded. After the data was cleaned according to the scope of the study, a total of twelve responses (54%) were used for data analysis. The questionnaire was made up of two parts. The first part contained demographic information. The second part comprised nine sections with twenty-five questions posed on the former DRU and the current BOMRA. The results are presented below.

4.1.2.1 Part 1 – Demographic information

The demographic profiles are presented in Table 3 below and included No. of years of submissions to BOMRA, type of company, company's activity, type of products, type of applications submitted, gender, location, and No. of years in RA.

Table 3: Demographic profile of the respondents to the Customer Service Standards Survey

		F	%
No. of years of submissions to BOMRA	1 – 2 years	12	100.0%
Type of company	Generic Pharmaceutical/Biotech Company	3	25.0%
	Innovator Pharmaceutical/Biotech Company	8	66.7%
	Innovator Pharmaceutical/Biotech company, Generic Pharmaceutical/Biotech Company	1	8.3%
Company's activity	Imports	1	8.3%
	Imports & Distributes	7	58.3%
	Imports & Distributes, Markets	3	25.0%
	Markets	1	8.3%

Type of products	Medicinal products	4	33.3%
	Medicinal products, Vaccines	5	41.7%
	Medicinal products, Vaccines, Complementary medicines, Cosmetics	2	16.7%
	Medicinal products, Vaccines, Complementary medicines, Cosmetics, Devices	1	8.3%
Type of applications submitted	New registration	1	8.3%
	New registration, Variations	2	16.7%
	New registration, Variations, Exemptions	1	8.3%
	New registration, Variations, Exemptions, Import permits	2	16.7%
	New registration, Variations, Exemptions, Promotional materials/Advertising, Import permits, Pharmacovigilance activities	3	25.0%
	New registration, Variations, Exemptions, Promotional materials/Advertising, Pharmacovigilance activities	1	8.3%
	New registration, Variations, Promotional materials/Advertising, Import permits, Pharmacovigilance activities	1	8.3%
	Variations	1	8.3%
Gender	Female	11	91.7%
	Male	1	8.3%
Location	Botswana	4	33.3%
	South Africa	8	66.7%

No. of years in RA*	1 – 5 years	2	16.7%
	6 – 10 years	3	25.0%
	More than 10 years	7	58.3%

*RA= Regulatory Affairs. Used in the general term in the study and does not represent a specific profession

4.1.2.2 Part 2 – Responses to Customer Service Standards Survey

As outlined in Chapter 3, there were nine sub-sections of the 'General Administrative Services Response Time' and 'Technical Services Timelines' with twenty-five questions from the Customer Service Standards posed on the former DRU and the current BOMRA. The paired sample t-test and the Wilcoxon signed rank tests (Appendix 3) were performed on the collected data of the small sample size to compare the observed means and medians of the services performed by DRU and BOMRA following the transition.

4.1.2.2.1 DRU vs BOMRA GENERAL ADMINISTRATIVE SERVICES RESPONSE TIME (Q1, Q2, Q3)

BOMRA showed a higher mean score (M = 3.08; SD = 0.75) compared to DRU (M = 2.42; SD = 0.82) in terms of the 'General Administrative Services Response Time'. Both the paired samples t-test (t (11) = 2.82; p = 0.016) and the Wilcoxon signed rank test (z = 2.38; p = 0.017) showed a statistically significant difference. The null hypothesis that there is no significant difference in service delivery between DRU and BOMRA following the transition was rejected in terms of 'General Administrative Services Response Time.

4.1.2.2.2 DRU vs BOMRA REGISTRATION ASSESSMENT PROCESS SERVICES TIMELINES (Q4)

A higher mean score (M= 3.42; SD = 1.00) was observed in the DRU compared to BOMRA (M = 2.92; SD = 1.56) in terms of 'Registration Assessment Process' services timelines. However, both the paired samples t-test (t (11) = 1.20; p = 0.26) and the Wilcoxon signed rank test (z = 1.09; p = 0.28) showed no statistically significant difference between DRU and BOMRA. The null hypothesis was retained.

4.1.2.2.3 DRU vs BOMRA PHARMACOVIGILANCE (PV) and CLINICAL TRIALS (CT) SERVICES TIMELINES (Q5, Q6, Q7, Q8)

There was a higher mean score (M= 2.21; SD = 1.26) in the DRU compared to BOMRA (M = 1.73; SD = 1.42) in terms of 'PV & CT' services timelines. However, both the paired samples t-test (t (11) = 1.20; p = 0.072) and the Wilcoxon signed rank test (z = 1.09; p = 0.057) showed no statistically significant difference between DRU and BOMRA. The null hypothesis was retained.

4.1.2.2.4 DRU vs BOMRA REGISTRATION OF HUMAN MEDICINES SERVICES TIMELINES (Q9, Q10, Q11, Q12)

BOMRA showed a higher mean score (M= 2.77; SD = 0.94) compared to the DRU (M= 2.56; SD = 0.85) in terms of 'Registration of Human Medicines' services timelines. However, the observed difference between DRU and BOMRA was not statistically significant as indicated in both the paired samples t-test (t (11) = 1.15; p = 0.28) and the Wilcoxon signed rank test (z = 1.02; p = 0.31). The null hypothesis was retained.

4.1.2.2.5 DRU vs BOMRA VARIATION FOR HUMAN MEDICINES SERVICES TIMELINES (Q13, Q14, Q15)

A higher mean score (M= 3.00; SD = 0.88) was observed in BOMRA compared to DRU (M = 2.67; SD = 0.95) in terms of 'Variation for Human Medicines' services timelines. However, both the paired samples t-test (t (11) = 1.82; p = 0.097) and the Wilcoxon signed rank test (z = 1.80; p = 0.072) showed that there was no statistically significant difference between DRU and BOMRA. The null hypothesis was retained.

4.1.2.2.6 DRU vs BOMRA EXEMPTION FOR REGISTRATION SERVICES TIMELINES (Q16, Q17)

BOMRA showed a higher mean score (M = 1.54; SD = 1.30) compared to DRU (M = 1.17; SD = 1.21) in terms of the 'Exemption for Registration' services timelines. Both the paired samples t-test (t (11) = 1.13; p = 0.28) and the Wilcoxon signed rank test (z = 0.95; p = 0.34)

showed no statistically significant difference in the 'Exemption for registration' services timelines between DRU and BOMRA. The null hypothesis was retained.

4.1.2.2.7 DRU vs BOMRA INSPECTION AND LICENSING: INSPECTION SERVICES TIMELINES - Inspection of Distributor/ retailer (Q18, Q19, Q20)

No difference was observed between the means of DRU (M = 1.19; SD = 1.27) and BOMRA (M = 1.19; SD = 1.47) in terms of 'Inspection Services of Distributor/Retailer' timelines [(t (11) = 0.0; p = 1.00); Z = 0.0; p = 1.00)]. Thus suggesting that the timelines of the 'Inspection Services of Distributor/Retailer remained unchanged despite the transition. Therefore, the null hypothesis was retained.

4.1.2.2.8 DRU vs BOMRA INSPECTION AND LICENSING TIMELINES: INSPECTION SERVICES - Inspections of Manufacturers (Q21, Q22)

There was a higher mean score (M= 1.17; SD = 1.76) in DRU compared to BOMRA (M = 0.96; SD = 1.50) in terms of 'Inspection Services of Manufacturers' timelines. However, both the paired samples t-test (t (11) = 1.45; p = 0.18) and the Wilcoxon signed rank test (z = 1.34; p = 0.18) showed no statistically significant difference. The null hypothesis was retained.

4.1.2.2.9 DRU vs BOMRA IMPORT/EXPORT CONTROL SERVICES TIMELINES (Q23, Q24, Q25)

BOMRA showed a higher mean score (M= 1.75; SD = 1.28) compared to the DRU (M= 1.89; SD = 1.36) in terms of 'Import/Export Control Services' timelines. However, the observed difference between DRU and BOMRA was not statistically significant as indicated in both the paired samples t-test (t (11) = 0.418; p = 0.68) and the Wilcoxon signed rank test (z = 0.53; p = 0.60). The null hypothesis was retained.

Overall, the null hypothesis that states that there is no statistically significant difference in service delivery between DRU and BOMRA following the transition was rejected in terms of the 'General Administrative Services Response Time'. No significant difference was observed in the Technical Services Timelines, i.e., 'Registration Assessment Process', 'PV & CT',

'Registration of Human Medicines', 'Variation for Human Medicines', 'Exemption for Registration', 'Inspection and Licensing Services of Distributors/Retailers & Manufacturers', and 'Import/Export Control'.

Table 4: Other similarities and differences between DRU and BOMRA

DRU		BOMRA
Legislation and policy		
Act	Drugs and Related Substances Act, 1992	Medicines and Related Substances Act, 2013
Regulatory scope	Drugs and related substances Habit-forming drugs	Human and Veterinary Medicines Medical Devices Cosmetics
Regulations	Made by the MoH	Made by the MoH
Functions and roles	The legislation does not clearly state DRU's functions	The legislation clearly states BOMRA's functions
NRA structure and governance		
Composition	Director - appointed by the MoH Advisory Board of DRU - appointed by the MoH Staff - government appointments	Board of BOMRA - appointed by the MoH CEO - recommendation, terms, and conditions by the Board - appointed by the MoH Senior officers - recommendation by the CEO - appointed by the Board Staff - appointed by the CEO
Legal power	The Board advises the Director on the registration of a drug, the conditions thereof, and the suspension or revocation of a registration Applications for the medicine's registration, importation, exportation, manufacturing, distribution, sale, promotion, advertising, storage, or dispensing are made to and approved by the Director	The Board is responsible for managing the operational activities of the Authority, including administration, financial management, and policy formulation CEO is responsible for the management and control, administration, and organization of BOMRA Applications for the medicine's registration, importation, exportation, manufacturing, distribution, sale, promotion, advertising, storage, or dispensing are made to and approved by BOMRA

Source of funding	Government	Government Grants and donations User fees Investment Income
Revenue and budgetary independence	Revenue collected and allocated to the DRU by the MoH	Revenue collected is used to meet BOMRA's operational costs. Accumulated excess revenue is used as determined by the Authority, with the approval of the Minister
Autonomy	Department under the MoH (no autonomy on operations, financials, staff appointment)	Semi-autonomous (operational autonomy, financial semi-autonomy, staff appointment autonomy)
Transparency and accountability		
Appointment of the board	Notice in the Gazette by the MoH when the appointment is made	Notice in the Gazette by the MoH when the appointment is made
Appeals	Appeals to grievances against the Director's decision are made to the Minister	Appeals to grievances against BOMRA's decision are made to the Appeals Committee
NRA website	MoH website https://www.moh.gov.bw/drug_regulation.html	BOMRA website https://bomra.co.bw/
Regulatory fees	Not available	Published
Legislation	Guidelines/ Forms published	Act/ Regulations/ Guidelines/ Bill/ Forms published
Registers	Register of registered drugs kept and maintained by the Director - not published	Published lists of registered/ withdrawn medical products
Repository	Not available	Product Safety Information, Safety Alerts
Information technology	Paper-based approach	Electronic approach

4.2 Discussion

The study set out to assess and compare the changes in the regulatory system for the WHO-recommended regulatory functions and service delivery following the transition of DRU to BOMRA from the industry perspective. The outcomes of the results were analyzed and discussed below to identify the emerging trends and draw conclusions.

4.2.1 General Administrative Services Response Time

General administrative services are key to the operation of any organization. This requires effective planning and coordination of the activities that ensure efficient service delivery. Efficient service delivery indicates that the inputs of the delivery system lead to the desired outcomes (World Health Organization, 2010b).

As mentioned in Chapter 1, DRU was under-resourced and did not have the autonomy under the MoH to attract and retain an adequate competent workforce to carry out its functions (Republic of Botswana, 1992). Whereas BOMRA, as a semi-autonomous body is empowered to appoint its workforce for efficient service delivery under the MRSA (Botswana Medicines Regulatory Authority, 2021a). It could be said that the observed improvement in the 'General Administrative Services' between DRU and BOMRA was due to more human resources acquired by BOMRA following the transition. However, it should also be noted that submissions of new applications for MA and variations were suspended during the transition (Botswana Medicines Regulatory Authority, 2018). Therefore, the resultant influx of submissions following the resumption of these services could likewise be the reason for the observed improvement.

4.2.2 Registration Assessment Process services

Timely access to and supply of affordable quality-assured medicines is key to achieving SDGs, UHC, and the global health agenda as outlined in Chapters 1 and 2. To achieve the desired public health outcomes, the NRAs must have the regulatory system capacity (World Health Organization, 2021f).

Under the MoH, DRU had a considerable backlog of applications for the registration of

medicines, variation approvals, and responses to evaluation queries. The regulatory framework was limited and the applicable product evaluation and registration timelines were inconsistent and not adhered to. Thus, lacking transparency and hindering the achievement of the desired health outcomes.

Following the transition, BOMRA had an improved regulatory scope in line with the updated legislative framework. The registration assessment process and timelines were reviewed and clearly defined (Botswana Medicines Regulatory Authority, 2020b). However, product evaluation and registration timelines were soon revised by BOMRA. This was attributed to the high volume of received applications, human resources, and operational interruptions due to COVID-19 (Botswana Medicines Regulatory Authority, 2021b). Despite limiting the number of applications to five per institution per month in anticipation of the influx of submissions upon resumption of registration services (Botswana Medicines Regulatory Authority, 2020a). On the other hand, while the product evaluation process is time and resource-consuming and requires technical expertise, poor capacity may result in delays in the evaluation of MA applications and access to quality-assured medicines (Ball, Roth and Parry, 2016). That may have contributed to the observed survey results in this regard.

Nevertheless, the clearly defined assessment process and the published timelines, demonstrate improvement in the agility and flexibility to respond appropriately and timeously to the changes in the regulatory environment within the regulatory framework. A timeous and appropriate response is necessary in achieving the intended health outcomes. Thus, safeguarding transparency and improving public trust.

Furthermore, as a semi-autonomous body under the MRSA, BOMRA is empowered to use excess revenue as it deems fit to efficiently accomplish its mandate. Therefore, BOMRA may allocate external investment toward the training and development of its workforce to improve technical expertise and capacity (Roth *et al.*, 2018).

4.2.3 Registration of human medicines, Variation for human medicines, Exemption for registration services vs the legal provisions and guidelines to enforce MA

NRAs are mandated to protect public health through the authorization of safe, effective, and

quality-assured medical products (Dube-Mwedzi *et al.*, 2020). However, the legal provisions to enforce MA and their required guidelines showed the least improvement following the transition of DRU to BOMRA. Nonetheless, an improvement was noted in the explicit nature of the MRSA and MRSR vs the implicitness of the DRSA and DRSR in terms of the legal provision to enforce MA. The MRSA was also found to be comprehensive compared to the DRSA's limiting nature. For example, where routine MA procedures may be exempted in the interest of public health, the DRSA authorized the donation of drugs through the Central Medical Stores (CMS), government, or mission hospitals (Republic of Botswana, 1992). While, any authorized person is empowered to donate medicines under the MRSA (Republic of Botswana, 2013). This indicates improvement in the legal framework for equality and impartiality towards all stakeholders, not only government institutions. Impartial regulation and regulatory decisions promote fairness and prevent the risk of undue influence (World Health Organization, 2016a).

Both the DRU and BOMRA were empowered to request any information as needed, withdraw MA, and/or enforce penalties in case of non-compliance. However, the concerns regarding quality, safety, or efficacy issues that call for the suspension or cancellation of MA depend on the opinion of the Director of the DRU under the DRSA and DRSR (Republic of Botswana, 1992, 1993). This is found to expose the Director to undue influence, either political from the ministry or that of special interest stakeholders. Whereas, following the transition, BOMRA is empowered with decision-making autonomy (Republic of Botswana, 2013), eliminating the threat of exposure to undue influence. Decision-making autonomy safeguards the independence of the NRA and instils confidence (European Union, 2019).

Furthermore, the DRSA and DRSR were observed to be ambiguous in some instances. The five-year validity period for the renewal of MA under the DRSR was extended until a decision was made by the Director of the DRU and communicated to the applicant (Republic of Botswana, 1993). This suggests poor regulatory practice as it insinuates that the MA validity may be indeterminate, especially given the backlog challenge that the DRU was facing. Even so, it was found that the renewal of MA was not enforced by the DRU in practice, rendering the authority non-compliant. In contrast for BOMRA, the five-year validity condition is clearly defined under the MRSR following the transition. Consequently, BOMRA implemented a phased approach to the renewal of registration of MA based on the classification of the product to manage the volume of applications effectively (Botswana

Medicines Regulatory Authority, 2020c). Another observed example of a lack of clarity from the DRSR was the requirement to report the intention to make changes without any undue delay (Republic of Botswana, 1993). Indeed, some changes can be reported soon after being implemented (notifications) while others can be reported within a year of being implemented (annual notifications), a distinction clearly defined in the MRSR. Thus, improvement is noted in the clarity and consistency of the legal framework. Thereby, promoting compliance from both BOMRA and the MAHs following the transition.

The MRSA and MRSR were found to be responsive to the changes in the regulatory environment and international standards and practices. Thus, improving the effectiveness of BOMRA as a regulatory authority. For example, applications for the registration of medicine are made in the CTD format (Republic of Botswana, 2013, 2019). This in turn facilitates electronic submissions for the applicants, promotes good review practices, and facilitates timely access to safe, effective, high-quality medical products (International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use, 2003). It should be noted though that, the DRU had been accepting applications for the registrations of medicines in the CTD format recent to the transition. Indicating that the NRA was already committed to improving the regulatory system.

Whereas recognition of decisions from other bodies in terms of MA was undefined from the DRSA & DRSR, the MRSA & MRSR implied that BOMRA can have beneficial relations as necessary with other bodies to fulfil its mandate (Republic of Botswana, 2013, 2019). References to the Zazibona Collaborative Process and the Collaborative Registration Procedure for WHO Prequalified products can be found on BOMRA's website, and the applicable approval timelines are specified in BOMRA's Customers Service Standards. It should also be noted that the DRU's Drugs Advisory Board recognized the competence of SRAs for registration and MA although it was undefined in the legislation then. Hence it was recognized that the legal framework was outdated. As noted by the WHO (World Health Organization, 2019a) beneficial relations with other bodies strengthen decision-making and accelerate access and availability of affordable, quality-assured medical products.

The survey results concerning the 'Technical Services Timelines' in terms of 'Registration of human medicines', 'Variation for human medicines', and 'Exemption for registration' between DRU and BOMRA following the transition were found to be in line with the least

improvement observed in the legal provisions to enforce MA and their respective guidelines.

4.2.4 PV & CT services vs the legal provisions and guidelines to enforce VL and CT

CT oversight is meant to establish the safety and efficacy of medical products and protect the participants' rights and their safety (World Health Organization, 2021f).
Some improvement was observed in BOMRA's legal provisions to enforce CT following the transition in comparison to the former DRU. However, both the DRSA & DRSR and the MRSA & MRSR lacked provisions for GMP requirements for IMPs, amendments to CT protocols, the establishment of an IEC, and circumstances in which the routine CT evaluation procedures may not be followed. Thus, the observed inadequacy in the legal provision to enforce those CT activities could be seen to discredit BOMRA's decision regarding the clinical trial results or the quality of registered medical products within the country.

On the other hand, the next best improvement following the transition of DRU to BOMRA was observed in both the legal provision and the required guidelines to enforce VL. Thus in converse, promotes confidence that medical products that are within the country are safe, effective, and of high quality (World Health Organization, 2021f). Through VL, identification of previously unknown adverse effects and assessment of risk/benefit can help improve product safety and prevent harm to the public. Therefore, continuous monitoring of safety data of approved medical products' is crucial for the early detection of safety issues, including SF medical products in the market. Although the legal provisions explicitly empower BOMRA to ensure the establishment of the national VL system, the trend noticed in the provisions of vigilance activities was that of implicitness.

As far as the legal provisions to recognize decisions from other bodies in terms of CT and VL, the DRSA & DRSR and the MRSA & MRSR echoed the same observed trend about MA; undefined for the former and implicit for the latter. Yet, to ensure NRA's effectiveness and independence, legislation should be clear (European Union, 2019).

The observed 'PV & CT' services survey result between DRU and BOMRA following the transition is therefore found to be aligned with the legal provisions.

4.2.5 Inspection and Licensing Services of Distributors/Retailers & Manufacturers vs the legal provisions and guidelines to enforce 'LI and RI'

The licensing activities and inspection of establishments throughout the medical product supply chain are central to public health promotion and protection (World Health Organization, 2021f).

The DRSA & DRSR were mostly implicit in the legal provision to enforce LI and RI in contrast to the explicit nature of the MRSA & DRSA. Following the transition BOMRA is empowered to fully enforce LI and RI in contrast to the former DRU. This improvement in the legal framework enables BOMRA to ensure the availability of quality-assured medical products in the market.

An improvement in transparency was also observed in the legal framework as BOMRA is mandated to maintain a database of all licensed establishments. Furthermore, there are legal provisions to enforce penalties and/or revoke licenses in cases of non-compliance (Republic of Botswana, 2013). This, in turn, increases confidence in the regulatory system and increases public trust in BOMRA's credibility and regulatory decisions. In contrast, the decision to enforce penalties or revoke licenses was dependent on the opinion of the Director of the DRU. A trend of an increased risk of undue influence was observed in the DRSA in that the information required for the approval of manufacturing, export/ import of drugs, and the qualifications of the technical manager for export/import business were subject to the Director's satisfaction (Republic of Botswana, 1992). Undue influence undermines the NRA's independence and effectiveness in exerting its authority (OECD, 2017).

An improved legal framework following the transition has adopted a risk-based approach in ensuring compliance with GxPs across the supply chain compared to the prescribed periodic inspections under the DRSA (Republic of Botswana, 1993, 2013). However, an inconsistency is noted in the legal provisions of MRSA and MRSR in that the inspection of foreign manufacturing establishments for GxP compliance was not explicitly stated even though some of the products circulating in the market could be from foreign countries. All stakeholders should have a clear understanding of the requirements and applicable sanctions in case of non-compliance. Therefore, the legal provisions should be clear and consistent (World Health Organization, 2016a).

Formerly under the DRSA and DRSR, the license for drug manufacturing and retail pharmacy were issued under different Acts. Duplication of mandates creates confusion, wastes resources, and increases the risk of non-compliance (World Health Organization, 2007c). Whereas following the transition BOMRA is responsible and accountable for the licensing of all establishments. This will prevent issues of fragmentation and co-ordinating different regulatory priorities and mandates (World Health Organization, 2007c). Thereby, leading to improvement in the regulation of licensing activities.

As in the case of MA and PV & CT, the evidence of the recognition of decisions from other bodies in terms of RI was absent in the DRSA & DRSR but implied in MRSA & MRSR. Mutual recognition of inspection reports prevents work duplication, maximizes available resources, and facilitates access and availability of quality-assured medical products (Roth *et al.*, 2018).

The survey results in the 'Inspection and licensing services of distributors/retailers & manufacturers' endorsed the observed results in the legal provision and guidelines to enforce 'LI and RI'.

4.2.6 Import/export control services vs the legal provisions and guidelines to enforce 'MC'

MC is key and a gateway to ensuring access to and availability of quality-assured medical products and therefore public health safety (World Health Organization, 2021f).
Following the transition, BOMRA is explicitly empowered to control and monitor activities of medical products through the supply chain by MRSA & MRSR in contrast to the DRSA & DRSR. The observed improvement in the regulatory framework indicates the NRA's commitment to responding to the evolving complexities of the medical product supply chain and the high prevalence of SF medical products in Africa reported in Chapter 2. Moreover, applicable fines and sanctions empower BOMRA in facilitating the prevention of SF medical products in the market. This also promotes transparency and ensures access to safe and quality-assured medical products. Authorizing NRAs with sanctioning powers to enforce penalties for non-compliance is crucial for independence and effective functioning (European Union, 2019). Although designated Ports of Entry (PoEs) are mandatory for effective control

and monitoring of import/export activities, evidence of permanent regulatory intervention was not found in the Legal provisions.

A trend of comprehensiveness for MRSA & MRSR versus the limiting nature of DRSA and DRSR was continued in terms of the MC. For example, under the DRSA the distribution and sale of drugs were limited to duly licensed premises/persons while the import or export of drugs was only limited to CMS, a government entity (Republic of Botswana, 1993). A single source of supply of medical products to all public health facilities leads to overburdened staff and poses risks of stockouts which may lead to patients' non-compliance and delays in treatment initiation. Moreover, it increases the risk of undue influence. Independence from undue influence provides consistency in the NRA's decision-making, thus promoting trust in the NRA and its decisions (OECD, 2017). Contrarily, any duly licensed person is authorized to import, export, distribution, and sale of medical products under the MRSA (Republic of Botswana, 2013).

Despite the most observed improvement in the legal provisions and the required guidelines to enforce MC following the transition, the survey results for Import/export control services suggested the improvement to be due to chance.

However, with respect to the observed study results in terms of the 'General Administrative Services Response Time' and the 'Technical Services Timelines' where the null hypothesis was retained and rejected respectively, it is crucial to consider the resultant sample size of the study. Besides convenience sampling used in the study, the sample size was further greatly reduced by non-response error, and some respondents with either BOMRA or DRU interactions but not both. Therefore, considering the scope of the study, the qualitative method and study design used, and the quality of the data obtained, the resultant sample size was too small to sufficiently draw reliable conclusions from statistical analysis of service delivery between BOMRA and DRU. The lack of statistical significance may not mean a lack of effect. The study size lacked sufficient power to draw reliable conclusion about the null hypothesis (Huecker and Shreffler, 2023).

4.2.7 Other similarities and differences between DRU and BOMRA

An improved legal framework following the transition of DRU to BOMRA included an extended mandate to regulate the supply chain of veterinary medicines, medical devices, and cosmetics (Republic of Botswana, 2013).

Unlike the DRU, BOMRA's organizational structure includes the CEO who is appointed by the MoH on the Board's terms and conditions. The CEO has the management and administration responsibilities for the authority, including the appointment of staff, and is accountable to the Board (Republic of Botswana, 2013). Thus, by establishing recruitment procedures with qualifications related to the specific competencies, BOMRA can hire adequate staff with the required expertise and experience to perform its mandate. The involvement of the MoH or government in the recruitment procedures of staff exposes the NRA to undue political influence (European Union, 2019), which can be avoided following the transition.

Similarly to the DRSA, the MRSA mandates the publication of the board member appointments in the Gazette. This supports the legitimacy of the board and promotes confidence in the governance of the NRA (OECD, 2017). Although the DRSA made provisions for the board members' tenure of office, the MRSA is more transparent and explicit on the terms and conditions of reappointment, disqualification, dismissal, removal from office, and conflict of interest (Republic of Botswana, 2013). Moreover, the board members can be reappointed for not longer than 2 consecutive terms and are from different fields to offer diverse knowledge and expertise. According to the literature review, board members' appointments should be staggered to maintain the knowledge and expertise for continuity between re-appointments (OECD, 2017; Council of European Energy Regulators, 2021; United States Agency for International Development, 2022) however the MRSA is not explicit on staggering.

In comparison to the DRU, BOMRA's Board is empowered with full operational autonomy, overall responsibility, and accountability for all the regulatory functions under a single regulatory body. Previously, the NDQCL was a unit under the MOH, separate from the DRU. This may have posed challenges of uncoordinated planning, fragmented service delivery, and

funding arrangements from the government. According to the OECD issues of unclear roles and responsibilities, and control over resource allocation and priorities in some countries with decentralized health systems had diminished improvements in achieving immunization coverage within the immunization programmes (World Health Organization, 2018a). Thus, there can be an alignment of the operational approach and financial strategy for improved regulatory efficiency and service delivery following the transition.

The functions, roles, and responsibilities are clearly stipulated in the MRSA, contrary to the DRSA. In addition, appeals against any decisions are made to the appeals committee. Hence preventing bias and ensuring impartiality as opposed to the DRSA where the final decision was made by the MoH. Such transparency and accountability prevent undue influence, ensure good governance and promote consistent decision-making (OECD, 2017; European Union, 2019).

According to the literature review, NRAs should report performance information to demonstrate the impact of internal governance in achieving the desired outputs and outcomes, including transparency in procedures (World Health Organization, 2007c, 2010b; OECD, 2017; Roth *et al.*, 2018). Accountability in expenditure can be ensured through audits of annual accounts and submission of the audited accounts and annual reports to parliament (Republic of Botswana, 2013). However, evidence of the legal provisions on performance assessment impact to ensure accountability was not found.

To increase transparency and accountability in addition to explicit and comprehensive legislation, NRAs must proactively and clearly communicate relevant information to the relevant stakeholders through appropriate channels for understanding. Compared to the MoH website, BOMRA's official website provides an accessible platform to engage and communicate relevant information on legislation, awareness, education, consultations, compliance, and regulatory decisions (Table 4). Stakeholder engagements facilitate the exchange of information, provide opportunities for consultations and contributions to the new regulations, and safeguard compliance (OECD, 2017).

In response to the changes in the regulatory environment and to align with international standards, electronic services have been introduced following the transition. With the electronic systems, submissions of applications, tracking, and assessment process can be enhanced for accelerated access to quality-assured medicines. Furthermore, it has become

easier and more convenient to report vigilance data through electronic channels. Thus, electronic systems create an enabling environment for efficient evaluation and monitoring processes for improved health service delivery.

Regulatory services have mostly been free since medicine regulation was introduced in Botswana. Thus DRU's main funding was from the government and governed by the MoH. However, paid regulatory services were introduced following the transition. The legal provision empowers BOMRA to generate, retain, and use the accrued revenue to meet its operational costs and any surplus as it deems with prior approval from the minister of finance (Republic of Botswana, 2013). Such semi-autonomy is conducive and enables expenditure towards the improvement in infrastructure and continuous development of the workforce to strengthen BOMRA's capacity. However, the approval from the minister of finance shows the lack of final decision-making and full financial autonomy. While DRU solely depended on government funding, various financial sources following the transition offer sustainable funding for BOMRA. The diverse sources of funding enhance independence and safeguard the NRA against undue influence from the government (European Union, 2019; Council of European Energy Regulators, 2021).

The results showed some improvement in the legal framework of the regulatory system following the transition of DRU to BOMRA. However, some inadequacies have also been identified. The areas of focus will be highlighted in the next chapter for recommendations for strengthening the regulatory system and improving service delivery.

Chapter 5 – Limitations, Conclusions, and Recommendations

5.1 Limitations

The study focused on only one indicator of the WHO GBT as a data collection tool; the legal framework of the regulatory system. Additionally, only the existence of the legal provisions of the regulatory functions was assessed for the scope of the study and not their implementation, outputs/ outcomes other than service delivery. However, to determine the capacity of the regulatory system according to the WHO GBT an assessment of the regulatory inputs including the legal framework, organizational structure, available resources, processes, and desired outputs should be performed (World Health Organization, 2021c). Thus, the results of one aspect of the WHO GBT present a risk of validity. However, they can provide some evidence and can serve as a basis for establishing BOMRA's regulatory system's capacity.

In terms of service delivery, the study focused only on the timeliness of the services. Other aspects of service performance such as accessibility, responsiveness, quality, and cost-effectiveness of the services were not considered (Baredes, 2022). These measures are also required to identify issues contributing to the achievement of the objectives and areas of improvement when measuring the service performance for a better user experience. With more time and resources, further studies can be done to unpack the trends and provide insights into specific underperforming aspects to inform decision-making for improved service delivery (Baredes, 2022).

Although the respondents were asked the same survey questions regarding service delivery received from both DRU and BOMRA, they had to recall their past experiences. It is possible that some details may have been forgotten or inaccurately remembered. Thus, posing a risk of recall bias (Spencer, Brassey and Mahtani, 2017).

Even though the target population of interest for the study was pharmaceutical companies that have received regulatory services in Botswana, only a few respondents residing in Botswana gave their perspective. Members of one pharmaceutical industry association residing in South Africa but from different pharmaceutical companies were conveniently sampled due to ease

of access. The perspectives of the regulators and other stakeholders such as patients were not considered in this study as they were out of scope. The study could have offered an opportunity to observe the viewpoint of DRU/BOMRA as entities responsible to ensure public safety through effective regulation. However, this was out of the scope of this study. So, there is a risk that the responses were biased. Moreover, some of the respondents declined to participate in the survey, preventing the results from being generalized.

In addition, along with the non-response error, some of the respondents had received regulatory services from the DRU but not from BOMRA and vice versa. This had a major limitation on the sample size and threatened the validity of statistical analysis results.

Despite the limitations, areas that need attention for strengthening regulatory system capacity and improving service delivery have been highlighted in this study. Thus, the study can be used in the design of follow-up or future studies seeking to understand the stance of stakeholders in this regard.

5.2 Conclusions

The first study objective was to explore the similarities and differences in the scope of the WHO's recommended regulatory functions between the former DRU and the current BOMRA. The data review showed defined functions, roles, and responsibilities with an extended mandate for BOMRA to regulate the supply chain of veterinary medicines, medical devices, and cosmetics. The analysis of the DRSA & DRSR and the MRSA & MRSR showed that BOMRA had more legal provisions and guidelines to enforce the WHO's recommended regulatory functions than DRU.

While DRSA and DRSR were implicit and limiting, the MRSA & MRSR were found to be explicit, comprehensive, and responsive in empowering BOMRA to fulfil its mandate. It can be said that the DRU, operating within the MoH did not have budgetary and revenue independence. With the DRSA's implicit nature and exposure to undue influence, it can be concluded that the DRU without sustainable funding and the autonomy to appoint its staff, lacked the capacity and the decision-making autonomy required for the efficient implementation of its mandate.

In contrast, it can be said that BOMRA is empowered as a semi-autonomous body with sustainable funding, transparency, and accountability to the decision-making required for efficient oversight of the regulation of medical products. In addition to full operational autonomy, the authority is empowered to appoint its staff and use accumulated excess revenue as it determines but subject to the approval of the minister of finance.

It can thus be concluded that there is evidence of some improvement in the legal framework of the regulatory system in line with international norms and standards following the transition of DRU to BOMRA.

Based on the results of the study and the literature review it can be concluded that there needs to be a clear delegation of powers, roles, functions and responsibilities, accountability, and transparency for NRA's independence and effective functioning (OECD, 2017; European Union, 2019). Clear and comprehensive legislation is key in empowering the NRAs with independent, impartial, and consistent decision-making powers for efficient regulatory governance (OECD, 2017; Council of European Energy Regulators, 2021). Access to sustainable funding and budget independence, and adequate competent staff are critical for NRAs to carry out their mandate (Roth *et al.*, 2018; European Union, 2019).

The study's second objective was to assess the changes in the service delivery of the implemented regulatory system as perceived by the employees of pharmaceutical companies registering and marketing medical products in Botswana. The statistical analysis of the survey showed a significant difference in the 'Administrative Services Response Time' but no significant difference in the 'Technical Services Timelines' i.e., 'Pharmacovigilance & Clinical Trials' timelines, 'Registration of Human Medicines' timelines, 'Variation for Human Medicines' timelines, 'Exemption for Registration' timelines, 'Inspection and Licensing Services of Distributors/Retailers & Manufacturers', and 'Import/Export Control Services' timelines. However, the study lacked sufficient power to draw reliable conclusion about the null hypothesis.

Nevertheless, the observed improvement in the legal provision and guidelines to enforce the WHO's recommended regulatory functions under the first objective of the study suggests some improvement in the regulatory system's capacity to perform core regulatory functions.

Lastly, the objective of the study was to highlight and recommend areas of focus for service delivery improvement for both employees of pharmaceutical companies registering and marketing medical products in Botswana and BOMRA. The recommendations are based on the results and are outlined below.

5.3 Recommendations

The study aimed to assess and compare the changes in the regulatory system for the WHO-recommended regulatory functions and service delivery following the transition of DRU to BOMRA from the industry's perspective. It is recommended to consider some identified inadequacies from the data analysis for strengthening the regulatory system capacity and service delivery improvement.

It was found that under the MRSA & MRSR, BOMRA had more legal provisions to enforce the WHO-recommended regulatory functions than DRU under the DRSA & DRSR. However, the legal provisions empowering BOMRA were found to be implicit and limiting in nature. It is recommended to improve the legal provision to enforce all the WHO-recommended regulatory functions to strengthen the regulatory system capacity.

The legal provisions should be explicit in empowering BOMRA to collaborate with other regulatory bodies (national, regional, and international) for information exchange and benefit from reliance on medicine regulation and regulatory decisions. BOMRA should consider issuing a Reliance guideline for applicants. The least improvement was observed in the legal provision to enforce MA.

There should be legal provisions covering circumstances in which the routine CT evaluation procedures may not be followed for public-health interests. The MRSA should empower BOMRA to authorize amendments to protocols. The legal provisions should be explicit on the establishment of the IEC and clearance from the IEC before CT of medical products is conducted in humans. There should be explicit provisions for IMPs in terms of the exemption from registration, GMP compliance, and disposal/destruction. CT regulatory function was found to lack full enforcement legal powers.

The legal provisions should be explicit in enforcing inspection of foreign manufacturing establishments for GxP compliance and permanent regulatory intervention at the designated PoEs. Regulatory systems must be robust across the lifecycle and supply chain of medical products to attain UHC and the desired health outcomes.

It was found that BOMRA had more guidelines to enforce the WHO-recommended regulatory functions than DRU. However, some required guidelines were not available to enforce MA, MC, and CT. Thus, it is recommended to issue all the guidelines required to enforce all the WHO-recommended regulatory functions for an effective regulatory system. The legislation should be comprehensive for efficient drug regulation and protection of public health. The least improvement was observed in the regulatory functions to enforce MA, with some improvement in MC and no improvement in CT.

Although the study lacked sufficient power to draw reliable conclusions about the null hypothesis, improvement in the legal provisions and the guidelines to enforce the WHO-recommended regulatory functions as recommended above is emphasized for efficient medicine regulation and delivery of quality services. Furthermore, as the study was conducted merely two years after the transition, strong commitment, leadership, and support are required to further implement and enforce the legislation for a well-functioning regulatory system. Therefore, BOMRA, the government, and all stakeholders should work together in achieving the desired objective for the benefit of all.

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APPENDICES

Appendix 1: Legal provisions of the regulatory functions

Table 1: Legal provisions for Registration and MA

1. Registration and MA (MA)	DRU (9/12) 75%	BOMRA (11.6/12) 96.7%	Comments
1.1 There are legal provisions that require the receipt of a registration or marketing authorization (MA) before placing the product on the market	**(1)**	**(1)**	
	Act	**Act**	
	3. (1) No drug shall be imported into or exported from Botswana, or Registration manufactured, distributed or sold unless such drug has been and is of drugs registered by the Director of Health Services, hereinafter referred to as "the Director **(0.5)**	*23. (1) No person shall — (a) import; (b) export; (c) manufacture; (d) distribute; (e) sell; (f) promote; (g) advertise; (h) store; or (i) dispense, any medicine unless the medicine is registered by the Authority* **(0.5)**	**DRSA and MRSA:** Explicit on the registration of medical products before market entry
	15. (1) (a – e) In the event of non-compliance *a fine of P10 000 and imprisonment for 2 years* shall be applicable **(0.5)**	23. (6) (a-b) In the event of non-compliance *a fine not exceeding P100 000, or to imprisonment for a term not exceeding 15 years, or to both* shall be applicable **(0.5)**	**DRSA and MRSA:** Applicable fines, charges, penalties, and sanctions in the event of non-compliance stipulated
1.2 There are legal provisions that require demonstration of the product quality, safety, and efficacy before registration or MA	**(1)**	**(1)**	
	Act	**Act**	

	5. (1) The function of the Drugs Advisory Board shall be to advise the Director on the conditions or the revision thereof subject to which a drug should be registered or not. **(0.3)**	*4. The functions of the Authority shall be to (a) ensure that (i) all medicines and related substances manufactured in, imported into, or exported from, Botswana are registered and conform to established criteria of quality, safety, and efficacy.* **(0.3)**	**DRSA:** Implies that compliance with the legal requirements for product registration or MA shall be ensured **MRSA:** Explicit in ensuring full compliance with the legal requirements for product registration or MA
	3. (4) Application for the registration of a drug shall be made to the Director in such form and accompanied by such further information as may be prescribed. **(0.3)**	*24. (1) An application for the registration of medicine shall be submitted to the Authority in the prescribed form and accompanied by the prescribed fee, and any further information that the Authority may consider necessary to process the application* **(0.3)**	**DRSA + MRSA:** Possibly implied in the prescribed application form/further information
	4. (a) If in the opinion of the Director new information indicates safety and efficacy issues to a registered drug he may require such revisions in the composition of the drug, its packaging, labelling, or advertising as he may consider necessary or desirable to ensure the safety and efficacy of the medicine is maintained. **(0.3)**	*24 (3) In considering an application for registration the Authority shall consider the safety, efficacy, and quality of medicine.* **(0.3)**	**DRSA:** Implies that the registration or MA of a medical product includes the review of the quality, safety, and efficacy data **MRSA:** Explicit that medical product assessment for registration or MA includes the review of data on quality, safety, and efficacy
1.3 *Product information (SPC- like, packing, and labelling information), assessed as part of the registration or MA application process	**(1)**	**(1)**	
	Act + Regulations	**Act + Regulations**	

	3. (4) + R 3. (1) Application for the registration of a drug shall be made to the Director in a prescribed form and accompanied by such further information as may be prescribed **(0.5)**	24. (1) + R3 (1) An application for the registration of medicine shall be submitted to the Authority in the prescribed form and shall be accompanied by the CTD Form, a sample, and any further information that the Authority may consider necessary to process the application **(0.5)**	**DRSA + DRSR:** Implicit CTD Form + sample absent Sample implied in the prescribed form **MRSA + MRSR:** Explicit on the submission of samples for the application process implying the review of product information Referenced/implied in the CTD form for registration
	5. (1) The function of the Drugs Advisory Board shall be to advise the Director on the conditions or the amendments thereof as to whether a drug should be registered or not **(0.5)**	*R (2) The Authority shall specify conditions for registration for a particular medicine or group of medicines and may -* *(a) amend any conditions for registration;* *(b) specify product labelling requirements; or* *(c) determine what is to be described in the label or packages of medicines* ***(0.5)***	**DRSA:** Product information possibly implied in the conditions for the application process **MRSR:** Explicit on conditions of product information for registration
1.4 *GMP inspection report and/or certification are part of the registration or MA requirements	**(1)**	**(1)**	
	Act + Regulations	**Act + Regulations**	
	3. (4) + R 3. (1) Application for the registration of a drug shall be made to the Director in a prescribed form and accompanied by such further information as may be prescribed **(0.5)**	24. (1) + R3 (1) An application for the registration of medicine shall be submitted to the Authority in the prescribed form and shall be accompanied by the CTD Form and any further information that the Authority may consider necessary to process the application	**DRSA + DRSR:** CTD Form absent GMP certificates possibly implied in the application form for registration/further information **MRSA + MRSR:**

		(0.5)	GMP certificates referenced/implied in the CTD form for registration
	5. (1) The function of the Drugs Advisory Board shall be to advise the Director on the conditions or the amendments thereof as to whether a drug should be registered or not **(0.5)**	4. (a) (ii) The functions of the Authority shall be to ensure that the personnel, premises, and practices employed to manufacture, promote, procure, store, distribute and sell such medicines comply with defined codes of practice and other requirements **(0.5)**	**DRSA**: Implicit on GMP compliance conditions for the registration process **MRSA:** Explicit on GMP compliance conditions for the registration process
1.5 *PV system plan submitted at the time of registration or MA application	**(0.5)**	**(1)**	
	Act + Regulations	**Act + Regulations**	
	3. (4) + R 3. (1) Application for the registration of a drug shall be made to the Director in a prescribed form and accompanied by such further information as may be prescribed **(0.5)**	24. (1) + R3 (1) An application for the registration of medicine shall be submitted to the Authority in the prescribed form and shall be accompanied by the CTD Form and any further information that the Authority may consider necessary to process the application **(0.5)**	**DRSA + DRSR:** CTD Form absent PMS might be implied in prescribed form/further information **MRSA + MRSR:** PMS referenced/implied in the application for registration
		R 29. (11) The MAH or importer shall in accordance with the guidelines, provide a post-market surveillance plan for their medical product **(0.5)**	**MRSR:** Explicit on PMS
1.6 *Risk Management Plan submitted at the time of registration or MA application	**(0.5)**	**(1)**	

	Act + Regulations	**Act + Regulations**	
	3. (4) + R 3. (1) Application for the registration of a drug shall be made to the Director in a prescribed form and accompanied by such further information as may be prescribed **(0.5)**	24. (1) + R3 (1) An application for the registration of medicine shall be submitted to the Authority in the prescribed form and shall be accompanied by the CTD Form and any further information that the Authority may consider necessary to process the application **(0.5)**	**DRSA + DRSR:** CTD Form absent RMP might be implied **MRSA + MRSR:** RMP referenced/implied in the application for registration
	Absent	R 31. (1) An importer, exporter, MAH, manufacturer, distributor, dispenser, and promoter of medical products shall have in place, risk management plans to prevent circulation of counterfeit medicines **(0.5)**	**MRSR:** Explicit on RMP for the registration process
1.7 There are legal provisions or regulations limiting the duration of the validity of the MA and requiring periodic reviews of MAs (i.e. renewals).	**(1)**	**(1)**	
	Regulations	**Regulations**	
	R 3. (5) A certificate of registration shall be valid for five years or such lesser period as the Director may, in any particular case specify, and provided that an application for the renewal of registration is made at least six months before the date of expiry, such validity shall extend until a decision is made and communicated to the applicant **(1)**	R 4. A + R 5. (1) A registration certificate issued shall be valid for five years and provided that an application for renewal of registration is submitted at least six months before the expiry date **(1)**	**DRSR:** Explicit on the validity period However, the statement that five-year validity shall extend until a decision is made and communicated to the applicant insinuates that validity may take longer than 5 (Poor practice) **MRSR:** Explicit on the validity period Five-year validity is subject to annual submission of information

			(Encourages compliance)
1.8 There are regulations for the definitions, types and the scope of variations along with the required documentation for these variations	**(0.5)**	**(1)**	
	Regulations	**Regulations**	
	R 6. (3) The manufacturer shall, without any undue delay, report in writing to the Director any intention- *(a) to change the process of manufacture, or the method of testing any drug; or* *(b) to alter materially the establishment, where such alteration will or is likely to affect the conditions under which approval for the manufacture of drugs was given* ***(0.5)***	R *10. (1) A marketing authorisation holder shall not make a* ***variation*** *in the particulars of a registered medicine without the prior approval of the Authority, except where the change is a* ***notification****.* ***(0.2)***	**DRSR:** Not explicit Not detailed on the types and scope of variations Definitions and required documentation are non-existent The requirement to report an intention to make changes – suggests that all changes are to be reported before implementation
	Absent	R 10. (2) (a – c) A **variation** application shall be submitted to the Authority in a prescribed form and accompanied by a prescribed **variation fee** and the **supporting documents** as **specified** in the conditions laid down for **each type of variation**. **(0.2)**	**MRSR:** Explicitly states the types of notifications Explicitly states the existence of variations Refers to the type of variations and specified supporting documents Implies the existence of the definitions and scope of variations but the details are absent
	Absent	R 11. (1 - 2) A MAH shall submit to the Authority an application for **notification** of a variation in the particulars of a registered medicine in a prescribed form accompanied by a prescribed **notification fee**.	

		(0.2)	
	Absent	*R 11. (3) An application for **immediate notification** shall be submitted soon after implementing the variation.* ***(0.2)***	
	Absent	*R 11. (4) An application for **annual notification** shall be submitted within 12 months after implementing the variation.* ***(0.2)***	
1.9 There are legal provisions that require the NRA to withhold, suspend, withdraw or cancel an MA if there are concerns regarding quality, safety, or efficacy issues	**(0.6)**	**(1)**	
	Act + Regulations	**Act + Regulations**	
	4. If, in the opinion of the Director, information not previously available indicates that a registered drug may not be safe and effective when used in the manner and for the purposes approved at the time of its registration, he may — *(a) require such revisions in the composition of the drug, its packaging, labelling or advertising as he may consider necessary or desirable to ensure safety and efficacy;* *(b) **suspend** the registration for a specified period or pending*	4. (d) + 24 (7) + R 15 (1) The Authority shall after due assessment suspend, cancel, or revoke MA for medicines whether locally manufactured or imported and whether intended for local use or export, and recall the medical product. ***(0.2)***	**DRSA + DRSR:** The conditions on when to withhold, suspend, withdraw or cancel a registration or MA are not stated in details Concerns regarding quality, safety, or efficacy issues are dependent on the opinion of the director (exposure to undue influence) The applicable fines, charges, penalties, and sanctions in the event of non-compliance are explicitly stated

	compliance with any revisions required under paragraph (a); or (c) ***revoke*** *the registration* ***(0.2)***		**MRSA + MRSR:** The requirements to withhold, suspend, withdraw or cancel a registration or MA are explicitly specified. There are details on applicable actions to be taken and how to be enforced Explicitly states applicable medical products The applicable fines, charges, penalties, and sanctions in the event of non-compliance are explicitly stated
	R 9. Whenever the Director finds that any portion of any batch of drugs does not conform to the standards of identity, strength, quality and purity, or any other requirement specified in the documentation for registration, he may instruct the licensee to discontinue the sale of the remainder of the batch and, so far as is practicable, to recall any portion of the batch already sold ***(0.2)***	*R 1.5 (1) Where the Authority suspends or revokes marketing authorisation for reasons including -* *(a) failure to report adverse reactions to the Authority;* *(b) failure to meet safety, quality, efficacy requirements; or* *(c) implementing variations without approval of the Authority,* *the Authority shall communicate to the marketing authorisation holder in writing, the decision to suspend or revoke the market authorisation* ***(0.2)***	
	Absent	*R15. (2) In the case of a suspension or revocation, the Authority shall, within seven days of taking the decision, communicate to the marketing authorisation holder, conditions of the suspension, the duration and the action the marketing authorisation holder has to take.* ***(0.2)***	
	Absent	*R 15. (3)In the case of a revocation, the marketing authorisation holder shall be required to recall his or her medicines from the market in line with the guidelines.*	

		(0.2)	
	15. (1) In the event of non-compliance *a fine of P10 000 and imprisonment for 2 years* shall be applicable **(0.2)**	24. (6) In the event of non-compliance *a fine not exceeding P100 000 and to imprisonment not exceeding 10 years, or to both* ***(0.2)***	
1.10 There are legal provisions to cover circumstances under which the routine MA procedures may not be followed (e.g., for public health interest).	**(0.9)**	**(0.6)**	
	Act + Regulations	**Act + Regulations**	
	R 3. (1) (b) any drug declared to be banned or registered drug by notice in the Gazette **(0.09)**	23. (3) (b) any medicine declared to be banned or registered by order published in the Gazette **(0.09)**	
	R 4. (1) (a) any drug manufactured by the Central Medical Stores for specific therapeutic use **(0.09)**	Absent	DRSA empowers CMS to manufacture drugs however prior approval is required
	R 4. (1) (a) Wholesale based importation **(0.09)**	R 8. (1) Wholesale based importation **(0.09)**	
	R 4. (1) (b) Donated drugs **(0.09)**	R 9. Donated medicines **(0.09)**	**DRSA:** Donation of drugs authorized only through CMS, Government, or mission hospital (limiting) **MRSA:** Any authorized person is empowered to donate medicines (comprehensive)
	R 4. (1) (c) any drug imported for use in CT or medical research or tests **(0.09)**	-	**MRSA:** Legal provision for CT, medical research, or tests absent

	R4. (1) (c) Personal use importation (not for sale) **(0.09)**	23. 4 (a) Personal use importation (not for sale) **(0.09)**	
	R4. (1) (c) Medicines imported by healthcare practitioner for patient therapeutic use (for sale) **(0.09)**	23. 4 (b) Medicines imported by healthcare practitioner for patient therapeutic use (for sale) **(0.09)**	
	-	*23. (4) (c) medicine intended for re-export in the form and packaging that it was imported* **(0.09)**	**DRSA**: Legal provisions for re-exportation absent
	R4. (1) (d) Extemporaneous preparations made by health care professionals **(0.09)**	23. 4 (d) Extemporaneous preparations made by health care professionals **(0.09)**	
	R 4. (1) (e) any non-scheduled herb used for traditional medicine and exempted by the Director; ***(0.09)***	Absent	
	R 4. (1) (f) any preparation not containing active ingredients in excess of one millionth part of the preparation's own weight. ***(0.09)***	Absent	
1.11 There are legal provisions or regulations that define regulatory requirements to approve the donation of medical products.	**(1)**	**(1)**	
	Regulations	**Regulations**	
	R(1)(b) + (2) The prior approval by the Director shall be sought for exemption from registration donated drugs **(1)**	R 9. A person may apply to the Authority for exemption from registration of donated medicines in a prescribed form and he or she shall meet the requirements of the guidelines on donation **(1)**	**MRSA:** Specifies the condition to meet the requirements for use of donated products
1.12 Legal provisions or regulations allow the NRA to recognize and/or rely on MA-relevant decisions,	**(0)**	**(1)**	

reports or information from other NRAs or regional and international bodies.			
		Act + Regulations	
	Absent	4. (o) The function of the Authority shall be to do those things, or enter into those transactions that are expedient or necessary for the proper and efficient discharge of the functions of the Authority **(0.5)**	**DRSA:** Absent; however, the Registration guideline for Additional Requirements for products registered in the SRA states that *the Drugs Advisory Board recognises the competence of SRAs* **MRSA + MRSR:** Implies that the NRA is allowed beneficial relations as necessary with other bodies to fulfil its mandate
	Absent	R 68. The Authority shall collaborate with other institutions and authorities in any harmonisation and collaborative activities in order to benchmark and facilitate developments of requirements and guidelines for efficient operations and prudent use of resources **(0.5)**	

Italics text: Direct quote.

*Sub-indicators adapted based on the requirements of application for the registration or marketing authorization process.

Table 2: Legal provisions for VL

2. Pharmacovigilance (VL)	DRU (1/5) 20%	BOMRA (5/5) 100%	Comments
2.1 Legal provisions for a national vigilance system exist.	**(0)**	**(1)**	
		Act + Regulations	
	Absent	*4. (h) The function of the Authority shall be to ensure the monitoring and reporting of adverse reactions to medicines* **(0.25)**	**DRSA + DRSR:** Absent; however, the PV guideline refers to the National PV Monitoring Centre
	Absent	R 30. (1) The Board shall appoint a committee to deal with adverse medicines or medical products and to review reports of suspected medicine reactions **(0.25)**	**MRSA + MRSR:** Explicitly states the function of the Authority in PV
	Absent	*R 29. (9) The Authority may investigate and decide on an appropriate action to be taken by either the Authority or the marketing authorisation holder, where any problem regarding the quality, safety or efficacy of the medicines is suspected* ***(0.25)***	Explicitly empowers the NRA to monitor, collate and investigate medical products safety data and to manage the risks appropriately
	Absent	R 29. (1), (6); R 30. (4); 32. (1); Any person authorized to prescribe, dispense, import, export, manufacture, or distribute medical products is mandated to report adverse reactions or any medical product-related safety issues to the Authority and the MAH **(0.25)**	Explicit on the obligations of stakeholders

2.2 Legal provisions and regulations require the manufacturers and/or MAHs to set up a vigilance system of their medical products and periodically report vigilance data to the NRA	**(0)**	**(1)**	
		Act + Regulations	
	Absent	*32. (1) A person whose medicine has been registered or exempted from registration shall report to the Authority, in the prescribed manner, any adverse reactions to the medicine* ***(0.25)***	**DRSA + DRSR:** Absent **MRSA + MRSR:** Establishment of a vigilance system implied Explicit on the reporting of safety data Not specific on safety issues outside of Botswana or actions taken by foreign NRA PV inspection by NRA absent
	Absent	*R 30. (2) A marketing authorisation holder of medicines, medical products shall report to the Authority any adverse reactions in line with the guidelines* ***(0.25)***	
	Absent	R 29. (7) A marketing authorisation holder or importer shall carry out the investigation to identify the root cause of the safety problem and develop a risk management plan to prevent recurrence **(0.25)**	
	Absent	*R 29. (11) The marketing authorisation holder or importer shall in accordance with the guidelines, provide a post market surveillance plan for hjs or her medicine and report to the Authority, any findings from an accredited quality control laboratory* ***(0.25)***	

2.3 Legal provisions and regulations allow NRA to require manufacturers and/or MAHs to conduct specific studies on safety and effectiveness under specific conditions	**(0)**	**(1)**	
	Absent	R 29. (9) The Authority may investigate and decide on the appropriate action to be taken where any important medical product-related safety issue is suspected **(1)**	**DRSA + DRSR:** Absent **MRSR:** Explicit on carrying out an investigation Implicit, appropriate action may include specific safety and effective studies under specific conditions
2.4 Legal provisions, regulations and guidelines require manufacturers and/or MAHs to designate an individual person to be in charge of vigilance system	**(1)**	**(1)**	
	Act + Regulations	**Act + Regulations**	
	3. (4) + R 3. (1) Application for the registration of a drug shall be made to the Director in a prescribed form and accompanied by such further information as maybe prescribed **(1)**	24.(1) + R 3. (1) An application for the registration of a medicine shall be submitted to the Authority in the prescribed form and shall be accompanied by the CTD Form and any further information that the Authority may consider necessary to process the application **(1)**	**DRSA + DRSR:** Implicit, QPPV referenced in the application form for registration **MRSA + MRSR:** Implicit, QPPV referenced in the application CTD form for registration
2.5 Legal provisions and regulations allow recognition and/or reliance on vigilance-related decisions, reports or information from other countries or regional or international bodies.	**(0)**	**(1)**	

		Act + Regulations	
		4. (o) The function of the Authority shall be to do those things, or enter into those transactions that are expedient or necessary for the proper and efficient discharge of the functions of the Authority **(0.5)**	**DRSA + DRSR:** Absent
		R 68. The Authority shall collaborate with other institutions and authorities in any harmonisation and collaborative activities in order to benchmark and facilitate developments of requirements and guidelines for efficient operations and prudent use of resources **(0.5)**	**MRSA + MRSR:** Implies that the NRA is allowed beneficial relations as necessary with other bodies to fulfil its mandate

Italics text: Direct quote.

Table 3: Legal provisions for Market surveillance and control

3. Market surveillance and control (MC)	DRU (0.5/4) 12.5%	BOMRA (4/4) 100%	Comments
3.1 Legal provisions and regulations are in place with respect to import activities including permanent regulatory intervention at designated entry and exit ports where medical products are being moved.	**(0.5)**	**(1)**	
	Act + Regulations	**Act + Regulations**	
	Absent	4. (e), (p) The functions of the NRA shall be to control and monitor import activities of all medicinal products **(0.1)**	**DRSA:** Absent **MRSA:** Explicitly states the mandate of the NRA to control and monitor import activities
	Absent	R 28. A person shall apply to the Authority for approval to import samples for registration in a prescribed Form **(0.1)**	**MRSR:** Explicitly mandates authorization of importation of samples for registration
	3. (1) No drug shall be imported into or exported out of Botswana unless registered **(0.1)**	23. (1) No medical product shall be imported into or exported out of Botswana unless registered **(0.1)**	**DRSA + MRSA:** Explicit requires that only duly authorized or registered medical products be imported and exported
	7. (1) The importation or exportation of drugs shall be made by the Central Medical Stores or a duly licensed person by the Director **(0.05)**	28. (1) The importation, exportation, distribution, and sale of medical products shall be made by authorized persons and duly licensed premises **(0.1)**	**DRSA:** CMS empowered to import or export drugs (limiting to the government entity - risk of stock shortages, human resources) Only duly licensed premises are legalized to distribute and sell drugs (limits licensed premises to the distribution and sale of medical products)
	7. (4) The distribution and sale of drugs may only be made by authorized persons and duly licensed establishments by the Director **(0.05)**		

			Explicit on import, export, distribute and sale of drugs by authorized persons only **MRSA**: Explicit on the import, export, distribution, and sale of medical products by authorized persons and duly licensed premises (comprehensive/inclusive)
	7. (2) An application for the importation, exportation of drugs shall be submitted in the prescribed form and accompanied by such information as may be required satisfactory by the Director that the applicant has satisfactory premises and that the business will be operated in accordance with good professional standards. **(0.1)**	28. (2) An application for the importation, exportation of a medicinal product shall be submitted in the prescribed form and accompanied by such a prescribed fee and information as may be prescribed necessary to process the application **(0.1)**	
	Absent	28. (3) An applicant to import/export medicinal product into or out of Botswana shall be a resident in Botswana **(0.1)**	**MRSA:** Implies that manufactures/MAH require a Local Representative
	7. (3) The business of exporting or importing drugs shall be under the control of a technical manager with such qualifications as the Director may approve **(0.1)**	28. (4) The import, export, distribution, or sale of medicines shall be under the continuous supervisory control of a pharmacist **(0.1)**	**DRSA + MRSA**: Explicitly mandates the continuous supervision at licensed premises for import activities by authorized person to ensure compliance **DRSA:** No transparency on the qualifications of the authorized person - approved by the Director **MRSA**: Qualifications of a pharmacist set up by the law
	Absent	28. (5) A person authorised to import, export, distribute, or sell medicines shall not	**MRSA:** Explicitly requires that

		import, export, distribute, sell, or keep in storage contrary to such conditions as may be prescribed, any medicine after the date of expiry indicated on the package of the medicine **(0.1)**	good storage and distribution practices be followed
	R. 7. (3) (a) – **(d)** The export, import and distribution of all drugs other than Schedule 4 drugs shall be in designated pharmacies or healthcare facilities **(0.1)**	36. + R 34. (1) The Minister, in consultation with the Authority, may designate ports through which medical products may be imported or exported **(0.1)**	**DRSR:** Designated PoE absent, Confusing as it implies that designated premises are PoE **MRSA + MRSR:** Explicit on the importation/exportation of all medical products through the designated PoE; however, no evidence of permanent regulatory intervention at the PoE
	Absent	*R 34. (2) The Authority shall review the list of designated ports from time to time.* **(0.1)**	**MRSR:** Forward thinking of the changing environment
3.2 Legal provisions and regulations authorize market surveillance and control activities which include product sampling from different points of the supply chain.	**(0.6)**	**(1)**	
	Act + Regulations	**Act + Regulations**	
	Absent	4. (c) (i) The function of the Authority shall be to perform sampling and establish a laboratory or other facilities for the testing and analysis of medicines, for the determination of their compliance with the approved standards of quality approved by the Minister on the	**MRSA:** Explicitly states the function of the Authority on sampling, testing and analysis to ensure the quality, safety, efficacy of the medical products

		recommendations of the Board **(0.3)**	
	*12. (1) All premises where drugs are stored, handled, dispensed, manufactured, or sold shall be subject to periodical inspection by persons authorized by the Director in writing for the purpose, and such persons shall be given unhindered access to such premises with the right to take samples, without payment, of any drugs on the premises, and to carry out any investigations that he considers necessary or desirable **(0.3)***	R 29. (2) The Authority shall from time-to-time conduct risk-based inspections of pharmaceutical operations and take the samples of medicines on the market for testing and investigation to establish the quality, safety, and efficacy **(0.3)**	**DRSA:** Periodic inspections, sampling, and testing limited to premises only Explicit on carrying out an investigation **MRSR:** Explicit on sampling and testing of products across the supply chain including on the market. Explicit on carrying out an investigation **MRSA + DRSR:** Market control of internet sales of medical products not stated.
	R 7. (1) Importers, exporters, and distributors including wholesalers and retailers shall keep and maintain records containing all details of the importation, wholesale, and distribution of drugs by them, which shall be retained and kept available for inspection by a police officer, or by any authorized person by the Director for a period of at least five years from the date of each relevant entry **(0.3)**	R 25. (1), (2), (3) A person dealing with the manufacture, import, export, storage, distribution, promotion, advertising and dispensing of medicines shall, according to the scope of operation, keep record as outlined in the guidelines, which may be subject to inspection at any reasonable times by authorized persons **(0.3)**	
3.3 Legal provisions and regulations address the role of NRA in dealing with substandard or falsified (SF) medical products.	**(0)**	**(1)**	
		Act + Regulations	
	Absent	*35. (1) No person shall import, export, manufacture, distribute, sell, promote,*	**DRSA + DRSR:** Absent

		advertise, store or dispense, any counterfeit product ***(0.25)***	
	Absent	35. (2) In case of non-compliance a fine not exceeding P 100 000, or imprisonment for a term not exceeding 10 years, or both is applicable **(0.25)**	**MRSA + MRSR:** Explicit on addressing SF medical products and applicable fines and sanctions, (however, the terminology is retrogressive)
	Absent	R 31. (1); R (2) (a-d) An importer, exporter, MAH, manufacturer, distributor, dispenser, and promoter of medical products shall have in place and regularly review risk management plans to prevent the circulation of counterfeit medicines in the market and measures to address such once detected. **(0.25)**	
	Absent	R 31. (3) The Authority shall publish the information on circulating counterfeit medicines and medical products as and when the need arises. **(0.25)**	
3.4 Legal provisions and regulations exist for the control of promotion, marketing and advertising of medical products to avoid communication of false or misleading information	**(0.5)**	**(1)**	
	Act	**Act + Regulations**	
	Absent	*4. (i) The function of the Authority shall be to ensure that the advertising of*	**MRSA:** Explicitly states the function of the Authority in advertising of

		medicines is in accordance with this Act **(0.17)**	medicines but not on the promotion of medicines
	Absent	R 53. (1) (2) (3) The Authority shall assess the submissions of the advertising and promotional materials of registered medical products in accordance with the set guidelines for compliance and issue a written approval to the MAH **(0.17)**	**MRSA:** Explicitly states the requirement for approval for advertising and promotion of medicines
	11. (1) The advertising of any drug shall not, by word or by illustration, give any false, misleading or deceptive information concerning the properties of the drug, or which is likely to encourage wrong or excessive use of the drug **(0.17)**	*46. (1) The advertising or promotion of any medicine shall not, by word, illustration or by any other way give any false, misleading, or deceptive information concerning the properties of the medicine, or information which is likely to encourage wrong or excessive use of the medicine.* **(0.17)**	**DRSA:** Explicit on the advertising of drugs; promotion of drugs is absent
	11. (2) The advertising of drugs which may be sold on prescription only shall be disseminated solely through professional journals and magazines or only to authorized healthcare professionals. **(0.17)**	46. (2); R 53. (2); R 53. (5) The advertising or promotion of medicines which may be dispensed on prescription only shall be disseminated solely through the professional journals, magazines, and publications to the professionals or only to authorized healthcare professionals and not directly to the public. **(0.17)**	

	11. (3) The advertising of drugs which may be dispensed without prescription may be addressed to the public but shall not include promises of unfailing results or expressions or illustrations of a nature likely to offend or intimidate members of the public or make reference to symptoms in a manner likely to induce members of the public to make wrong diagnoses. **(0.17)**	46. (3) The advertising or promotion of medicine which may be dispensed without prescription may be addressed to the public but shall not include promises of unfailing results or expressions or illustrations of a nature likely to offend or intimidate members of the public, or make reference to symptoms in a manner likely to induce members of the public to make wrong diagnosis **(0.17)**	
	Absent	R 53. (7) + R 53. (8) Any advertising shall not mislead, compare medicines from other manufacturers, include illustrations or pictures which may offend or contain promises that have not been scientifically proven. **(0.17)**	

Italics text: Direct quote.

Table 4: Legal provisions for Licensing of establishments

4. Licensing of establishments (LI)	**DRU (3.06/4) 76.5%**	**BOMRA (4/4) 100%**	**Comments**
4.1 There are legal provisions for licensing of facilities throughout the supply chain and based on Good Practices (GXPs) compliance	**(0.56)**	**(1)**	
	Act	**Act + Regulations**	
	Absent	**4.** (*r*) The function of the Authority shall be to license privately owned medicine quality control laboratories **(0.14)**	**MRSA:** Explicitly states the function of the Authority in LI
	6. (1) The manufacture of drugs may only be undertaken in an establishment licensed therefor under the Industrial Development Act, 1988, and with the written approval of the Director ***(0.14)***	*27. (1) The manufacture of medicine may only be undertaken in an establishment licensed by the Authority* **(0.14)**	**DRSA:** Explicit on the license to manufacture drugs ML issued under the *Industrial Development Act, 1988* and approved for manufacturing of drugs by the Director **MRSA:** Explicit on requiring license to manufacture medicines issued by the Authority
	6. (2) A person wishing to manufacture drugs shall make application to the Director in such form as may be prescribed and supply such further information as the Director may require to satisfy himself that the premises to be used are satisfactory for the purpose and will be operated in accordance with standards of good practice in the manufacture and quality control of drugs. ***(0.14)***	*27. (2) A person who wishes to manufacture medicines shall apply in the prescribed form and pay the prescribed fee to the Authority and supply any further information which the Authority may require to satisfy itself that the premises to be used are suitable for the purpose and will be operated in accordance with standards of good practice in the*	**DRSA:** Explicit in requiring that premises/ facilities and persons hold licenses to operate the said premises/facilities in accordance and in compliance with the standards of good practices

		manufacture and quality control of medicines ***(0.14)***	Information required to issue a license is to the satisfactory of the Director (exposure to undue influence) License for retail pharmacy is issued under the *Trade and Liquor Act* and approved for the retailing of drugs, other than Schedule 4 drugs by the Director **MRSA + MRSR:** Explicit in requiring that premises/ facilities and persons hold licenses to operate the said premises/facilities in accordance and in compliance with the standards of good practices that has been issued by the Authority
	7. (1,2) Drugs shall not be exported or imported, except by the Central Medical Stores or by a person who has made an application for approval, in the prescribed form, accompanied by such information as the Director may require to satisfy himself that the applicant has satisfactory premises and that the business will be operated in accordance with good professional standards, and has been duly licensed in accordance with any written law requiring such licence, and with the written approval of the Director for such export or import. **(0.07)**	28. (1,2) No person shall import, export, distribute or sell medicines unless the person has made an application in the prescribed form, accompanied by the prescribed fee and such information as the Authority may require for approval and has been issued with a licence in accordance to import, export, distribute, or sell medicines in terms of this Act **(0.14)**	
	7.(4) The distribution of drugs may only be made by establishments or persons approved by the Director for the sale or distribution of such drugs **(0.07)**		

	10. (1) The retailing of drugs, other than Schedule 4 drugs, shall, except as may be otherwise provided in this Act, be through a pharmacy duly licensed as such under the Trade and Liquor Act, and approved for the purpose by the Director, and shall be under the control of a pharmacist **(0.14)**	26. (1) (a), (*c*); 26. (2) No person shall practise as a pharmacist or operate a pharmacy or a dispensary on any premises unless the person is a resident in Botswana and has applied for and been issued with a licence in respect of the said premises for operating the pharmacy by the Authority or authorised in writing by the Director of Health Services in the case of a dispensary **(0.14)**	License to operate a pharmacy issued to a pharmacist who is a resident in Botswana License to operate dispensary approved by the Director of Health Services
	Absent	*R 16. (6) The Authority shall keep a database of all Licensed manufacturing facilities, pharmacies, and pharmaceutical wholesalers* ***(0.14)***	**MRSA:** Database of licensed facilities premises (promotes transparency)
4.2 There are legal provisions to empower the NRA to issue, suspend or revoke licenses for establishments.	**(1)**	**(1)**	
	Act + Regulations	**Act + Regulations**	
	R 5. (1) + R 5. (3) An application to manufacture, import, export, distribute or sell drugs shall be submitted to the Director for approval in a prescribed form and where granted, the approval shall be valid for a period of five years for the renewal of approval. **(0.25)**	R 16 (1 – 2); R 17 (1 – 2); R 18 (1 – 2); R 20 (1 - 3); R 21 (1 - 3) The Authority may grant License for pharmaceutical operations, or manufacture of medicine, or to operate a pharmacy/ pharmaceutical wholesaler or dispensary subject to the consideration of the submission of all required documents according to the guidelines **(0.25)**	**DRSR:** NRA mandated to issue licences Explicit on validity period of issued licenses **MRSR:** NRA mandated to issue licences

	Absent	R 23. (1), (2) Where the License holder does not meet the required standards and guidelines, the Authority may **suspend** or **withdraw** the License and shall notify the License holder of the decision and may indicate the actions to be taken by the License holder and give the License holder seven days to respond **(0.25)**	**MRSR:** NRA is authorized to communicate the decision to suspend or withdraw the license and specify the response timeline to the license holder
	10. (2) If the Director is of the opinion that a pharmacy is being operated in an unsatisfactory manner, or not in accordance with good professional standards, he may, in writing to the pharmacy, **withdraw** his approval, either **absolutely** or **pending** compliance with such directions as he considers necessary or desirable **(0.25)**	26. (5) Where the Authority is of the view that a pharmacy or dispensary is not being operated in accordance with good professional standards, the Authority may, in writing, **suspend** the issued licence pending compliance with any directions the Authority considers necessary, or **cancel** the licence where the non-compliance continues **(0.25)**	**DRSA:** Explicit on suspension or withdrawal of licenses in case of identified non-compliance Implicit that the manufacturing of drugs shall cease upon written notice of withdrawal of approval **MRSA:** Explicit on suspension or withdrawal of licenses in case of non-compliance Explicit that manufacturing of medicines shall cease upon written notice to cancel the issued licence
	*6. (4) Where the Director is satisfied that the conditions of any licence, or of any approval by him, are not being observed, or that the manufacture is not being carried out in accordance with the provisions of this Act and in a satisfactory manner, he may **withdraw** his approval and give notice thereof to the manufacturer, whereupon any further such manufacture shall, unless or until the Director resumes his approval, constitute an offence under this Act*	27. (4), (5) Where the Authority is satisfied that the conditions of any licence are not being observed, or that the manufacture of any medicine is not being carried out in accordance with the provisions of this Act or standards of good practice in the manufacture and quality control of medicines, the Authority may, after notice in writing to the licence holder, cancel the issued licence, at	

	(0.25)	which point the licence holder shall cease all manufacturing **(0.25)**	
	7. (5) Where the Director is satisfied that drugs are being exported, imported or distributed otherwise than in accordance with the conditions of any licence or any other authority required under any other written law, or any approval given by the Director, or the provisions of this Act, or that the business is not being operated in accordance with good professional standards, he may by written notice to the exporter, importer or distributor concerned ***withdraw*** *his approval for the continued operation of the business, either absolutely or pending compliance with such directions as he considers necessary or desirable* ***(0.25)***		
4.3 There are legal provisions that require that the NRA to be informed, for the purpose of notification or approval, in case post-licensure changes or variations are made.	**(1)**	**(1)**	
	Regulations	**Regulations**	
	R 6. (3) (b) The manufacturer shall, without any undue delay, report in writing to the Director any intention to alter materially the establishment, where such alteration will or is likely to affect the conditions under which approval for the manufacture of drugs was given	*R 22. (1) A License holder shall apply to the Authority for variation of his or her License* ***(1)***	**DRSR:** Manufacturers are mandated to report changes to the to the conditions under which the initial license was issued **MRSR**

	(1)		License holders are mandated to apply for approval to changes to the license
4.4 There are legal provisions that require manufacturers to inform the NRA about the appointed qualified and authorized person for the purpose of acknowledgment or approval.	**(0.5)**	**(1)**	
	Act	**Act + Regulations**	
	6. (3) The manufacture of drugs shall be under the control of a registered pharmacist ***(0.25)***	*27. (3) The manufacture of medical products shall be under the continuous supervisory control of a registered pharmacist who possesses such practical experience as the Authority may prescribe* ***(0.25)***	**DRSA:** Explicit on the designation of a qualified and authorized person for licensed premises; Registered pharmacist for manufacturing of drugs and a technical manager for drug importation or exportation The Director approves the qualification of the technical manager **MRSA + MRSR:** Explicit on the designation of a qualified and authorized person for licensed premises; Registered pharmacist for manufacturing of medical products and a pharmacy
	7. (3) The business of exporting or importing drugs shall be under the control of a technical manager with such qualifications as the Director may approve ***(0.25)***	*R 16. (4) The licensed premises shall be under the supervision of a qualified person in line with the guideline* ***(0.25)***	
	Absent	*26. (1) (b) The premises in the case of a pharmacy, are under the continuous supervision of a pharmacist* ***(0.25)***	

			The authority sets the required experience
	Absent	*R. 16. (5) Any change in the person who supervises the premises shall be communicated to the Authority within 30 days* ***(0.25)***	**MRSR:** Explicit on informing the NRA in case of change in the appointed authorized person and the timeline of such notification

Italics text: Direct quote.

Table 5: Legal provisions for Regulatory inspections

5. Regulatory inspections (RI)	**DRU (1.84/4) 46%**	**BOMRA (4/4) 100%**	**Comments**
	Act + Regulations	**Act + Regulations**	
5.1 Legal provisions authorize the inspectorate to inspect and enforce Good Practices (GXPs) throughout the supply chain	**(0.34)**	**(1)**	
	Absent	**4.** (*f*), (*r*) The functions of the Authority shall be to inspect or cause to be inspected, all domestic manufacturing premises, exporters, importers, wholesalers, distributors, clinics and hospital pharmacies, retail pharmacies, dispensaries, and other outlets where medicines are dispensed or stored, and privately owned medicine quality control laboratories **(0.17)**	**DRSA:** Explicitly requires the inspection of premises by the NRA Periodical inspection; implies regular intervals/scheduled Inspection of transport, bonded warehouse and privately owned medicine QC lab absent (not comprehensive)
	Absent	R 54. (1) The Authority shall ensure all premises are inspected to assess compliance to set guidelines **(0.17)**	**MRSA + MRSR:** Explicitly states the function of the Authority in RI
	12. (1) All premises where drugs are stored, handled, dispensed, manufactured, or sold shall be subject to periodical inspection by persons authorized by the Director in writing for the purpose **(0.17)**	47 (1) All premises where medical products are stored, used, handled, dispensed, manufactured, or sold, shall be subject to inspection to assess compliance to set guidelines with or without prior arrangement with the person in control of the premises by inspector authorized by the Authority in writing **(0.17)**	Explicitly requires that the NRA inspects the premises throughout the supply chain Inspection with or without prior arrangement; implies that the inspections may be announced or unannounced – risk based

	Absent	47. (1) Any vehicle, transhipment, or receptacle in which medical products are transported, shall be subject to inspection with or without prior arrangement with the person in control of the vehicle, transhipment, or receptacle by an inspector authorised by the Authority in writing **(0.17)**	
		R 32. (2) The importer of medicines shall keep records for the medicines or medical products at the bonded warehouse which records shall be open for inspection by the Authority and other relevant authorities ***(0.17)***	
	R 6. (1); R 7. (1); R 17. (5) Manufacturers, sellers, importers, exporters, distributors, wholesalers, and retailers of drugs shall keep and maintain readily comprehensive records containing all details of the manufacturing, sale, distribution, importation, wholesale of drugs and hold readily available for inspection **(0.17)**	R 25. (1); R 25. (2) A person dealing with the manufacture, import, export, storage, distribution, promotion, advertising and dispensing of medicines shall, according to the scope of operation, keep a record as outlined in the guidelines and avail such records for inspection **(0.17)**	**DRSR**: Implicit on the inspection of the records for the promotion, advertising and dispensing of drugs
5.2 Legal provisions allow inspectors to enter facilities throughout the supply chain at any reasonable time and in any place	**(0.5)**	**(1)**	
	Act	**Act + Regulations**	
	12. (1) Inspectors shall be given unhindered access to all premises **(0.5)**	47. (1) Inspectors shall be given unhindered access to all premises	**DRSA**:

		(0.5)	Explicit on all access for oversight of activities at all premises, Not explicit on reasonable time **DRSA**: Explicit on all access at any reasonable time for oversight of activities at all premises
		R 54. (3); R 25. (3) The inspection of premises and records shall be done at reasonable times **(0.5)**	
5.3 Legal provisions allow inspectors to collect relevant evidence, including samples, during GXP inspections	**(1)**	**(1)**	
	Act	**Act + Regulations**	
	12. (1) Inspectors have the right to take samples, without payment, of any drugs on the premises without payment, and to carry out any investigations that he considers necessary **(1)**	47. (1), R 54. (2) Inspectors have the right to take samples, without payment, of any medicines on the premises without payment, and to carry out any investigations that the inspector considers necessary **(1)**	**DRSA + MRSA + MRSR**: Explicit mandate for investigation and sample collection
5.4 Legal provisions and regulations allow the recognition of and/or reliance on foreign NRA inspections and enforcement actions based on well-defined criteria	**(0)**	**(1)**	
		Act + Regulations	
	Absent	4. (o) The Authority shall do those things, or enter into those transactions that are expedient or necessary for the proper and efficient discharge of the functions of the Authority **(0.5)**	**DRSA:** Absent **MRSA:** Implicit
	Absent	R. 68. The Authority shall collaborate with other institutions and authorities in any harmonisation and collaborative activities in order	

		to benchmark and facilitate developments of requirements and guidelines for efficient operations and prudent use of resources **(0.5)**	

Italics text: Direct quote.

Table 6: Legal provisions for Laboratory access and testing

6. Laboratory access and testing	DRU (0.5/2) 25%	BOMRA (2/2) 100%	Comments
	Act	**Act + Regulations**	
6.1 There are legal provisions to establish a national quality control laboratory (NCL) to perform quality control (QC) testing, and/or to authorize the National Regulatory Authority (NRA) to sub-contract the required testing services	**(0.5)**	**(1)**	
	12. (1) Authorised persons shall take samples to carry out any investigations considered necessary **(0.5)**	*4. (c) (i) The function of the Authority shall be to perform sampling and establish a laboratory or other facilities for the testing and analysis of medicines, for the determination of their compliance with standards of quality approved by the Minister on the recommendations of the Board, and for the issue of certificates with regard thereto* ***(0.5)***	**DRSA:** Establishment of NQCL - Absent Access to laboratory – implied **MRSA:** Explicit on the establishment of laboratory, testing and issue of certificates, however implied that the laboratory is NQCL
	Absent	R 29. All testing shall be done in accredited quality control laboratories **(0.5)**	
6.2 Legal provisions and regulations allow the NRA to recognize and use laboratory testing-related decisions, reports or information from other NRAs or regional and international bodies.	**(0)**	**(1)**	
		Act + Regulations	
	Absent	4. (o) The Authority shall do those things, or enter into those transactions that are expedient or necessary for the proper and efficient discharge of the functions of the Authority **(0.5)**	**DRSA**: Absent **MRSA**: Implicit

	Absent	R 68. The Authority shall collaborate with other institutions and authorities in any harmonisation and collaborative activities in order to benchmark and facilitate developments of requirements and guidelines for efficient operations and prudent use of resources **(0.5)**	

Italics text: Direct quote.

Table 7: Legal provisions for Clinical Trials oversight

7. Clinical Trials (CT) Oversight	DRU (2.5/10) 25%	BOMRA (6/10) 60%	Comments
	Regulations	**Act + Regulations**	
7.1 Legal provisions and regulations for CTs oversight exist	**(0.5)**	**(1)**	
	Absent	***4.*** *(q) The function of the Authority shall be to grant approval of the use of medicine for clinical trials or medical research* ***(0.5)***	**DRSR** Explicit on authorization before conducting CT
	R 18. (2), (5) Any person wishing to conduct a clinical trial of a drug shall submit to the Director an application, and if the Director approves, he shall issue a written authorization permitting the applicant to conduct such trial, with or without such conditions or directions as he may specify ***(0.5)***	R 55. (1-2) + 56. (1-2) No person shall sell, dispense, supply, assemble, or manufacture medicine for use in clinical trials unless the person has applied to the Authority in a prescribed form, accompanied by prescribed fee and sufficient information, and has been issued a written approval or granted an exemption by the Authority ***(0.5)***	**MRSR + MRSR**: Explicitly states the function of the Authority in CT Explicit on authorization before conducting CT
7.2 Legal provisions and regulations that stipulates that notification to the NRA and authorization from the NRA is required for any changes or variations (i.e., amendments) in the original protocol or in any relevant documents of the CT	**(0)**	**(0)**	
	Absent	**Absent**	**DRSA + DRSR:** Absent **MRSA + MRSR** Absent
7.3 Legal provisions and regulations requiring research centers, researchers, sponsors, clinical research organizations (CROs) and all relevant institutions in the CT to comply with GCP	**(1)**	**(1)**	

	Regulations R 18. (3) The Director shall monitor the clinical trial from the beginning to the end to ensure compliance with all specific and general conditions or directions subject to which the trial was authorized and that the aims and objectives will be achieved **(1)**	**Regulations** *R 55. (4) The clinical trials shall be conducted according to the set standards and guidelines* ***(1)***	**DRSR + MRSR:** Explicit in stakeholders GCP compliance
7.4 Legal provisions, regulations and guidelines requiring that investigational medical products (IMPs) comply with good manufacturing practices (GMP) for IMPs	**(0)**	**(0)**	
	Absent	Absent	**DRSA + DRSR:** Absent **MRSA + MRSR** Absent
7.5 There are legal provisions or regulations covering circumstances in which the routine CT evaluation procedures may not be followed (e.g. for public-health interests)	**(0)**	**(0)**	
	Absent	Absent	**DRSA + DRSR:** Absent **MRSA + MRSR:** Absent
7.6 Legal provisions or regulations exist for NRA to inspect, suspend or stop CTs	**(0.5)**	**(1)**	
	Regulations	**Act + Regulations**	
	R 18. (3) The Director shall monitor the clinical trial from the beginning to the end to ensure compliance with all specific and general conditions or directions subject to which the trial was	4. (f) + R 57. The Authority shall inspect all clinical trial sites for readiness and compliance with GCP **(0.25)**	**DRSA:** Explicit on CT inspection at the start till end Not explicit on inspection before CT Not explicit on reasonable times

	authorized and that the aims and objectives will be achieved **(0.25)**		**MRSA + MRSR:** Explicit on inspection before CT Explicit on all access for oversight of activities at reasonable times
	Absent	57. (1) The Authority shall have access to the clinical trial or medical research site at all reasonable times for inspection and auditing of the process and records of a clinical trial or medical research approved under a different Act **(0.25)**	
	Absent	*56. (3) Where the Authority is not satisfied with the information provided, it may request further information or may refuse to grant authorisation, or revoke authorisation for the use of medicine for a clinical trial or medical research* ***(0.25)***	**DRSR:** Explicit in CT suspension or termination (patient safety)
	R18. (4) If at any stage during the clinical trial of any drug the Director is satisfied that, having due regard to the initial risks, discomforts or other adverse effects caused to persons taking part in the trial, it is in the public interest immediately to stop or suspend the trial, he may, in writing, so notify the person conducting the trial, who shall immediately comply with such notice ***(0.25)***	R 58. (1 – 2) The Authority may suspend or terminate an approval to conduct clinical trials where the Authority determines that the use of the medicines under trial is not safe, or the anticipated benefits cannot be realized or if the conduct is not according to the issued approval **(0.25)**	**MRSA +MRSR:** Explicit in request of information, refusal, approval or revocation of use of medicine for CT and circumstances
7.7 There are legal provisions or regulations that require the establishment of an IEC	**(0)**	**(0)**	
	Absent	Absent	**DRSA + DRSR:**

			Absent **MRSA + MRSR** Absent
7.8 Legal provisions, regulations and guidelines that require authorization for the import or destruction of IMPs	**(0.5)**	**(1)**	
	Act	**Act + Regulations**	
	3. (1) + 4 (c) Any drug exempted from registration by the Minister for clinical trial or medical research may be imported under the authority of the Director, or any person authorized by him **(0.5)**	56. (1) A person shall not sell, dispense, supply, assemble, or manufacture medicine for the purpose of a clinical trial or medical research on a medicine unless the person is authorised to do so or has been granted an exemption by the Authority **(0.5)**	**DRSR:** Any exempted drug; implicit of IMPs Destruction of IMPs absent **MRSA + MRSA:** Exemption of medicine for CT or medical research; implicit of IMPs Disposal of unused medicines in CT; implicit of IMPs
	Absent	R 34. (3) + R 59. A person shall dispose of unused medicines in a clinical trial in line with the guideline and shall notify the Authority **(0.5)**	
7.9 There are requirements for monitoring and reporting of adverse events and reactions during conduct of CT	**(0)**	**(1)**	
		Act + Regulations	
	Absent	57. (2); R56 The licence holder shall report any adverse reactions to a medicine in a CT or medical research in a prescribed manner in line with the guidelines and international standards (1)	**DRSA + DRSR:** Absent **MRSA + DRSA:** Explicit on reporting of adverse events in CT
7.10 Legal provisions or regulations allow the NRA to recognize and use relevant CT decisions, reports or	**(0)**	**(1)**	

information from other NRAs or from regional and international bodies.			
		Act + Regulation	
	Absent	4. (o) The functions of the Authority shall be to do those things, or enter those transactions that are expedient or necessary for the proper and efficient discharge of the functions of the Authority **(0.5)**	**DRSA**: Absent **MRSA + MRSR**: Implicit - Not explicit on CT
	Absent	R. 68. The Authority shall collaborate with other institutions and authorities in any harmonisation and collaborative activities to benchmark and facilitate developments of requirements and guidelines for efficient operations and prudent use of resources **(0.5)**	

Italics text: Direct quote.

Appendix 2: Guidelines on the regulatory functions

Table 1: Registration and MA Guidelines

1. Registration and MA	DRU 6/11 (54.5%)	BOMRA 7/11(63.4)
1.1 There are guidelines presenting details on when and how to withhold, suspend, withdraw or cancel registration or MA	Not published	✓
1.2 There are guidelines that provide the requirements for renewing registrations or MAs	✓	✓
1.3 There are guidelines giving clarity on the regulatory requirements for use of medical products that are received through donation	Not published	✓
1.4 There are guidelines that permit the NRA to recognize and/or use relevant MA decisions, reports or information from other NRAs or regional and international bodies	✓	Not published (only for GMP inspections)
1.5 Specific guidelines on the quality, nonclinical and clinical aspects are established	✓	✓ (Quality, Reference made to SADC Bioavailability / Bioequivalence Guideline but not published Reference made to Botswana Bioavailability/Bioequivalence Guideline but not published)
1.6 There are guidelines on the format and content for submission of MA applications that are consistent with the WHO or other internationally accepted standards.	✓	✓
1.7 There are guidelines for MA holders that define the types and scope of variations, the format and content to be used for documenting the variations, and the identification of those variations that require prior approval or notification	✓	✓
1.8 There are guidelines for the definitions, types and the scope of variations along with the required documentation for these variations	✓	✓
1.9 There are established guidelines that cover circumstances under which the routine MA procedures may not be followed (e.g., for public- health interest).	Not published	Not published (information on the BOMRA website)
1.10 There are guidelines that give clarity on the regulatory requirements for granting MA to medical products through a route other than the routine MA procedure	Not published	Not published (Applicants should consult BoMRA to confirm eligibility and for applicable fees/ payment arrangements for EAP products)
1.11 There are guidelines on the content of product information leaflets, SPC-like information, and product packaging and labelling.	Not published	Not published (References made to SADC Product Information guideline + Package Insert Guideline but both not published)

Table 2: Pharmacovigilance Guidelines

2. Pharmacovigilance	DRU 3/4 (75%)	BOMRA 4/4 (100%)
2.1 There are guidelines explaining the obligations of the manufacturers and MAHs for safety data reporting	✓	✓
2.2 There are guidelines that ensure that distributors, importers, exporters, healthcare institutions, consumers and other stakeholders are encouraged to report adverse drug reactions (ADRs) and AEs to the MAH and/or NRA	✓	✓
2.3 There are guidelines require manufacturers and/or MAHs to designate an individual person to be in charge of vigilance system	✓	✓
2.4 There are guidelines for planning, conducting, monitoring, and reporting of vigilance activities.	Not published (PV guideline has no guidance on planning and conducting vigilance activities)	✓

Table 3: Market surveillance and control Guidelines

3. Market surveillance and control	DRU 1/8 (12.5%)	BOMRA 6/7 (85.7%)
3.1 Guidelines relevant to medical products import activities including good storage and good distribution practices	Not published	✓
3.2 Guidelines relevant to surveillance program which includes sampling and testing of samples of medical products	Not published	✓
3.3 Guidelines relevant to market control of internet sales of medical products	Not published	✓
3.4 Guidelines relevant to the role of the NRA in dealing with SF medical products	Not published	✓
3.5 Guidelines relevant to control of promotion, marketing, and advertising of medical products	Not published	✓
3.6 Guidelines exist for importers that specify the format and content of the relevant applications and procedures to receive the necessary authorizations or permissions.	✓	✓
3.7 Guidelines exist on the recall, storage and disposal of SF medical products	Not published (Guidelines on pharmaceutical operations are general, not specific to SF products)	Not published (GDP Guidelines are general, not specific to SF products)

Table 4: Guidelines on Licensing of establishments

4. Licensing of establishments	DRU 3/3 (100%)	BOMRA 3/3 (100%)
4.1 Guidance to applicants defining the circumstances that would warrant an application for a new license or for renewal, expansion, or modification to an existing license	✓ (for pharmaceutical wholesale only)	✓
4.2 There are guidelines on the procedures to apply for a license and on content and format of the license application	✓ (for pharmaceutical wholesale only)	✓ (for manufactures, a Community Pharmacy and Pharmaceutical wholesale)
4.3 Guidelines on post-licensure changes or variations for applicants	✓ (for manufactures and a pharmaceutical wholesale)	✓ (for manufactures, a Community Pharmacy and Pharmaceutical wholesale)

Table 5: Regulatory inspections Guidelines

5 Regulatory inspection	DRU (3/4) 75%	BOMRA (4/4) 100%
5.1 Updated national GXP guidelines are mandatory. (e.g. GMP, GDP, GCP, and Good Cold Chain Management Practices RI01.04:		
5.1.1 Guidelines on GMP	✓	✓
5.1.2 Guidelines on GDP	✓ (Reference made to the WHO GDP)	✓
5.1.3 Guidelines on GCP	✓ (guideline is not intended as a comprehensive guide and should be read in conjunction with relevant international GCP guidelines)	✓ (guideline is not intended as a comprehensive guide and should be read in conjunction with relevant international GCP guidelines)
5.1.4 Good Cold Chain Management Practices	Not published	✓ (Reference made to WHO TRS No. 961, Annex 9)

Table 6: Guidelines on lab testing

6 Laboratory testing	DRU	BOMRA
	N/A – Internal function	**N/A – Internal function**

Table 7: Guidelines on Clinical trials

7 Clinical trials oversight	DRU (8/9) 89%	BOMRA (8/9) 89%
7.1 The guidelines that define the format and content of protocol, the procedure for submission, and the timeframe for review of application	✓	✓
7.2 The guidelines that specify the format and content of submissions related to changes or variations to original protocol, the procedure for submission, and the timeframe for review	✓	✓
7.3 Guidelines used to provide guidance in the application of the legal provisions and regulations for stakeholders involved in CT to comply with GCP principles	✓	✓
7.4 Guidelines describing the content and format of CT applications requesting application of non-routine CT procedures such as fast-track.	Not published	Not published
7.5 Guidelines specifying the scope of the evaluation process (i.e., screening, verification, or other relevant activities).	✓	✓
7.6 Guidelines or similar documents providing guidance on the justifiable quantities of IMPs that should be imported relative to the timelines in the CT protocol	✓	✓
7.7 The guidelines on monitoring and reporting of adverse events and reactions, as well as the guidance on required follow up.	✓	✓
7.8 Guidelines defining the timelines allocated for reporting adverse reactions and events on the part of the investigator or sponsor and timelines for generating and submitting a report on the adverse reaction or event to the NRA.	✓	✓
7.9 There are guidelines on the format and content of CT applications.	✓	✓

Appendix 3: Statistical Analysis

1. Descriptive statistics

Table 1: DRU vs BOMRA Legal Provisions on the WHO recommended regulatory functions

Table. *Statistics*

	N								
	Valid	**Missing**	**Mean**	**Median**	**Mode**	**Std. Deviation**	**Variance**	**Range**	**Sum**
DRU Legal provisions on regulatory functions	7	5	40.0000	25.0000	25.00	26.45594	699.917	64.00	280.00
BOMRA Legal provisions on regulatory functions	7	5	93.8143	100.0000	100.00	14.96133	223.841	40.00	656.70

Table 2: DRU vs BOMRA Guidelines on the WHO recommended regulatory functions

Table. *Descriptive Statistics*

	N					Std.			
	Valid	**Missing**	**Mean**	**Median**	**Mode**	**Deviation**	**Variance**	**Range**	**Sum**
DRU Guidelines on regulatory functions	6	5	68.0000	75.0000	75.00	30.48934	926.600	86.00	408.00
BOMRA Guidelines on regulatory functions	6	5	89.333	94.5000	100.00	14.09137	198.5667	36.00	539.00

Table 3: Likert scale Paired samples (mean, size, standard deviation and standard error mean)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	DRU GEN ADMIN SERVICES RESPONSE TIME	2.4167	12	.81804	.23615
	BOMRA GEN ADMIN SERVICES RESPONSE TIME	3.0833	12	.75378	.21760
Pair 2	DRU REG ASSESSMENT PROCESS	3.42	12	.996	.288
	BOMRA REG ASESSMENT PROCESS	2.92	12	1.564	.452
Pair 3	DRU PV and CT	2.2083	12	1.25605	.36259
	BOMRA PV and CT	1.7292	12	1.42406	.41109
Pair 4	DRU REGISTRATION OF HUMAN MEDICINES	2.5625	12	.84695	.24449
	BOMRA REGISTRATION OF HUMAN MEDICINES	2.7708	12	.94423	.27258
Pair 5	DRU VARIATION FOR HUMAN MEDICINES	2.6667	12	.95346	.27524
	BOMRA VARIATION FOR HUMAN MEDICINES	3.0000	12	.87617	.25293
Pair 6	DRU EXEMPTION FOR REGISTRATION	1.1667	12	1.21231	.34996
	BOMRA EXEMPTION FOR REGISTRATION	1.5417	12	1.30486	.37668
Pair 7	DRU INSPECTION SERVICES Inspection of Distributor/ retailer	1.1944	12	1.26697	.36574
	BOMRA INSPECTION SERVICES Inspection of Distributor/ retailer	1.1944	12	1.47339	.42533
Pair 8	DRU INSPECTION SERVICES Inspections of Manufacturers	1.1667	12	1.76240	.50876

	BOMRA INSPECTION SERVICES Inspections of Manufacturers	.9583	12	1.49937	.43283
Pair 9	DRU IMPOR/TEXPORT	1.7500	12	1.28019	.36956
	BOMRA IMPORT/EXPORT	1.8889	12	1.35835	.39212

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	DRU GEN ADMIN SERVICES RESPONSE TIME - BOMRA GEN ADMIN SERVICES RESPONSE TIME	-.66667	.81650	.23570	-1.18544	-.14789	-2.828	11	.016
Pair 2	DRU REG ASSESSMET PROCESS – BOMRA REG ASSESSMENT PROCESS	.500	1.446	.417	-.419	1.419	1.198	11	.256
Pair 3	DRU PV and CT - BOMRA PV and CT	.47917	.83570	.24125	-.05181	1.01014	1.986	11	.072
Pair 4	DRU REGISTRATION OF HUMAN MEDICINES - BOMRA REGISTRATION OF HUMAN MEDICINES	-.20833	.62915	.18162	-.60808	.19141	-1.147	11	.276
Pair 5	DRU VARIATION FOR HUMAN MEDICINES - BOMRA VARIATION FOR HUMAN MEDICINES	-.33333	.63564	.18349	-.73720	.07053	-1.817	11	.097
Pair 6	DRU EXEMPTION FOR REGISTRATION - BOMRA EXEMPTION FOR REGISTRATION	-.37500	1.15059	.33215	-1.10605	.35605	-1.129	11	.283
Pair 7	DRU INSPECTION SERVICES Inspection of Distributor/ retailer - BOMRA INSPECTION SERVICES Inspection of Distributor/ retailer	.00000	.61955	.17885	-.39364	.39364	.000	11	1.000
Pair 8	DRU INSPECTION SERVICES Inspections of Manufacturers - BOMRA INSPECTION SERVICES Inspections of Manufacturers	.20833	.49810	.14379	-.10815	.52481	1.449	11	.175

Pair 9	DRU IMPORT/EXPORT – BOMRA IMPORT/EXPORT	-.13889	1.14995	.33196	-.86953	.59176	-.418	11	.684

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between DRU GEN ADMIN SERVICES RESPONSE TIME and BOMRA GEN ADMIN SERVICES RESPONSE TIME equals 0.	Related-Samples Wilcoxon Signed Rank Test	.017	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Related-Samples Wilcoxon Signed Rank Test Summary

Total N	12
Test Statistic	59.500
Standard Error	11.124
Standardized Test Statistic	2.382
Asymptotic Sig.(2-sided test)	.017

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between DRU TECH SERVICES TIMELINES and BOMRA TECH SERVICES TIMELINES equals 0.	Related-Samples Wilcoxon Signed Rank Test	.276	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Related-Samples Wilcoxon Signed Rank Test Summary

Total N	12
Test Statistic	3.500
Standard Error	3.674
Standardized Test Statistic	-1.089
Asymptotic Sig.(2-sided test)	.276

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between DRU PV and CT and BOMRA PV and CT equals 0.	Related-Samples Wilcoxon Signed Rank Test	.057	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Related-Samples Wilcoxon Signed Rank Test Summary

Total N	12
Test Statistic	9.000
Standard Error	9.734
Standardized Test Statistic	-1.901
Asymptotic Sig.(2-sided test)	.057

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between DRU REGISTRATION OF HUMAN MEDICINES and BOMRA REGISTRATION OF HUMAN MEDICINES equals 0.	Related-Samples Wilcoxon Signed Rank Test	.309	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Related-Samples Wilcoxon Signed Rank Test Summary

Total N	12
Test Statistic	31.000
Standard Error	8.359
Standardized Test Statistic	1.017
Asymptotic Sig.(2-sided test)	.309

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between DRU VARIATION FOR HUMAN MEDICINES and BOMRA VARIATION FOR HUMAN MEDICINES equals 0.	Related-Samples Wilcoxon Signed Rank Test	.072	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Related-Samples Wilcoxon Signed Rank Test Summary

Total N	12
Test Statistic	19.000
Standard Error	4.717
Standardized Test Statistic	1.802
Asymptotic Sig.(2-sided test)	.072

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between DRU EXEMPTION FOR REGISTRATION and BOMRA EXEMPTION FOR REGISTRATION equals 0.	Related-Samples Wilcoxon Signed Rank Test	.340	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Related-Samples Wilcoxon Signed Rank Test Summary

Total N	12
Test Statistic	15.000
Standard Error	4.717
Standardized Test Statistic	.954
Asymptotic Sig.(2-sided test)	.340

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between DRU INSPECTION SERVICES Inspection of Distributor/ retailer and BOMRA INSPECTION SERVICES Inspection of Distributor/ retailer equals 0.	Related-Samples Wilcoxon Signed Rank Test	1.000	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Related-Samples Wilcoxon Signed Rank Test Summary

Total N	12
Test Statistic	5.000
Standard Error	2.716
Standardized Test Statistic	.000
Asymptotic Sig.(2-sided test)	1.000

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between DRU INSPECTION SERVICES Inspections of Manufacturers and BOMRA INSPECTION SERVICES Inspections of Manufacturers equals 0.	Related-Samples Wilcoxon Signed Rank Test	.180	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Related-Samples Wilcoxon Signed Rank Test Summary

Total N	12
Test Statistic	.000
Standard Error	1.118
Standardized Test Statistic	-1.342
Asymptotic Sig.(2-sided test)	.180

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between DRU IMPORT/EXPORT and BOMRA IMPORT/EXPORT equals 0.	Related-Samples Wilcoxon Signed Rank Test	.599	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Related-Samples Wilcoxon Signed Rank Test Summary

Total N	12
Test Statistic	13.000
Standard Error	4.757
Standardized Test Statistic	.526
Asymptotic Sig.(2-sided test)	.599

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between DRU Guidelines and BOMRA Guidelines equals 0.	Related-Samples Wilcoxon Signed Rank Test	.066	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Related-Samples Wilcoxon Signed Rank Test Summary

Total N	6
Test Statistic	10.000
Standard Error	2.716
Standardized Test Statistic	1.841
Asymptotic Sig.(2-sided test)	.066

Hypothesis Test Summary

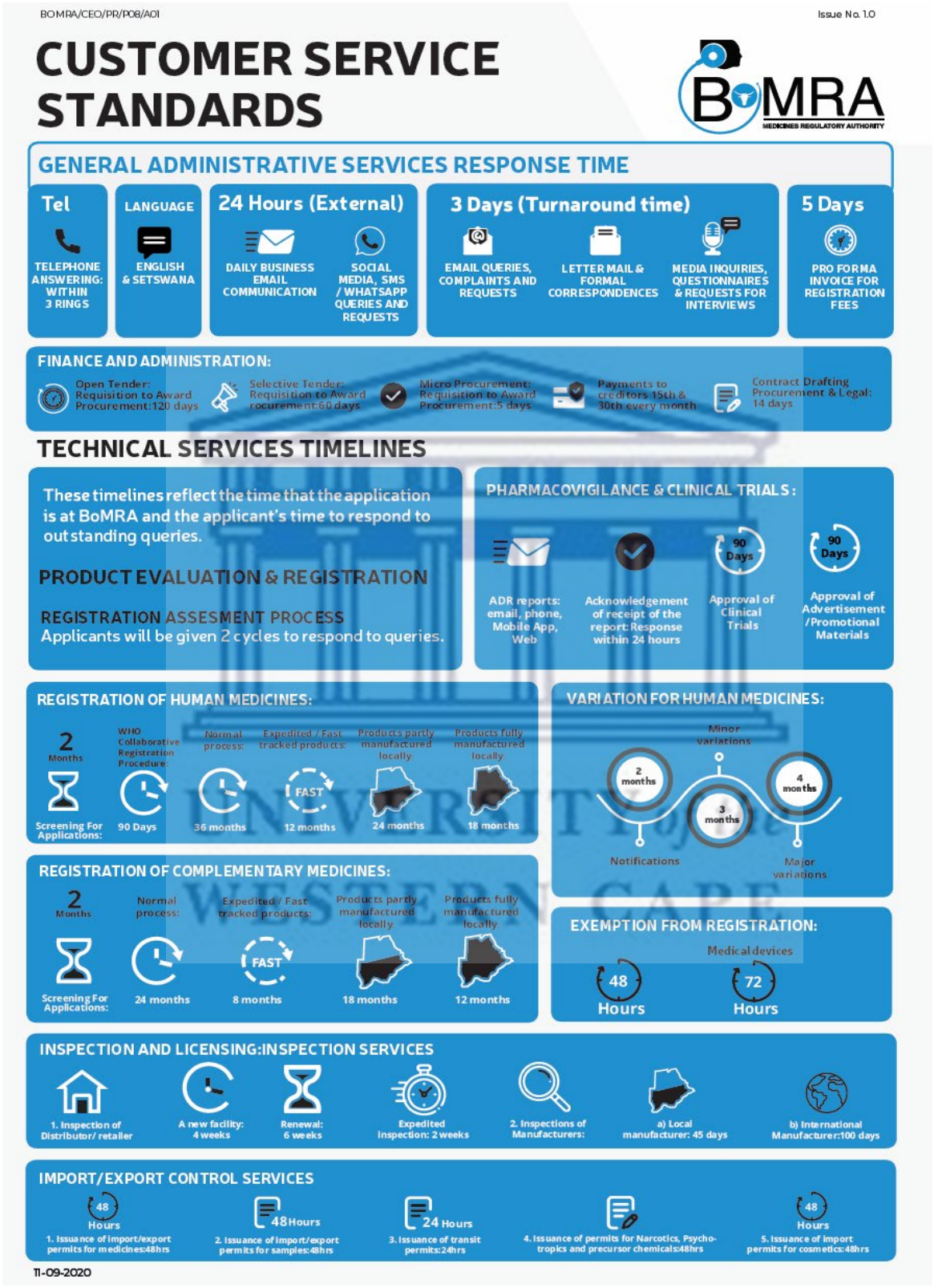
	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between DRU Legal provisions on regulatory functions and BOMRA Legal provisions on regulatory functions equals 0.	Related-Samples Wilcoxon Signed Rank Test	.018	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

Related-Samples Wilcoxon Signed Rank Test Summary

Total N	7
Test Statistic	28.000
Standard Error	5.916
Standardized Test Statistic	2.366
Asymptotic Sig.(2-sided test)	.018

Appendix 4: BOMRA Customer Service Standards



Appendix 5: Questionnaire

The Transition of Regulatory Services from the Drug Regulatory Unit to Botswana Medicines Regulatory Authority: An evaluation of the changes in regulatory services from the industry's perspective

Demographic information

1. Please indicate your Gender
   Gender: Male____ Female_____

2. Please provide information on where you are located
   _____

3. Please indicate the number of years in regulatory affairs
   1 – 5 years _____ 6 – 10 years_____ More than 10 years_____

4. Please indicate if you have made regulatory submissions to
   DRU_____ BOMRA_____

5. Please indicate the number of years you have made submissions to DRU
   1 – 5 years _____ 6 – 10 years_____ More than 10 years_____

6. Please indicate the number of years you have made submissions to BOMRA
   0 year _____ 1 – 2 years_____

7. Please indicate the type of company you work for
   Innovator Pharmaceutical/Biotech company_____ Generic Pharmaceutical/Biotech company

8. Please indicate your company's activity
   Imports_____ Distributes_____ Imports & Distributes_____
   Markets_____

9. Please indicate the type of products you work with
   Medicinal products_____ Vaccines_____ Complementary medicines_____
   Cosmetics_____ Other: _____ (please specify)

10. Please indicate the type of applications you have submitted
    New registration_____ Variations_____ Exemptions_____ Clinical trials_____ Promotional materials/Advertising_____
    Import permits_____ Pharmacovigilance activities_____ Other: _____ (please specify)

The following statements are based on BOMRA customer Service Standards BOMRA/CEO/PR/P08/A01

Based on your interactions with BOMRA, please indicate the response that describes your experience

GENERAL ADMINISTRATIVE SERVICES RESPONSE TIME	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	N/A
E-mail Queries, Complaints and Requests are answered within 3 days						
Telephone is answered within 3 rings						
Pro forma invoice for registration fees is provided within 5 days						
TECHNICAL SERVICES TIMELINES						
REGISTRATION ASSESSMENT PROCESS: Applicants are given 2 cycles to respond to queries						
PHARMACOVIGILANCE & CLINICAL TRIALS						
ADR reports can be done via email, phone, Mobile App, Web						
Acknowledgement of receipt of the report is received within 24 hours						
Approval of Clinical Trials is received within 90 days						
Approval of Advertisement /Promotional Materials is received within 90 days						
REGISTRATION OF HUMAN MEDICINES:						
Screening for Applications is conducted within 2 months						
Approval for WHO Collaborative Registration Procedure is received within 90 days						
Approval for Normal process is received within 36 months						
Approval for Expedited / Fast tracked products: 12 months						
VARIATION FOR HUMAN MEDICINES:						

Notifications: 2 months						
Approval for Minor variations is received within 3 months						
Approval for Major variations is received within 4 months						
EXEMPTION FOR REGISTRATION:						
Application for exemption is granted within 48 Hours						
Application for exemption of Medical devices is granted within 72 Hours						
INSPECTION AND LICENSING: INSPECTION SERVICES						
Inspection of Distributor/ retailer An audit report of a New facility is received within 4 weeks						
An audit report for a license Renewal for a Distributor/Retailer is received within 6 weeks						
An audit report of an Expedited inspection is received within 2 weeks						
Inspections of Manufacturers: An audit report for Local manufacturer inspection is received within 45 days						
An audit report for International Manufacturer inspection is received within 100 days						
IMPORT/EXPORT CONTROL SERVICES						
Import/export permits for medicines are issued within 48hrs						
Issuance of Import/export permits for samples are issued within 48hrs						
Import permits for cosmetics are issued within 48hrs						

Based on your interactions with DRU, please indicate the response that describes your experience

GENERAL ADMINISTRATIVE SERVICES RESPONSE TIME	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	N/A
E-mail Queries, Complaints and Requests are answered within 3 days						
Telephone is answered within 3 rings						
Pro forma invoice for registration fees is provided within 5 days						
TECHNICAL SERVICES TIMELINES						
REGISTRATION ASSESSMENT PROCESS: Applicants are given 2 cycles to respond to queries						
PHARMACOVIGILANCE & CLINICAL TRIALS						
ADR reports can be done via email, phone, Mobile App, Web						
Acknowledgement of receipt of the report is received within 24 hours						
Approval of Clinical Trials is received within 90 days						
Approval of Advertisement /Promotional Materials is received within 90 days						
REGISTRATION OF HUMAN MEDICINES:						
Screening for Applications is conducted within 2 months						
Approval for WHO Collaborative Registration Procedure is received within 90 days						
Approval for Normal process is received within 36 months						
Approval for Expedited / Fast tracked products: 12 months						
VARIATION FOR HUMAN MEDICINES:						
For Minor variations If applicable, objection letter is received within 3 months						

Approval for Major variations is received within 4 months						
EXEMPTION FOR REGISTRATION:						
Application for exemption is granted within 48 Hours						
Application for exemption of Medical devices is granted within 72 Hours						
INSPECTION AND LICENSING: INSPECTION SERVICES						
Inspection of Distributor/ retailer An audit report of a New facility is received within 4 weeks						
An audit report for a license Renewal for a Distributor/Retailer is received within 6 weeks						
An audit report of an Expedited inspection is received within 2 weeks						
Inspections of Manufacturers: An audit report for Local manufacturer inspection is received within 45 days						
An audit report for International Manufacturer inspection is received within 100 days						
IMPORT/EXPORT CONTROL SERVICES						
Import/export permits for medicines are issued within 48hrs						
Import/export permits for samples are issued within 48hrs						
Import permits for cosmetics are issued within 48hrs						

Appendix 6: Responses to the Questionnaire

Part 1 – Demographic information

Respondent	DRU Interactions	BOMRA Interactions	No. of yrs of submissions to BOMRA	Type of company	Company's activity	Type of products	Type of applications submitted	Gender	Location	No. of yrs in RA
11	Yes	Yes	1 – 2 years	Generic Pharmaceutical/Biotech company	Imports & Distributes, Markets	Medicinal products, Vaccines	New registration, Variations	Female	South Africa	More than 10 years
12	Yes	Yes	1 – 2 years	Innovator Pharmaceutical/Biotech company	Imports & Distributes	Medicinal products	New registration	Female	South Africa	More than 10 years
13	Yes	Yes	1 – 2 years	Innovator Pharmaceutical/Biotech company	Imports & Distributes	Medicinal products	New registration, Variations, Exemptions, Import permits	Female	South Africa	1 – 5 years
14	Yes	Yes	1 – 2 years	Generic Pharmaceutical/Biotech company	Imports & Distributes	Medicinal products, Vaccines, Complementary medicines, Cosmetics	New registration, Variations, Promotional materials/Advertising, Import permits, Pharmacovigilance activities	Female	Botswana	6 – 10 years
15	Yes	Yes	1 – 2 years	Innovator Pharmaceutical/Biotech company	Imports	Medicinal products, Vaccines	New registration, Variations, Exemptions, Import permits	Female	Botswana	6 – 10 years
17	Yes	Yes	1 – 2 years	Innovator Pharmaceutical/Biotech company	Imports & Distributes, Markets	Medicinal products, Vaccines	New registration, Variations, Exemptions, Promotional materials/Advertising, Import permits, Pharmacovigilance activities	Female	South Africa	More than 10 years
18	Yes	Yes	1 – 2 years	Innovator Pharmaceutical/Biotech company	Imports & Distributes, Markets	Medicinal products	New registration, Variations, Exemptions, Promotional materials/Advertising, Pharmacovigilance activities	Female	South Africa	More than 10 years
19	Yes	Yes	1 – 2 years	Innovator Pharmaceutical/Biotech company	Markets	Medicinal products	New registration, Variations	Female	South Africa	More than 10 years
21	Yes	Yes	1 – 2 years	Innovator Pharmaceutical/Biotech company	Imports & Distributes	Medicinal products, Vaccines	Variations	Female	South Africa	More than 10 years
22	Yes	Yes	1 – 2 years	Innovator Pharmaceutical/Biotech company, Generic Pharmaceutical/Biotech company	Imports & Distributes	Medicinal products, Vaccines, Complementary medicines, Cosmetics, Devices	New registration, Variations, Exemptions, Promotional materials/Advertising, Import permits, Pharmacovigilance activities	Female	Botswana	1 – 5 years

26	Yes	Yes	1 – 2 years	Innovator Pharmaceutical/Biotech company	Imports & Distributes	Medicinal products, Vaccines	New registration, Variations, Exemptions	Female	South Africa	More than 10 years
28	Yes	Yes	1 – 2 years	Generic Pharmaceutical/Biotech company	Imports & Distributes	Medicinal products, Vaccines, Complementary medicines, Cosmetics	New registration, Variations, Exemptions, Promotional materials/Advertising, Import permits, Pharmacovigilance activities	Male	Botswana	6 – 10 years

Part 2 – Responses to Customer Service Standards

DRU Interactions

	GEN ADMIN SERVICES RESPONSE TIME			TECHNICAL SERVICES TIMELINES											
				REG ASSESSMENT PROCESS	PV & CT				REGISTRATION OF HUMAN MEDICINES				VARIATION FOR HUMAN MEDICINES		
Resp.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
11	Disagree	Strongly disagree	Undecided	Agree	Undecided	Strongly disagree	N/A	N/A	Disagree	Agree	Disagree	Disagree	Disagree	Disagree	Disagree
12	Strongly disagree	Undecided	Disagree	Undecided	N/A	N/A	N/A	N/A	Disagree	Undecided	Disagree	Disagree	Disagree	Disagree	Disagree
13	Disagree	Disagree	Disagree	Undecided	Undecided	Disagree	Undecided	Undecided	Disagree	Disagree	Strongly agree	Agree	Disagree	Disagree	Disagree
14	Strongly disagree	Disagree	Disagree	Agree	Agree	Agree	Disagree	Disagree	Strongly disagree	Disagree	Agree	Agree	Agree	Agree	Agree
15	Disagree	Disagree	Undecided	Disagree	Agree	Agree	Undecided	Agree	Disagree	N/A	N/A	N/A	Disagree	Disagree	Disagree
17	Agree	Agree	Strongly Agree	Agree	Agree	Strongly Agree	N/A	Agree	Agree	Strongly agree	Agree	N/A	Agree	Agree	Agree
18	Agree	Disagree	Agree	Disagree	Agree	Agree	N/A	Agree	Disagree	N/A	Agree	Disagree	Disagree	Disagree	Disagree
19	Undecided	Disagree	N/A	Agree	N/A	N/A	N/A	Disagree	Disagree	Disagree	Agree	Undecided	Disagree	Disagree	Disagree
21	Agree	Disagree	Strongly disagree	Agree	N/A	N/A	Undecided	Agree	Agree	Agree	Agree	Undecided	Agree	Agree	Disagree
22	Disagree	Disagree	Disagree	Disagree	Agree	Undecided	N/A	Disagree	Disagree	Undecided	Disagree	Undecided	Agree	Disagree	Strongly disagree
26	Disagree	Strongly disagree	Undecided	Strongly agree	Undecided	Undecided	N/A	N/A	Disagree	Undecided	Agree	Agree	Agree	Strongly disagree	Strongly disagree
28	Disagree	Agree	Agree	Agree	Disagree	Agree	Strongly agree	Agree	Strongly disagree	Disagree	Undecided	Disagree	Agree	Strongly agree	Agree

	TECHNICAL SERVICES TIMELINES									
	EXEMPTION FOR REGISTRATION		INSPECTION AND LICENSING: INSPECTION SERVICES - Inspection of Distributor/ retailer			INSPECTION AND LICENSING: INSPECTION SERVICES - Inspections of Manufacturers		IMPORT/EXPORT CONTROL SERVICES		
Resp.	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25
11	Disagree	N/A	N/A	N/A	N/A	N/A	N/A	Undecided	Undecided	N/A
12	Undecided	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
13	Disagree	N/A	N/A	Undecided	Undecided	Undecided	Undecided	Disagree	Disagree	Disagree
14	Agree	Agree	Disagree	Disagree	Disagree	N/A	N/A	Strongly agree	Strongly agree	N/A
15	Disagree	N/A	Undecided	N/A	N/A	N/A	N/A	Disagree	Disagree	Disagree
17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Agree	Agree	N/A
18	Disagree	N/A	N/A	N/A	N/A	N/A	N/A	Disagree	Disagree	N/A
19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	Undecided	N/A	Undecided	Undecided	Agree	Undecided	Disagree	N/A
22	Disagree	N/A	N/A	Agree	N/A	N/A	N/A	N/A	N/A	N/A
26	Strongly disagree	N/A	Undecided	N/A	Undecided	Undecided	Undecided	Undecided	Undecided	N/A
28	Agree	Disagree	Agree	Agree	Agree	Strongly agree	Agree	Agree	Agree	Agree

BOMRA Interactions

Resp.	GEN ADMIN SERVICES RESPONSE TIME			TECHNICAL SERVICES TIMELINES										
				REG ASSESSMENT PROCESS	PV & CT				REGISTRATION OF HUMAN MEDICINES				VARIATION FOR HUMAN MEDICINES		
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
11	Disagree	Disagree	Agree	Agree	N/A	N/A	N/A	N/A	Agree	Agree	Disagree	Disagree	Disagree	Disagree	Disagree
12	Agree	Undecided	Agree	Undecided	N/A	N/A	N/A	N/A	Agree	Undecided	Undecided	Undecided	Undecided	Undecided	Undecided
13	Agree	Disagree	Disagree	Undecided	Undecided	Disagree	Disagree	Disagree	Disagree	Disagree	Agree	Agree	Agree	Disagree	Disagree
14	Agree	Agree	Agree	Undecided	Agree	Agree	Agree	Agree	Undecided	Undecided	Agree	Agree	Agree	Agree	Agree
15	Disagree	Disagree	Disagree	N/A	Disagree	Agree	N/A	N/A	Disagree	N/A	N/A	N/A	Disagree	Disagree	Disagree
17	Agree	Agree	Strongly Agree	Agree	Agree	Agree	N/A	Agree	Agree	Agree	Agree	N/A	Agree	Agree	Agree
18	Disagree	Disagree	Agree	Disagree	Agree	Disagree	N/A	Agree	Disagree	N/A	Agree	Disagree	Disagree	Disagree	Disagree
19	Agree	Agree	N/A	Agree	N/A	N/A	N/A	N/A	Disagree	N/A	Undecided	Undecided	Agree	Agree	Agree
21	Agree	Disagree	Agree	N/A	Agree	N/A	N/A	Agree	Agree	Agree	Agree	Agree	Undecided	Agree	Agree
22	Undecided	Disagree	Disagree	Agree	Agree	Undecided	N/A	Disagree	Disagree	N/A	Agree	Undecided	Agree	Disagree	Strongly disagree
26	Disagree	Disagree	Agree	Strongly agree	N/A	N/A	N/A	N/A	Agree	Undecided	Agree	Disagree	Agree	Disagree	Strongly disagree
28	Agree	Agree	Agree	Undecided	Agree	Undecided	Disagree	Agree	Disagree	Agree	Agree	Agree	Agree	Agree	Agree

Resp.	TECHNICAL SERVICES TIMELINES									
	EXEMPTION FOR REGISTRATION		INSPECTION AND LICENSING: INSPECTION SERVICES – Inspection of Distributor/ retailer			INSPECTION AND LICENSING: INSPECTION SERVICES - Inspections of Manufacturers:		IMPORT/EXPORT CONTROL SERVICES		
	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25
11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12	Undecided	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
13	Disagree	Disagree	Undecided	Disagree	Undecided	Undecided	Undecided	Disagree	Disagree	Disagree
14	Agree	Agree	Disagree	Disagree	Disagree	N/A	N/A	Agree	Agree	N/A
15	Disagree	N/A	N/A	N/A	N/A	N/A	N/A	Disagree	Agree	Agree
17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Agree	Agree	N/A
18	Disagree	N/A	N/A	N/A	N/A	N/A	N/A	Disagree	Disagree	N/A
19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
21	Undecided	Undecided	Agree	Undecided	Undecided	Undecided	Agree	Undecided	Undecided	Disagree
22	Disagree	Agree	N/A	Agree	N/A	N/A	N/A	Agree	Agree	N/A
26	Disagree	N/A	N/A	N/A	Undecided	N/A	Undecided	Disagree	Disagree	N/A
28	Disagree	Disagree	Agree	Agree	Agree	Agree	Undecided	Agree	Agree	Agree

Appendix 7: Information Sheet and Informed Consent

UNIVERSITY of the WESTERN CAPE

Participant Information Sheet and Consent to Participate in Research

RESEARCH TITLE: The Transition of Regulatory Services from Drug Regulatory Unit to Botswana Medicines Regulatory Authority: An evaluation of the changes in regulatory services from the industry's perspective

Dear prospective participants impacted

You are invited to participate in a research study in partial completion of a mini-thesis towards the MSc (Regulatory Sciences) Degree at the School of Pharmacy, the University of the Western Cape conducted by Rebecca Maloisane, student number 4070409.

Please find provided below important information for your understanding, which explains the purpose of the study and your involvement should you choose to participate. I am available at 4070409@myuwc.ac.za for any questions and/or further information.

PURPOSE OF THE STUDY

The purpose of this study is to examine the transition of regulatory services from the Drugs Regulatory Unit (DRU) to Botswana Medicines Regulatory Authority (BOMRA) to tease out the similarities and differences in the scope of regulatory services of the two regulatory bodies. The study aims to assess the perceived efficiency of regulatory service delivery by the end users.

The study is intended to provide feedback on the impact of changes made by BOMRA for effective regulatory systems and incite further research on this subject.

DESCRIPTION OF THE STUDY

In December 2018, the regulatory functions that were carried over by the DRU were transferred to the newly established BOMRA to ensure availability and access to quality, efficacious, and safe medicines, and related substances. The study is conducted to examine what changes the transition has brought, what developments, if any, have been made in the scope of regulatory services, and what has been the efficiency in the delivery of services as a result.

YOUR INVOLVEMENT IN THE STUDY

Pharmaceutical companies registering and marketing medicinal products in Botswana have been impacted by the transition.

You are asked to participate in the study by completing an anonymous five-point Likert scale questionnaire on BOMRA's customer service standard and offer your perception of the efficiency of

service delivery based on your interactions with BOMRA.
The survey will take about five minutes to complete and has been approved by the Humanities and Social Sciences Research Ethics committee of the University of the Western Cape.

PROTECTION OF PERSONAL INFORMATION
You have the right to the protection of personal or organizational information. However, the survey is anonymous and does not collect contact details or any personal or organizational information. Submissions of responses to the survey are completely anonymous. Research data will be stored on the researcher's password-protected computer. The research report will be stored in the University of Western Cape archives for 5 years and will be destroyed according to the university's policy.

POSSIBLE RISKS AND BENEFITS OF PARTICIPATION
It is not foreseeable that here are any risks to you for participating in the study. The study offers no direct benefit to you, other than the information that will be disclosed by the study results that may or may not lead to improved service delivery from BOMRA. There are no monetary incentives to take part in the study.

VOLUNTARY PARTICIPATION AND WITHDRAWAL
Your participation in this research is voluntary. You have the right to decline participation. Should you consent to participate and change your mind, you have the right to withdraw without any implications at any time while completing the survey or after completing the survey. (No action will be required from you; the researcher will be automatically notified). However, since the survey is anonymous, once you have submitted the survey, your responses won't be excluded from the study as it will be impossible to identify.

Should you decide to participate, click on the link provided to download the Participant Information Sheet to keep for your records.

To take the survey, please tick the box in the Consent Form to give consent

CONTACT DETAILS
If you seek any clarity or want more information concerning this research or your involvement, please contact the researcher: Rebecca Maloisane at 4070409@myuwc.ac.za or
Research Supervisor: Samuel Egieyeh at segieyeh@myuwc.ac.za

INFORMED CONSENT FORM

I have read and fully understand the information presented in the Participant Information sheet about a study being conducted by Rebecca Maloisane toward the MSc (Regulatory Sciences) Degree at the School of Pharmacy, University of the Western Cape.

I confirm that I have access to a copy to download and keep.

I understand that my participation in this project is voluntary, that I do not have to participate, and I may withdraw my consent at any time without any implications

I understand that my identity and that of my organization will not be disclosed in the study.

I have had the opportunity to seek clarity and ask questions where I needed to before completing the survey

By ticking the box and proceeding to take the survey, I freely agree to participate in the research project.

[*] I agree to participate in the study.

A link to the survey: [https://forms.gle/uh3cuTVe8iAD2fXa6]

I've invited you to fill out a form:

The Transition of Regulatory Services from the Drug Regulatory Unit to Botswana Medicines Regulatory Authority: An evaluation of the changes in regulatory services from the industry's perspective

You are asked to participate in the study by completing an anonymous five-point Likert scale questionnaire on BOMRA's customer service standard and offer your perception on efficiency of service delivery based on your interactions with BOMRA.

The survey will take about five minutes to complete and has been approved by the Humanities and Social Sciences Research Ethics committee of the University of the Western Cape Should you decide to participate, click on the link provided to download the Participant Information Sheet to keep for your records https://docs.google.com/document/d/1Z2Vxre6WCBrRys48xaMCFjYiOMnbB0YSl8PuYXiYO_4/edit

FILL OUT FORM

Appendix 8: HSSREC Approval

UNIVERSITY of the WESTERN CAPE

60 YEARS of hope, action & knowledge

18 October 2021

Ms R Maloisane
School of Pharmacy
Faculty of Natural Sciences

HSSREC Reference Number:	HS21/8/16
Project Title:	The Transition of Regulatory Services from the Drug Regulatory Unit to Botswana Medicines Regulatory Authority: An evaluation of the changes in regulatory services from the industry's perspective
Approval Period:	**15 October 2021 – 15 October 2024**

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology, and amendments to the ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit a progress report by 30 November each year for the duration of the project.

For permission to conduct research using student and/or staff data or to distribute research surveys/questionnaires please apply via:
https://sites.google.com/uwc.ac.za/permissionresearch/home

The permission letter must then be submitted to HSSREC for record keeping purposes.

The Committee must be informed of any serious adverse events and/or termination of the study. .

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

Director: Research Development
University of the Western Cape
Private Bag X 17
Bellville 7535
Republic of South Africa
Tel: +27 21 959 4111
Email: research-ethics@uwc.ac.za

NHREC Registration Number: HSSREC-130416-049

FROM HOPE TO ACTION THROUGH KNOWLEDGE.