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ANALYSIS OF THE DRIVERS FOR THE PROLIFERATION OF UNREGISTERED MEDICINES IN HARARE, 2023

BY

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Abstract

Medicines are required to have prior assessment of their quality, safety and effectiveness before they are used by the public. This is the mandate of national medicines regulatory authorities, as recommended by the World Health Organisation. Some medicines, however, bypass this evaluation process and are marketed without having been evaluated. This risks substandard and falsified medicines being used by the public which threatens public health. The purpose of this study was to assess the reasons for unregistered medicines proliferation in Harare, Zimbabwe. A descriptive cross-sectional study was conducted in the Harare Metropolitan Province. Health workers from both private and public sectors were recruited. Stratified sampling was used to recruit 136 participants. Questionnaires were used to collect data, identify sources of unregistered medicines and evaluate if there is genuine need of these unregistered medicines. Epi Info version 7 was used to generate frequencies, proportions and means. The most commonly cited channel through which unregistered medicines were finding their way to the local market was cross border traders (56.6%). Other commonly cited sources were professionals with a know-how of pharmacy practice (10.3%) and people who work in the pharmaceutical sector (4.4%). Sixty-four percent of the respondents indicated that they had encountered circumstances where they needed unregistered medicines to diagnose, treat and manage their patients. A comparison of retail and wholesale prices indicated that 78.57% and 66.67%, respectively, of the registered medicines were more expensive than similar unregistered medicines. The study established that unregistered medicine outlets are sprouting due to inconsistent supply chain systems, unethical practices and economic recession. However, it was also revealed that the health system is in need of some of these unregistered medicines, and that not all unregistered medicines are of poor quality. The study recommended that registration of medicines be harmonised at regional level so that it becomes easier for manufacturers to enter and stay in the market. Capacitation and decentralisation of the regulatory authorities was also recommended so that they effectively execute their duties.

Key words: medicines, registered, unregistered, quality, safety, effectiveness

Declaration

I declare that this dissertation is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it ever be submitted to another university for the award of a degree.

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Dedication

This work is dedicated to my loving parents who are my pillar of strength.

List of Acronyms and Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
CDC	Centers for Disease Control and Prevention
COVID-19	Corona virus Disease 2019
HIV	Human Immunodeficiency Virus
LMICs	Low and Middle Income Countries
MCAZ	Medicines Control Authority of Zimbabwe
NRAs	National Regulatory Authorities
UNICEF	United Nations Children's Fund
WHO	World Health Organisation
ZRP	Zimbabwe Republic Police

Definition of Key Terms

Substandard medical product

Also referred to as out of specification: are authorised medical products that fail to meet either their quality standards or specifications, or both (MCAZ, 2023).

Unregistered medicine

An unregistered/unlicensed medical product that has not undergone evaluation and/or approval by the National or Regional Regulatory Authority for the market in which they are marketed/distributed or used, subject to permitted conditions under national or regional regulation and legislation (WHO, 2021).

Health worker

A professional who delivers care and services to the sick and ailing either directly as doctors and nurses or indirectly as aides, helpers, laboratory technicians, or even medical waste handlers (Joseph & Joseph 2016).

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CHAPTER 1 INTRODUCTION

1.1 Introduction

According to the United Nations, majority of African countries are poor, and those that are in the middle –income bracket have public health facilities that are under-funded and only a few people have access to well-funded private health facilities. In Zimbabwe, the quality of health services conforms to these African standards, and Murewanhema & Makurumidze (2020) underscored that most of the health facilities lack basic consumables such as medicines and sundries. This situation has created a critical need of both acute and chronic medicines especially in a country that is resource limited and facing a double burden of communicable and non-communicable diseases.

These circumstances have resulted in so many informal and illegal activities that impact negatively on public health. This study was interested in the sprouting of informal markets selling unregistered medicines and other medical products such as diagnostic test kits. This descriptive cross-sectional study specifically looked at the drivers of the proliferation of unregistered medicines and took stance from a health worker viewpoint.

The study based on the views of health workers and therefore lacked on other potential drivers like the political and cultural factors contributing to the observed trend. However, the chosen population gave an insight around the socio-economic drivers of unregistered medicines proliferation on the Zimbabwean market. This study sought to improve access to the public to registered medicines whose quality and effectiveness can be ascertained.

1.2 Background to the Study

World over, every country should ensure that its population has an adequate supply of medical products that are safe, effective, affordable and of good quality. To safeguard this, countries are encouraged to have national regulatory authorities (NRAs) that are functional, efficient and effective (Sillo et al, 2020). The mandate of the NRAs is to protect public health by ensuring that medicines and medical devices that are meant for sale in the respective countries are safe, effective and of good quality. The Institute of Medicine (2013) also underscored that NRAs are responsible for the development and enforcement of pharmaceutical regulations that protect consumers who on their own cannot judge whether a medical product is safe or authentic.

Medicines and medical products are allowed to be marketed and used after the respective NRAs approve the use of the respective medicines and medical products (Nyika et al, 2020). The regulation of medicines and medical products also promotes health security and helps to curb antimicrobial resistance by ensuring that medicines meet quality standards (Barton et al, 2019). However, there is a considerable amount of time and adequate skilled personnel that are required for the regulatory review process and this impacts on the availability of medicines (Guzman et al, 2020 & Ndomondo-Sigonda et al, 2017).

Unregistered medicines are associated with an increased risk of adverse drug reactions and poor therapeutic outcomes. This is because they would not have undergone evaluation by the relevant medicine regulatory authorities to ensure that they meet quality standards. This is supported by Sutherland & Waldek (2015) who highlighted that evidence exists that shows the link between incidence of adverse drug reactions and the use of unlicensed

medicines, and that, although there have been recent improvements in the regulation of medicines and professional organisations chipping in, there has not been significant reduction of the use of unlicensed medicines by at risk populations. Additionally, unregistered medicines are likely to be falsified and substandard. Use of unregistered medicines therefore poses a risk to public health as these medicines may contain toxic chemicals and they are also manufactured under unhygienic conditions by unqualified personnel.

The use of unregistered medicines is worryingly on the rise, especially in low- and middle-income countries, including Zimbabwe. This observation was confirmed by Sutherland & Waldek (2015) who indicated that commissioners and clinicians must refrain from the use of lower quality unregistered medicines instead of registered medicines in a bid to cut costs. The idea of cutting costs on medical products is also common among consumers especially in resource limited settings who opt for the cheaper unregistered medicines that are available from unapproved premises.

The World Health Organisation states that it has received reports of substandard and falsified medical products from all main therapeutic categories, including medicines, vaccines and in vitro diagnostic devices. The use of unregistered medicines will render useless efforts made in controlling communicable diseases such as HIV/AIDS, tuberculosis and malaria because the public will be at risk of being continuously exposed to falsified medicines (Gwatidzo, Murambinda & Makoni 2017). The public is also likely to lose confidence in medical products and health systems if they use falsified or substandard medicines and vaccines that fail to treat and prevent diseases for which they are intended.

According to the National Library of Medicine, the sale of unregistered medicines is not restricted to poor countries. Although the problem is rampant in poor economies, major drivers include weak regulatory oversight, poor clinical record keeping and weak pharmacovigilance systems. In Africa, particularly in Sub-Sahara Africa, the proliferation of unregistered medicines is mainly due to poor health systems which leaves the general public with limited options such as resorting to traditional herbal medicines or purchasing medicines from unregistered premises. The other driving force is poverty. Majority of the people are unemployed, for example as of 2021, unemployment rate in Zimbabwe stood at 9.5%. In order to provide for their families, those who are unemployed resort to selling unregistered medicines from unlicensed premises. Incapacitated hospitals that lack medicines, and an inconsistent supply chain in the private sector, drive patients to seeking unregistered medicines from unlicensed premises.

In Zimbabwe, the use of unregistered medical products is only considered for life-saving therapies, where there is unmet medical need such as in circumstances where a registered treatment option is not present, and the patient's health will be clinically compromised without treatment. This is done through section 75 of the Medicines and Allied Substances Act. For example, Ivermectin which has long been approved for veterinary use only, was approved for the treatment of COVID-19 as there was no approved therapy for the treatment of this condition.

The major market for unregistered medicines in Zimbabwe is the public sector where they are sold in retail/community pharmacies and other informal markets. Recently unregulated and unregistered medicines have reportedly flooded the Zimbabwean market, where consignment of medicines are smuggled into the country through the porous borders.

Syndicates take advantage of the collapsed public health system which has resulted in the private sector being unaffordable for the majority of people. The high prices being charged in the private sector has left patients at high risk as they are resorting to cheap and unregulated medicines that are coming from neighbouring countries such as Malawi, Mozambique, South Africa and Zambia. Consequently, there has been a proliferation of unregistered medicines on the Zimbabwean market.

1.3 Statement of the Problem

The Medicines Control Authority of Zimbabwe is responsible for ensuring that accessible medicines and allied substances and medical devices are safe, effective and of good quality. As such, all medicines that are used in the country must be evaluated for safety and effectiveness before getting registration status. Some medicines and medical devices are bypassing this evaluation phase, and are being sold to the public whilst they are not registered with the regulatory authority. This is confirmed by Gwatidzo et al (2017) who stated that the streets of Harare have become overwhelmed with vendors who sell various wares and products and worryingly, there has been an increase in the sale of unregistered pharmaceutical products. An even more worrying fact is that the WHO stated that an estimated 1 in 10 medical products in low- and middle-income countries is substandard or falsified.

This exposes the public to potentially substandard and falsified medicines. Use of substandard and falsified medicines may lead to failure to achieve treatment goals, antimicrobial resistance as well as an increased risk of adverse drug reactions. Additionally, if these events take place, the public will lose confidence in medicines, health professionals as well as health systems in general. As such vaccinations and mass

drug administrations will face resistance from the public, further threatening public health. All medicines must therefore be registered with the regulatory authority.

With the growing burden of both communicable and non-communicable diseases, the demand for both acute and chronic medicines is likely to increase. At the same time, the combination of a dwindling economy and a deficit of registered alternatives on the local market are likely to further push people into looking for cheaper and reliable sources of medicines, which might not be registered thereby further creating demand for unregistered medicines, and the subsequent proliferation of such medicines on the local market.

1.4 Research Objectives

1.4.1 Broad Objective

The main objective of the study was to identify the drivers of unregistered medicines proliferation by looking at the perspectives of Zimbabwean health workers practicing in Harare, 2023.

1.4.2 Specific objectives

The specific objectives of the study were to:

- Explore health workers' perspectives on unregistered medicines in Harare Metropolitan province, 2023.
- Compare the cost of unregistered medicines being sold in Harare with similar registered medicines on the same market.
- Determine the factors contributing to the proliferation of unregistered medicines in the Harare Metropolitan province, 2023.

1.5 Research Questions

The findings of this study responded to the following research questions:

- What is the viewpoint of health workers on unregistered medicines in the Harare Metropolitan province, 2023?
- Are registered medicines that are being sold in the Harare Metropolitan province more expensive than unregistered similar medicines?
- What are the factors contributing to the proliferation of unregistered medicines on the local market?

1.6 Significance of the Study

The research identified the socio-economic, public policy and other reasons why the sale of unregistered medicines is on the rise in Zimbabwe. By looking at the drivers of unregistered medicines proliferation, this provides a way to address the potential causes and the general public will have access to medicines that have been evaluated, of assured quality, safety and effectiveness.

This study can be used as a tool by policy makers, as evidence, to craft regulations that capacitate the national regulatory authority, promote local manufacture of medicines and harmonise regional registration of medicines. This study can also be used as a foundation, by policy makers and law enforcement agents, to formulate rules and regulations that prohibit the illegal selling of unregistered medicines.

Through enforcement of the abovementioned rules and regulations, combined with an increase in the knowledgebase on medicines and medical devices, the public are going to be using registered medicines that would have been evaluated for their safety and

effectiveness. Consequently, treatment outcomes are going to be improved, thereby increasing confidence in the government and the health care system. Additionally, efforts made in managing conditions such as HIV/AIDS, tuberculosis and malaria are going to be sustained through use of registered medicines that have a proven level of certainty in terms of effectiveness.

1.7 Delimitation of the Study

The study only focused on the perspectives of health workers and left out the outlooks of those supplying unregistered medicines and that of the consumers. Access to data regarding the sources of unregistered medicines was a challenge as this has some legal concerns.

1.8 Limitation of the Study

A sample should have been drawn from health workers from all of the country's provinces but this study only focused on health workers practising in Harare. The varying prices between brand and generic medicines made it difficult to make price comparisons between registered and unregistered medicines.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

The factors that encourage the proliferation of unregistered medicines are complex but overlapping. Potentiating factors include high demand for medicines, erratic supply of medicines, weak regulatory systems, as well as consumer/patient factors. This complex interaction leading to unlicensed medicines proliferation may be explained using the Ecological Model, which describes the interaction and interdependence of factors within and across all levels of the healthcare system. Furthermore, the Ecological Model clarifies the interaction of consumers/patients with the physical and sociocultural environment.

Documents reviewed in this section were accessed through google scholar. This search engine was ideal for this study as it specifically searches scholarly literature like peer – reviewed journals and academic sources.

2.2 Theoretical Framework

The Ecological Model, also called the Social Ecological Model (Figure 1) recognizes multiple levels of influence on health behaviours, and was used to expound the drivers of unlicensed medicines proliferation in Zimbabwe. The proliferation of unregistered medicines is dependent on individual, interpersonal, organisational, community and public policy factors which are all embedded in the ecological model. The model conceptualizes health broadly and focuses on multiple factors that might affect health (CDC) such as the sources where medicines are manufactured, how they are marketed and sold, and storage of medicines at health institutions, and how they are used by the patient.

The ecological approach considers both individual and population level determinants of health as well as health promotion interventions. Consequently, these determinants can also explain the drivers of the proliferation of unlicensed medicines.

Fielding et al (2010) highlighted that the ecological model explains the importance of the social and physical environments that strongly shape patterns of disease and injury as well as the responses to them.

Figure 1: The Social Ecological model (adapted from Moore, J. 2003)

In this study, the Ecological Model was useful in describing individual factors that lead people into using medicines and pharmaceutical products that are not registered/approved. Individual factors that lead people into smuggling and illegally sell medicines and unregistered medicines were unearthed. Organisational factors, which are part of the Ecological model, were instrumental in making price comparisons of unregistered

medicines and similar registered medicines. Public policy factors were helpful in assessing if prescribers were encountering medical conditions that require medicines outside the national essential medicines list.

2.3 Relevance of the Theoretical Framework

The social ecological model is useful in identifying sources of unregistered medicines, comparing cost implications of unregistered medicines with similar registered medicines and in establishing if there is need to use unregistered medicines. Health is affected by multiple levels of influence, which are individual, interpersonal, organisational, community and policy factors.

2.3.1 Individual factors that influence health behaviours

Individual factors are those characteristics that influence the tendency of a person to purchase medicines from either unlicensed or licensed sources. They include gender, age, socioeconomic status and level of knowledge. Familiarity with the dangers of purchasing unregistered medicines and/or from unlicensed premises helps the individual to opt for other sources of medicines which are safe and effective. Medical products are allowed for use after they get approval from the respective national regulatory authorities (Nyika et al, 2022). Consumers, however, at times are either not aware that medical products must have been licensed, or they choose to purchase unregistered medicines.

People of low socioeconomic status are likely to resort to cheap and unregistered medicines that are smuggled into the country from neighbouring countries such as Malawi, Zambia and Mozambique. Since unregistered medicines are smuggled they are often sold at lower prices compared to similar registered medicines. The findings of a

research by Shamu et al (2016) showed that richer households benefited significantly more from public health funds than poorer households. The only option left for poor households are unlicensed premises such as street stalls, tuck-shops and unlicensed health shops.

Given the economic hardships currently experienced in the country, people are finding it difficult to put food at the table, let alone medication for an ailment. Therefore, people from all social classes now have a tendency of comparing medicine prices before reaching a decision to purchase. The most commonly purchased option is the cheaper one. Given that unregistered medicines are generally cheaper compared to registered medicines, most of the cheaper medicines that are opted for by the general public, especially from illegal and unlicensed outlets are unregistered. Additionally, because it is difficult to assess treatment outcomes for most of the chronic diseases, patients oftentimes cannot tell whether a medicine is producing their intended outcomes basing merely on how they feel.

Individuals who are health literate are likely to get their medicines from approved premises which sell registered medicines. As shown in figure 2 below, level of education is a personal characteristic that influences health seeking behaviour. A study by Jansen et al (2018) found out that higher education was associated with higher health literacy scores. Therefore individuals who are health literate are likely to better understand the risks associated with the use of unregistered medicines and medicines purchased from unlicensed sources.

Health literate individuals have the capacity to research on their own, the dangers and consequences of buying and using medicines that have not been registered and whose safety and effectiveness has not been assessed. Individuals who are health literate are also quicker in identifying adverse drug reactions that may happen after taking a medicine and

the course of action to be taken after someone experiences an adverse reaction following the use of a medicine.

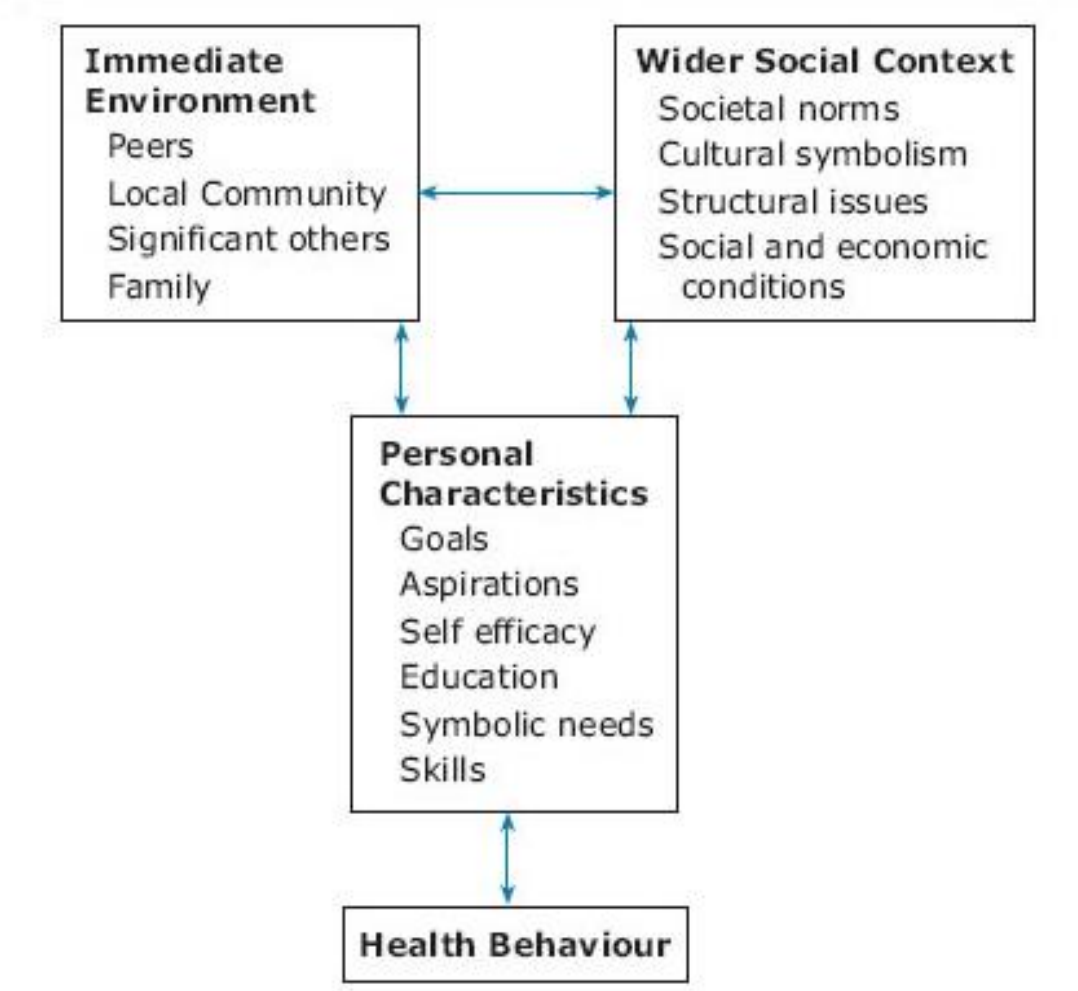


Figure 2: The wider determinants of health behaviour (adapted from Hastings, 2007)

Gender is another individual factor that influences the nature of medicines that are sought by consumers. The Medicines Control Authority of Zimbabwe (MCAZ) has not authorized any skin lightening creams, tablets or injections, but they are the most sought medical/cosmetic products by women. In a press statement MCAZ warned the public on the dangers associated with the use of skin lightening products such as oral or injectable

Glutathione and injectable Vitamins. This phenomenon is confirmed by Vlassoff (2007) and Regitz-Zagrosek (2012) who stressed that gender differences lead to different patterns in the use of formal health service resources. On the other hand, men oftentimes seek sex enhancing products from unlicensed sources.

There are currently no skin lightening products that have been registered with the local national regulatory authority. Women, however, often seek these products for their personal use, for cosmetic purposes. Since there are no registered products on the market, these products that are sought by most women are unregistered and the demand for these unregistered products remains high.

Age also influences the nature of medication and medical products that are sought by an individual. For example, research by Jakaza & Nyoni (2018) showed that there has been an upward trend in drug and substance abuse among adolescents and youth. Mukwenha et al (2021) also highlighted that most of these drugs are finding their way into the country in high volumes due to porous borders. Having been smuggled, these drugs will be unregistered. On the other hand, the elderly population is mostly on chronic medication and they mostly get their medication from approved premises that sell registered medicines.

The discretion to use health services from licensed premises is also affected by age. Most elderly patients fall victim to unscrupulous people falsely presenting themselves as medical personnel whilst offering bogus health services to unsuspecting members of the public. Young people on the other hand, do thorough checking for the credibility and compliance of such people before getting their health services and buying their products

which are mostly herbal medicines and are unregistered with the national regulatory authority.

Health status is another individual factor that influence health behaviour. An individual with a chronic health makes use of health services and health products more frequently. This may make them to opt for cheaper alternatives in a bid to cut down on their health costs. Most of the cheaper alternatives are unregistered medicines whose safety and effectiveness would not have been assessed with the local national regulatory authority. On the other hand, individuals with no known health conditions make use of health services less frequently. Such individuals are more likely to assess for the authenticity of health products and health services that they will be using.

Another individual factor that influence health behaviour is personal traits. People who are reckless are likely to get health services and medical products from any outlet that they encounter, regardless of whether they are authentic or not. As such, they are more likely to purchase unregistered medicines from unregistered premises. Unlike reckless individuals, people who are cautious about their health are likely to purchase medical products and pharmaceutical drugs from licensed premises only. As such, they are more likely to purchase registered medicines whose safety and effectiveness would have been assessed.

Mental ability is another individual factor that influence health behaviour. Individuals who are mentally challenged are easily coerced to get health services and medicines from unlicensed and unregulated outlets. This gets them at risk of using medicines that are unregistered in the management of various ailments that may befall them. On the other hand, individuals who can make decisions on their own have the capacity to identify

dubious medicine outlets and can make a sound decision as to use or not use health services or buy medicines from unregulated and unlicensed outlets.

Health behaviour is also affected by perceptions. People who perceive unregistered medicines to be more affordable compared to registered medicines will always purchase medicines from unregulated outlets. At the same time, individuals who perceive registered medicines to be safer and more effective than unregistered medicines will always get their medicines from regulated and licensed premises which sell registered medicines only. Additionally, individuals who perceive herbal medicines to be safer than allopathic medicines will always look for herbal medicines from various outlets. Most of these herbal medicines, however, are not registered with the national regulatory authority and as such users of these herbal products are at risk of adverse drug reactions such as liver and kidney failure.

2.3.2 Interpersonal factors that influence health behaviours

Interpersonal factors are those influences that compel or deter someone from purchasing medical products from unlicensed premises or from using unregistered medical products. They include family, friends and other social networks. Morowatisharifabad et al (2019) underscored that one of the most important factors contributing to using formal health care services by women is people who are involved in the social network around them. The decisions people make may be facilitated or hindered by social norms as people are overwhelmed by being approved by the environment (Cislaghi & Heise, 2018).

Pistikou et al (2014) stated that a healthy role model can positively effect on patient's attitude and lifestyles. If therefore a role model decides to use unregistered medical

products for cosmetic purposes, most people who are inspired by that model are likely to use the same product for the same purposes. If models and socialites advocate for use of registered medicines only, that is also likely to influence the public to seek medical products that are registered for their healthcare needs.

Cultures and subcultures is another interpersonal factor that influence health behaviour. Some cultures discourage people from using health services. As such, health problems are attended at home where the care givers manage the health conditions with a variety of concoctions which may include herbal products. In most cases these herbal products would not have been registered with the national regulatory authority. There is a high probability that these herbal products would have been adulterated or falsified. This puts the users of these products at significant risk of adverse drug reactions.

Another interpersonal factor that influence health behaviour are reference groups. Such groups may influence individuals to follow the same health seeking behaviour that they use. It therefore implies that if the reference group is not particular of the health services that they get, individuals who are influenced by that particular reference group will also seek health services from whatever health facility that they encounter. Subsequently, they may end up purchasing medicines from unregulated and unregistered premises that sell unregistered medicines.

Social classes also influence the health behaviour that is shown by individuals. People from higher social class have the privilege to access health care services from the best health service providers. As such, these health service providers make sure that they provide the best services through ensuring that their medicines are registered with the national regulatory authority. The safety and effectiveness of these medicines is thus

guaranteed. On the other hand, people from low social class have no liberty to choose the health services that they want. In most cases, they opt for health services that they can afford. The likelihood of these affordable health services and health products are unregulated and unregistered is very high. Use of unregistered health products such as pharmaceutical drugs is associated with an increased risk of adverse drug reactions.

Opinion leaders influence the health behaviours of their followers or congregants. If an opinion leader advocates for the use of registered medicines, this is likely going to affect the health seeking behaviour of the followers as they are likely to make use of registered medicines only. The impact opinion leaders can have on society was evidently seen during the COVID – 19 era when some leaders advised their followers to refuse getting the vaccines administered to them. The same is true if such leaders advocate for the use of registered medicines that are accessible only from regulated and licensed premises.

The family is another factor that can influence health behaviour. Individuals spend most of their time with their family members and most of the decisions they make mostly have to be approved by members of the family. This follows that if the family approve the use of unregistered medicines that are obtained from unregulated and unlicensed premises, if a family member falls ill they are likely to use such medicines that are unregistered. On the other hand, if the family does not approve the use of unregistered medicines and advocates the use of health services and products from regulated and licensed premises only, and a member of the family falls ill, they are most likely to use registered medicines that are accessed from licensed premises.

Caregivers can also have an influential role on the health behaviour of an individual. Like the family, if a caregiver approves or disproves the use of registered or unregistered

medicines, the patient is likely to make use of such services that would have been approved, or avoid the use of such products that would not have been approved. Caregivers include parents, other adults or kin with caregiving role. As such, the role of caregivers is closely intertwined with that of family in terms of the impact they can have on health seeking behaviour.

Peers and siblings also play a critical role on the health seeking behaviour of an individual. If a peer or sibling has had a negative experience following the use of an unregistered medicine, someone who is in close connection with that individual is less likely to seek health services from unregulated facilities or purchase unregistered medicines. Peers have a great influence on the decisions an individual is likely to make. Peers and siblings share experiences and one might fear going through the same negative experiences or might feel motivated to get the same pleasant feeling their peer would have experienced.

One of the purposes of interpersonal relationships is to get a sense of security. With regards to health matters, if an individual does not feel safe after using an unregistered medicine, for example, they are less likely to purchase such medicines. Individuals are thus more likely to associate with peers who give them that sense of security regarding their health matters. This may push individuals towards the use of registered medicines that are accessed from registered and licensed premises.

Co-workers and relatives also form part of the interpersonal relationships an individual might have. They may share experiences regarding their use of registered or unregistered medicines. If the experiences are perceived to be bad following the use of an unregistered medicine, for example, that might scare others from using the same unregistered

medicines. If the experiences are perceived to be good, on the other hand, this might attract others to use the same medicines.

2.3.3 Organisational factors that influence health behaviour

This refers to operational attributes, processes or conditions that exists within an organisation (Valaitis et al, 2018). Organisational factors may influence individuals to use medical products that are either registered or unlicensed. For example, pharmacy training institutions in Zimbabwe celebrate the pharmacy week every last week of September each year. During this week students educate the public on the dangers of using unlicensed medicines that are purchased from unlicensed premises.

Organisations like schools, workplaces and health facilities can take it upon themselves to encourage their students, employees or patients to use medical products from licensed facilities only. For example, schools now have health clubs that address such issues as drug and substance abuse. Cross-sector and organisation collaboration can strengthen the measures that support access to medical products that are registered and with assured safety and effectiveness (Ratanawijtrasin & Wondemagegnehu, 2022).

Organisations have their safety cultures that members of the organisation are expected to abide to. Such cultures are there to ensure and promote the health and well-being of the members. The safety culture of an organisation encourages individuals to seek health services from registered and licensed health facilities. It therefore means that they use pharmaceutical drugs that are registered with the national regulatory authority whose safety and effectiveness would have been evaluated. This reduces the chances of

experiencing adverse drug reactions and treatment failure following use of such medicines.

Organisations also have health and safety policies and procedures. These measures are implemented to promote the health of the organisational members. If members of the organisation take medicines from unregistered premises, this increases their risk of adverse events. Consequently, it is the organisation that will be at a disadvantage as they may be expected to take care of the affected individual. The organisation also loses productive hours of work that the individual might be absent from work. In order to reduce chances of this happening, organisations have since been implementing health and safety measures that protect and promote the health of members of the organisation.

The establishment of peer – groups within organisations might act as a ring – fencing measure to enhance and promote the health of members of the organisation. Peer – groups may play an influential role to prohibit members of the organisation from using unregistered medicines. Such groups may also act as testimonials to fatal incidents that would have occurred following the use of unregistered medicines and medical devices. Workers spend most of their day time at work interacting with their peers. It is during this time that they share ideas and experiences about what happened to them after using unregistered medicines.

The leadership from the organisation may take it upon themselves to ensure that members of the organisation are conscious about their health matters. This may include routine assessment of their health status, engaging in activities that promote health as well as punishing those who show reckless behaviour towards their health, through for example, purchasing unregistered medicines from unregulated premises. The leaders of the

organisation may as well reward those who show to be proactive about their health issues. This will motivate members of the organisation to take health issues more importantly by purchasing medicines that are registered only from approved premises.

Organisation may commit resources to ensure and promote the health of its workers. The allocation of resources such as time and money shows strong evidence of commitment by organisations. Organisations may ensure that their workers are on health insurance. This gives their employees the capacity to access health services that are proper and of good quality. This eliminates the tendency to opt for health services and health products that are cheaper thereby reducing the chances of treating ailments with medicines that are not registered.

Pressures from outside the organisation may also influence the health behaviour of its employees. This may include the financial state of the organisation and the impact of regulatory bodies such as the National Employment Council and the National Social Security Authority. Regulatory bodies enforce regulations that ensure that employees have a minimum wage and in some instances ensure that workers are on health insurance. These measures being implemented by regulatory bodies ensure that employees have the capacity to access decent health care services thereby eliminating the tendency of them getting medicines that are not registered from unregulated outlets.

The existence of organisational groups within organisations may be an effective tool in increasing awareness on health matters by employees. These groups, which may act as peer groups, provide health information to employees who will then make health choices that will promote their wellness. Such choices might include purchasing medicines and medical devices from regulated and licensed premises.

2.3.4 Community factors that influence health behaviour

These refer to relationships among organisations (Cappella & Godfrey, 2019). People and communities have different health needs that require medicines and medical products that are safe, effective and of good quality.

Community factors also refer to the environment in which an individual stays in that may promote certain social norms and provide access to resources such as registered medicines. The built environment, location of community, transportations, level of income and educational facilities are components of communities, (Yang et. al, 2016; Murewanhema & Makurumidze, 2022).

In most Zimbabwean towns and cities, the high density suburbs are often associated with illegal activities such as the sale of unregistered medicines (Mukwenha et al., 2021). On the other hand, people living in the low density suburbs often seek medical services from approved health facilities (Jakaza & Nyoni 2018).

An example of a community factor that influence health behaviour is employment. Individuals who are gainfully employed have the financial capacity to purchase medicines that meet their expectations, which in most cases will be registered medicines. On the other hand, individuals who are unemployed do not have that financial capacity and may opt for cheaper options when selecting medicines. These cheaper options may be unregistered medicines that would have been smuggled into the country through porous borders.

Another community factor that influence health behaviour is literacy. Individuals who have health literacy have the capacity to make informed decisions pertaining to their

health matters. They can as well research on latest trends and keep abreast with current treatment regiments and evolving health care. On the other hand, individuals who are not health literate do not appreciate the differences between a registered medicine and an unregistered medicine, for example. To them, buying a registered medicine and an unregistered medicines is just the same thing. Literacy levels are thus very important within communities because they have a bearing on the health choices people are likely to make.

Perceptions of safety is another community factor that influences health behaviour. If members of the community perceive a certain behaviour to be dangerous to their health, they are likely to desist from such behaviours. The use of unregistered medicines has been associated with an increased risk of adverse events and treatment failure. If members of the community perceive this to be unsafe to them, they are less likely to use unregistered medicines. They will instead opt for registered medicines that are accessed from regulated and licensed premises.

Community norms and values have a bearing on the health behaviour that will be exhibited by community members. Members of the community have a certain manner in which they look at health matters. If they are of the view that all medicines are the same regardless of the outlet from which they are accessed, they will purchase whatever medicine they come across without due consideration of its safety. This will promote the sale and use of unregistered medicines within the community. If however, members of the community regard it as unusual to purchase unregistered medicines, this will promote the use of medicines that are registered only whose safety and effectiveness can be ascertained.

The physical environment is another community factor that influences health behaviour. Settlements that are properly planned have proper outlets for various products and services such as clinics, laboratories and pharmacies. Under such settings, medicines are accessed only from pharmacies where only registered medicines are sold. However, in informal settlements, there are no proper outlets for medicines, and pharmaceutical drugs may accessed from illegal outlets. Such pharmaceutical drugs may be unregistered and may present a significant risk to the patient as they may cause adverse drug reactions and treatment failure.

The existence of social support networks may help improve the accessibility of safe medicines. These groups provide strong social support networks, social cohesion and mobilise community resources that can positively influence health outcomes. The social cohesion that may come as a result of the social support networks may influence community members to seek health care needs from regulated premises and buy medicines from licensed pharmacies only.

2.3.5 Public policy factors influencing health behaviour

To protect and promote public health, most countries have regulatory systems that enforce regulations to ensure that medical products meet the recommended standards (Reggi, 2016 & Ndomondo-Sigonda & Ambali, 2011). Countries that are World Health Organisation member-states are encouraged to have functional, effective and efficient national regulatory authorities (Sillo et al, 2020). These public policy factors ensure that the public have access to medical products that are safe, efficacious and of good quality.

Although WHO-member states are encouraged to have national regulatory authorities, at least 30% of those regulatory authorities do not have enough capacity to carry out the core regulatory functions (Mcauslane et al, 2009; Keyter et al, 2018). Limited capacity by some regulatory authorities results in fake, counterfeit and unlicensed medical products being smuggled into the country through porous borders.

The availability of registered medicines is impacted by the considerable amount of time and adequate skilled personnel required in the regulatory review process (Ndomondo-Sigonda, 2017). Unlicensed medicines, however, do not go through the route of assessing for safety and effectiveness, thus they have low market price. Low- and middle- income countries have higher prevalence and impact of unregistered medicines because of their less mature regulatory systems and limited human and financial capacity (Ndomondo-Sigonda, 2017).

Ineffective delivery of quality health services by governments at the public health facilities lead to shortages of medicines and medical products such as diagnostic test kits. The public may be left with no option but to opt for unregistered medicines whose quality and safety cannot be ascertained.

In Zimbabwe, for example, in the period 2021 to 2023, there were shortages of both acute and chronic live-saving medication such as Tenoric-50 (an antihypertensive), Carbamazepine (an anti-epileptic medication), Maxitrol suspension (an eye drop) and Amoxicillin (an antibiotic). These medicine shortages can be worsened by the absence of regulatory authorities that are functional, thus exposing the public to medical products that are potentially unsafe (Nyika et al, 2022).

Medicine shortages may be caused by natural disasters or incompetent public policy structures. They may include changes in manufacturer's marketing strategy, challenges in supply chain, unexpected increase in demand, issues related to production, global pandemics and disasters such as Ebola, COVID-19 and cyclones (Yang et al, 2016, Acosta et al, 2019 & Iyengar et al, 2016). Smugglers take advantage of these medicine shortages to supply unregistered medicines so as to meet the population needs. During such disasters the prices of registered medicines tend to rise due to challenges impeding their supply. Unregistered medicines, on the other hand, thrive because of relatively lower prices compared to the licensed medical products. For example, the wholesale price of Tenolam D (an anti-retroviral drug) is $9.90 USD from a local registered supplier whilst illegal suppliers are selling at $3.00 USD.

Kelesidis et al (2007) predicted the continued use of unregistered medicines into the foreseeable future, raising concerns globally. The economic hardships and declining standards at health facilities in low- and middle- income countries such as Zimbabwe has seen an upsurge in the use of these unregistered medicines. Attributes such as quality, safety and efficacy for unregistered medicines remains unknown to the countries importing these medicines (Mumphansha et al, 2017).

The importation of unregistered medicines is associated with an increase in risk of adverse medical events or lack of therapeutic effect (Kelesidis et al, 2007). The ecological model may be used to effect laws at national and local levels so as to restrict the importation and use of unregistered medicines. At policy level, the government may also increase funding to support local production of medicines so as to reduce the need for imported medicines.

2.4 The World Health Organisation view on unregistered medicines

According to the World Health Organisation, an unregistered/unlicensed medical product is a product that has not undergone evaluation and/or approval by the National or Regional Regulatory Authority for the market in which they are marketed/distributed or used, subject to permitted conditions under national or regional regulation and legislation. Since they would not have undergone evaluation and/or approval, unregistered medicines maybe substandard or falsified. These medicines fail to meet their quality standards or specifications (Kelesidis et al 2007). Use of these medicines by the public may lead to them losing confidence in medicines, as they will not be achieving their intended outcomes, and loss of confidence in healthcare professionals and health systems at large (Guzman et al, 2020).

An estimated 1 in 10 medical products in low- and middle-income countries is substandard or falsified (WHO). Given the fragmented regulatory systems in most low- and middle-income countries, the risk of getting substandard and falsified medical products on the market is significantly high. Therefore, in order to safeguard public health, the processes that are required for the approval of importation and distribution of unregistered medicines must be so vigorous to reduce the risk that comes with such exemptions from the normal registration processes that are usually in place to protect public health (Nyika et al, 2022).

The WHO also stated that medical products that are substandard or have been falsified from all therapeutic categories have been reported, including medicines, vaccines and in vitro diagnostic devices (Acosta et al., 2019; Ratanawijtrasin & Wondemagegnehu, 2002). The most commonly reported substandard and falsified medical products are anti-malarials and antibiotics (WHO, 2023). With malaria being endemic to some of the

LMICs where substandard and falsified medical products have been reported, this poses the risk of failing to treat the diseases for which they are intended (Sillo et al, 2020; Sutherland & Waldek, 2015). These products also contribute to antimicrobial resistance as they are often used inappropriately and will not achieve the intended pharmacological activity (Kelesidis et al, 2007).

Substandard, falsified and unregistered medicines and medical products undermine the ability to prevent, treat and cure and provide palliative care to disease thereby posing a significant threat to public health (WHO, 2023). This also results in governments, municipalities, communities and families suffering economic losses as they would have made payments for medicines and medical devices that will not produce the intended therapeutic outcome. Patients who use these medical products are also exposed to the harmful effects of undeclared/unauthorized substances, excipients and contaminants (Rojas-Cortés, 2020).

According to the WHO (2023), unregistered, substandard and falsified medical products affect every region of the world. This was confirmed by Rojas-Cortés (2020) who reported that substandard, falsified and unregistered medicines persist in Latin America as a highly prevalent problem. The problem persists due to lack of regulatory and enforcement capacity by various national regulatory authorities.

As stated by Pombo et al (2016) and Pombo et al (2009), the reasons include lack of procedures that are harmonized, standard definitions and training, shortage of human resources and lack of structure and information systems.

2.5 Current state of medicine regulation in Zimbabwe

Sillo et al (2020) underscored that countries world over, are encouraged to establish regulatory authorities that are functional, effective and efficient. In Zimbabwe, medicines and medical devices are regulated by the Medicines Control Authority of Zimbabwe whose function is to ensure that accessible medicines and allied substances and medical devices are safe, effective and of good quality through enforcement of adherence to standards by manufacturers and distributors. The mandate of MCAZ is to protect public health ensuring that medicines and medical devices on the market are safe, effective and of good quality (MCAZ). Barton et al (2019) stressed that national regulatory authorities carry out a continuum of functions which include upstream processes and downstream processes (Figure 3). Upstream processes are those that determine market entry and quality control while downstream processes dwell must on post-market surveillance.

The current economic hardships in Zimbabwe, coupled with high unemployment rates, have resulted in the sprouting of unregulated medicine outlets. This has presented a challenge to MCAZ in enforcing the law against unregulated markets and proliferation of substandard and falsified medicines (Mukwenha et al, 2021; Nyika et al, 2022). In an attempt to address this problem, the MCAZ has collaborated with the Zimbabwe Republic Police (ZRP), conducted public awareness campaigns and conducted inspections at ports of entry (Gwatidzo, Murambinda, & Makoni, 2017).

Like other low- and middle-income countries in Africa, Zimbabwe is presented with a major challenge in healthcare delivery due to a number of global forces that determine how health commodities reach the intended users (Gwatidzo, Murambinda, & Makoni, 2017).

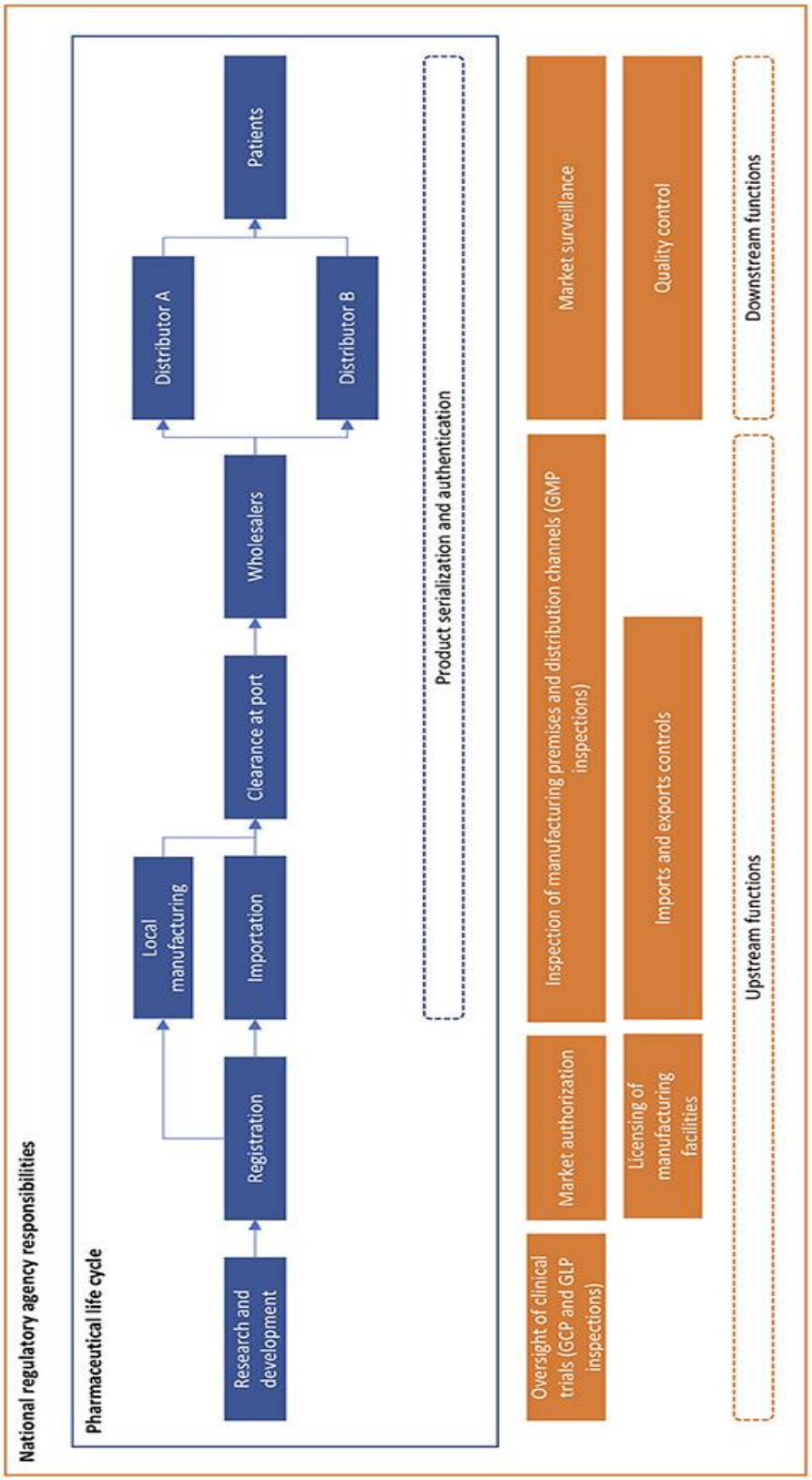


Figure 3: Responsibilities of regulatory authorities (adapted from Barton et al, 2019)

This is further compounded by the fact that many life-saving drugs are still inaccessible and unaffordable in most of these African countries (Barton et al, 2019). The healthcare delivery and distribution systems in most LMICs, including Zimbabwe, are fragmented to an extent that the integrity of the medicines supply chain is increasingly under threat due to proliferation of poor-quality medicines onto the market (Yadav et al, 2011).

In Zimbabwe, suppliers of unregistered medicines are taking advantage of a malfunctioning public healthcare system and an unaffordable private sector. The general public is thus opting for an affordable illegal market shunning the private pharmacies where the prices are out of the reach of many (Shamu et al, 2016). The problem is further compounded by the fact that most people are self-employed and cannot afford to be on medical insurance. The high out of pocket expenditure has seen some opting for cheaper sources of medicines and medical devices which are not registered and in some cases, falsified and substandard (Jakaza & Nyoni, 2018; Gwatidzo, Murambinda, & Makoni, 2017).

The existence of a parallel market for medicines has fuelled the proliferation of unregistered medicines and this is a major concern for the regulatory body, the MCAZ as the market is at risk of flooding with falsified and unregistered medicines (Gwatidzo, Murambinda, & Makoni, 2017). Parallel market thrives because of ignorance among members of the public and because private healthcare is out of the reach of many. In addressing this, the MCAZ has been conducting public exhibitions, lectures and live radio broadcasts to sensitize the public on its stance on falsified medicines and unregulated sale of medicines (Gwatidzo, Murambinda, & Makoni, 2017).

Despite efforts by the Medicines Control Authority of Zimbabwe to ensure that medicines and allied substances and medical devices are safe, efficacious and of good quality, unregistered medicines continue to be on the local market. This is confirmed by Gwatidzo et al (2017) who stated that as dusk approaches, the streets of Harare become alive with inviting calls from vendors in a frantic effort to sell various medicines, majority of which will be unregistered. National regulatory authorities in the region have various capacities to regulate medicines, and challenges which befall these regulatory authorities limit their capacity to adequately regulate medicines and allied substances.

2.6 Risks associated with use of unregistered medicines

Unregistered medicines would not have been evaluated to determine their safety, effectiveness and quality. Most unregistered medicines are falsified meaning that they are medical products that deliberately/fraudulently misrepresent their identity, composition or source (WHO, 2023). As such, they may not contain the active ingredient that they are purported to contain, may contain the wrong active ingredient or they may contain the wrong amount of the correct active ingredient. Falsified medicines may be toxic in nature as they may contain wrong quantities of the active ingredient, or they may contain other toxic chemicals.

According to the WHO (2023), anti-malarial and antibiotics are among the most commonly reported substandard and falsified medical products. Moreover, these products are manufactured under unhygienic conditions by people who are not qualified (Pombo et al (2016). Thus, they may contain unknown impurities and in some instances they may be contaminated with bacteria. Unregistered medicines, therefore, may lead to antibacterial resistance and infections that are drug-resistant. This in turn leads to higher treatment costs

because one would need more expensive drug molecules to kill the infection while the bacteria becomes resistant to first-line medication (Pombo et al, 2009).

Additionally, unregistered medicines are likely to harm patients' health and they may lead to death. A compelling incident is that of 84 children who died in Nigeria between November 2008 and February 2009 due to acute kidney failure as a result of the presence of the industrial solvent diethylene glycol in a teething syrup (Akuse et al., 2012; Polgreen, 2009). Unregistered medicines carry a risk of being substandard and falsified and as such may contain toxic doses of ingredients that are dangerous and may cause mass poisoning.

Due to lack of quality assessment, unregistered medicines may be ineffective towards the intended disease or condition, because they may not contain the active ingredient or they may contain the wrong amount of the correct active ingredient. Ultimately, use of these products may result in the general public undermining medical products and healthcare professionals who diagnose, treat and supply approved medical products (Barton, 2019).

The use of unregistered medical products promotes drug abuse (Jakaza & Nyoni, 2018). Since medicines will be accessed through informal channels, anyone can get whatever medicine they want, even if it is meant for abuse (Mukwenha et al, 2021). Registered medicines are mostly sold through formal channels and those that are prone to abuse usually require stringent documentation before they are supplied to the intended user. Unregistered medicines, on the other hand, are cheaper and easily accessible thereby giving drug abusers easy access to such medicines (Rojas-Cortes, 2020, Sutherland & Waldek, 2015).

Another risk that is associated with the use of unregistered medicines is that unregistered medicines may be mislabelled or incorrectly packaged. As highlighted by Sutherland & Waldek (2015), the medicines safety agenda integrates the safe and effective use of medicines. If however medicines are mislabelled or incorrectly packaged, this means that they may be either taken in toxic or sub therapeutic quantities, or they may be inappropriately stored. Incorrect medicine packaging and labelling can also result in administering those medicines in otherwise contraindicated conditions such as during pregnancy or during lactation.

Unregistered medicines are smuggled into recipient countries. Biotechnology derived products that require to be kept under the cold chain may be exposed to extreme hot temperatures resulting in them losing potency. The seventy – first world health assembly that convened to address the global shortage of, and access to, medicines and vaccines highlighted that every country has to ensure an adequate supply of safe, efficacious, good quality, and affordable medical products. If medicines are smuggled and improperly stored, they cease to be safe, efficacious and being of good quality.

There is a high risk of unregistered medicines being substandard and falsified. If such medicines are used, this has economic and social consequences. Use of substandard and falsified medicines increases the cost of treatment and may lead to loss of confidence in the health system and the government. Substandard and falsified medicines are likely to promote drug resistance which reduces the effective life of a medicine and it is the society that bears the cost of developing a new drug molecule.

2.7 Summary

Overlapping factors leading to the proliferation of unregistered medicines are best described using the ecological model. Although the factors range from individual to public policy factors, it is the policy level that mostly determines the success of control of use of unregistered medicines. Through upstream processes, public policy factors control the entry of unregistered medicines into the country while downstream processes monitor the use of such medicines. To address the challenge of unregistered medicine proliferation, there is need to strengthen capacities of national medicines regulatory authorities to ensure that medicines are safe, efficacious, good quality and affordable.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter outlines the methodology used to conduct the study. It presents the research design, study setting, study population, and the sampling procedure used. The data collection instruments used and the data collection procedure are also presented. This chapter also outlines how the data was organised and the statistical package used for data analysis.

3.2 The Research Design

A descriptive cross-sectional study design was used to get the perspective of health workers on the drivers of unregistered medicines proliferation on the Zimbabwean market. This research design was used to identify the reasons for the sprouting of unregistered medicine outlets in Harare. As underscored by Wang & Cheng (2020), this research design took a snapshot of the proportion of individuals in the population who were, for example, in need of medicines that are not registered.

The descriptive cross-sectional study design which was employed was instrumental in evaluating the proportion of health workers in Harare who are making use of unregistered medicines. Additionally, this study design was useful in comparing the prices of registered and unregistered medicines at different outlet points, as well as identifying the source countries for unregistered medicines found on the Zimbabwean market.

3.3 Study setting

In this study, data was collected from health facilities such as pharmacies, council clinics, private hospitals, government hospitals, and private surgeries located in the Harare Metropolitan province. Harare was selected because this is the target market of most informal traders due to the relatively high population density in the capital city. Most health training institutions and the regulatory authority are also located in Harare, hence the reason why it was selected as the study site.

Data was also collected from informal markets in Harare such as market places like Mbare Musika and street corners where illegal and unregistered pharmaceutical products are sold. Another data collection site that was used by the researchers are bus termini were vendors sell medicines and cosmetics in buses at bus termini.

3.4 Study Population

The research population for this study comprised of all registered pharmacists, pharmacy technicians, dispensary assistants, nurses, doctors and laboratory personnel practicing in the Harare Metropolitan Province. The eligibility criteria in this study was that the participants had to be a registered pharmacist, pharmacy technician, dispensary assistant, nurse, medical doctor or laboratory personnel practicing in Harare and had to be willing to participate in the study.

Cross border traders and vendors illegally dealing in pharmaceutical products and medical devices provided information on prices and sources of illegal and unregistered medicines. They also provided information on the different unregistered medicines that are available

on the local market. Some members of the public who use unregistered medicines and medical products also provided information on sources of these unregistered medicines.

3.4.1 Sample Size Calculation

Dobson's formula was used to calculate the sample size as shown below:

$$n = \frac{Z_{\alpha}^{2}\,(P)(1-P)}{d^{2}}$$

The researcher could not find information on similar studies, hence a proportion of 50% was used to estimate the sample size.

Using a 10% margin of error and a confidence interval of 95%, and assuming a non-response rate of 10%, the minimum sample size of health care workers required was 107.

3.5 Sampling Procedure

Stratified sampling was used in this study. Participants were divided into groups that are non-overlapping called strata and each strata was defined by selected characteristics (César & Carvalho, 2011), such as profession and sector in which the participant is employed. Each stratum consisted of specific professionals, which include pharmacists, medical doctors, nurses, pharmacy technicians and dispensary assistants. As highlighted by Parsons (2017) this sampling procedure is advantageous in that it increased the efficiency of the sampling design with regards to costs of the survey.

The stratified sampling procedure was also useful in that the researchers were able to get an effect size from each strata separately, as if the study was a different one, as highlighted

by Elfil & Negida, (2017). Through classification, the difference between different types of individuals was narrowed, and this favoured the extraction of representative samples and sample size reduction, according to Shi (2015).

3.6 Data Collection Instruments

Self-administered questionnaires and key informant interviews were used to collect data from the study participants. The questionnaire was designed such that it captures the demographic information about the participants, the sources purported to be supplying unregistered medicines and to determine if health workers are in need of some of the unregistered medicines to effectively diagnose, treat and monitor disease conditions in their patients (see Appendix 2). The questionnaire also unearthed if the participants consider a long registration process imposed by the regulatory authority a deterrent into medicine registration. This way, reasons why the rate of unregistered medicines is on the rise were unearthed.

Reliability of the data collection instrument was confirmed by a pre-test utilizing health workers excluded from the actual research who had similar characteristics to the study sample. This way, the clarity of the items and consistency of the responses were determined.

The validity of this study was compromised through use of a convenient sample of health workers practicing in Harare. There is no guarantee that health workers practicing in Harare have similar knowledge and perceptions on unregistered medicines with registered health workers practicing out of Harare, as the sample was not be drawn randomly,

implying that not every health worker in the research population had an equal chance of being selected to be part of the research sample.

3.7 Data Collection Procedure

Data collection spanned from September to October 2023. Self-administered questionnaires were distributed to prospective respondents through Google forms. The respondents would read and sign the consent form to indicate their willingness to participate in the study. They would then answer the questions outlined in the questionnaire by selecting the correct answer and giving their opinions. It took the respondents approximately eight to ten minutes to complete the questionnaire. Upon submission of the response by the respondents, the data became available to the researcher for analysis. In addition, key informant interviews were conducted via phone calls and physical meetings.

3.8 Analysis and Organisation of Data

Epi Info version 7 was used for data analysis. The software was used to generate frequencies, proportions and means. Tables, bar graphs and pie charts were used to present data. Tables were used to present price comparisons of unregistered and unregistered medicines. This comparison is a validation whether the general population is resorting to unregistered medicines because registered medicines are more expensive than similar unregistered medicines, or because of other reasons.

3.9 Ethical Consideration

Ethical approval was sought from Africa University Research and Ethical Committee (AUREC) (see Appendix 3). Permission to collect data from health facilities in Harare

was sought from the City of Harare, Department of Health Services (see Appendix 4). The aim of the study was fully explained to all participants. Informed consent was sought from all participants and confidentiality was maintained at all stages (see Appendix 1). Participants were given the liberty to withdraw from the study at any stage if they felt uncomfortable to proceed with the study. The withdrawal of participants from the study did not affect future relationships of the participants with the researcher and Africa University. Records of data and pictures taken during the investigation were kept under safe and lock at all times.

3.10 Summary

In this descriptive cross-sectional study, 136 participants were recruited to give their perspectives on the drivers of unregistered medicines proliferation. The study focused on health workers who are practicing in Harare. Self-administered questionnaires were sent via Google forms and the data was analysed using Epi Info version 7. Data collected was only accessible to the researcher.

CHAPTER 4 DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents findings of the investigation, which sought to identify the drivers of unregistered medicines in Harare. Descriptive statistics of the sociodemographic characteristics of the respondents are presented, sources of unregistered medicines on the local market and health worker perspectives on unregistered medicines. The response rate was 91%. The data presented is on the perspectives on unregistered medicines of health workers practicing in Harare, price comparison of unregistered and registered medicines, and demand and implications of unregistered medicines. Tables and graphs are used to present the research findings. A brief analysis of the research findings is also given.

4.2 Data Presentation and Analysis

4.2.1 Demographic Characteristics

A total of 136 respondents participated in the study. The median age of the respondents was 32, with an interquartile range of 9 (Q1=28, Q3=37). The majority of the respondents were female (53.7%), employed in the private sector (73.5%), less than 34 years (64.7%), and had a level of experience between 1 to 5 years (45.6%). Pharmacy personnel (Pharmacists, Pharmacy technicians, Dispensary assistants and Over the Counter Assistants) constituted 74.3% (101) of the respondents whereas doctors constituted 20.6% (28). Nurses and laboratory personnel (medical laboratory scientists and laboratory technicians) constituted 2.2% (3) and 2.9% (4) respectively. Table 1 below summarises the socio-demographic characteristics of the respondents.

Table 1: Socio-demographic characteristics of respondents

	n	%
Age (years)		
Less than 34	88	64.7
35-44	36	26.5
45-54	7	5.1
55 and above	5	3.7
Gender		
Male	63	46.3
Female	73	53.7
Profession		
Pharmacy personnel	101	74.3
Doctor	28	20.6
Nurse	3	2.2
Laboratory personnel	4	2.9
Number of years in practice		
1-5	62	45.6
6-10	38	27.9
11-15	19	14.0
16-20	6	4.4
21 and above	11	8.1
Sector employed		
Private	100	73.5
Government	26	19.1
Non-governmental organisation	5	3.7
Others	5	3.7

4.2.2 Sources of Unregistered Medicines

This investigation managed to state seven (7) sources of unregistered medicines on the local market. Of these sources, the major sources that were identified were cross border traders (56.5%). Other key sources of unregistered medicines that were stated were street vendors (11%) and professionals with a know-how of pharmacy practice (10.3%). About 7.4% of the respondents were not sure of the sources of unregistered medicines. The majority of the respondents stated Zambia as the source of unregistered medicines (52.2%).

Pharmaceutical wholesalers and distributors, health shops and private surgeries were stated as sources of unregistered medicines by 3.7% of the respondents. Six respondents (4.4%) cited the source of unregistered medicines to be people who work in the pharmaceutical sector, such as pharmacists, pharmacy technicians, dispensary assistants and other professions dealing with pharmaceuticals. Other professionals and people dealing with herbal drugs were identified as sources of illegal and unregistered medicines by 2.9% of the respondents. Interestingly, retail pharmacies were included in the list of sources of unregistered medicines and were cited by 3.7% of the respondents.

Countries that were cited as sources of unregistered medicines found on the Zimbabwean market are mainly neighbouring countries sharing borders with Zimbabwe or countries with high economic trade with Zimbabwe. Of the neighbouring countries, South Africa was the second cited source after Zambia, with 11% of the participants indicating that unregistered medicines on the Zimbabwean market are from South Africa. Eleven participants (8.1%) cited Mozambique as the source of unregistered medicines. Countries with high economic trade with Zimbabwe were included, for example India was cited as

the source of unregistered medicines by 6.6% of the participants. Table 2 summarises the identified sources of unregistered medicines.

Table 2: Sources of unregistered medicines

	n	%
Source		
Cross border traders/smugglers (runners)	77	56.5
Pharmaceutical wholesalers, health shops and private surgeries	5	3.7
People who work in the pharmaceutical sector	6	4.4
Street vendors	15	11
Other health professionals and people dealing with herbal products	4	2.9
Professionals with a know-how of pharmacy practice	14	10.3
Retail pharmacies	5	3.7
Not sure	10	7.4
Source countries		
Zambia	71	52.2
Mozambique	11	8.1
South Africa	15	11
Nigeria	2	1.5
India	9	6.6
China	3	2.2
Malawi	8	5.9
Democratic Republic of Congo	2	1.5
Tanzania	4	2.9
Botswana	3	2.2
Not sure	8	5.9

4.2.3 Health worker perspectives on unregistered medicines

The investigation managed to explore the perceptions of health workers on unregistered medicines. Majority of the respondents (64.7%) were of the viewpoint that health workers are involved in illegal importation of unregistered medicines. Most of the respondents (77.9%) believed that health workers were purchasing unregistered medicines and medical products from unlicensed distributors. The view that drug shortages and erratic supply are contributing to the rise in use of unregistered medicines was stated by 82.4% of the respondents. Respondents who cited drug shortages also highlighted that when a registered medical product is not available on the local market, unregistered similar medicines quickly fill in the market through runners who source the products from neighbouring countries such as Zambia and Mozambique.

Most respondents (83.1%) had the view that high drug prices that are beyond the reach of many are contributing to the rise in use of unregistered medicines. Majority of the respondents (47.8%) also believed that incapacitation of the regulatory authority was contributing to the proliferation of unregistered medicines on the local market. Eighty nine percent of the respondents were of the perception that porous borders were contributing to the proliferation of unregistered medicines.

Most respondents (72.1%) had the perception that regulatory authorities are creating an environment that discourages registration of medicines, due to expensive application fees, a lengthy assessment phase as well as the expensive retention fees which are paid on a yearly basis so that the medicine remains on the register that is kept by the national regulatory authority. Some respondents stated that although the fees depends on the category of the medicine, the application and retention fees are generally expensive. Some

respondents also indicated that it becomes difficult for herbal medicines developed locally to get registered with the authority because the innovators may not have the capacity to get it registered and may distribute the product on the local market without getting it registered. Table 3 below summarises the perceptions of health workers on unregistered medicines.

Table 3: Health workers perspectives on unregistered medicines

	n (%)	n (%)	n (%)
	Yes	No	Maybe
Health workers are involved in illegal importation of unregistered medicines	88(64.7)	12(8.8)	36(26.5)
Health workers are purchasing unregistered medicines and medical products from unlicensed distributors	106(77.9)	5(3.7)	25(18.4)
Drug shortages and erratic supply are contributing to the rise in use of unregistered medicines	112(82.4)	11(8.1)	13(9.6)
High drug prices beyond the reach of many are contributing to the rise in use of unregistered medicines?	113(83.1)	15(11.0)	8(5.9)
Incapacitation of the regulatory authority is contributing to the proliferation of unregistered medicines?	65(47.8)	38(27.9)	33(24.3)
Porous borders are contributing to the proliferation of unregistered medicines?	121(89)	4(2.9)	11(8.1)
	Agree	Disagree	
Regulatory authorities are creating an environment that discourages registration of medicines	98(72.1)	38(27.9)	

4.2.4 Factors contributing to the proliferation of unregistered medicines

This study managed to unearth the contributing factors to the proliferation of unregistered medicines. Majority of the respondents (22.8%) stated that unemployment, economic hardships and poverty is the contributing factor to the proliferation of unregistered medicines. The lack of medicines on the local market was identified as a contributing factor by 16.2% of the respondents. Some respondents felt that unregistered medicines are booming on the Zimbabwean market due to lack of strict regulations by the health ministry. This was cited by 10.3% of the respondents.

About ten percent of the respondents felt that unregistered medicines are becoming increasingly common on the local market because registered medicines are highly priced. Another 8.1% of the respondents felt that the observed phenomenon is due to the public not being aware of the dangers associated with the use of unregistered medicines. Some respondents also cited that some members of the public are of the opinion that unregistered medicines work better than registered medicines that are accessed through formal channels.

Unethical practices by some health workers was cited as a contributing factor to the rise of the sale and use of unregistered medicines by 7.5% of the respondents. Thirteen participants (9.6%) felt that illegal, counterfeit, falsified and unregistered medicines are booming on the local market because the registered medicines found through formal channels are highly priced.

Country wide corruption was also cited as a contributing factor to the rise of unregistered medicines on the Zimbabwean market. Corruption was cited by 6.6% of the respondents.

Some respondents indicated that corruption is rampant at the country's borders where the unregistered medicines are smuggled into the countries with police officers, government officials and border authorities being involved in the corrupt activities.

Six participants (4.4%) indicated that unregistered medicines are booming on the local market due to limited local manufacturing. Some respondents highlighted that the local manufacturing industry does not have the capacity to produce medicines to meet the needs of the local population. The deficit in supply is therefore complemented by foreign produced medicines that might not have local registration status.

Recently there has been a lot of competition in the pharmaceutical industry. This competition is contributing to the purchase and distribution of pharmaceutical drugs and medical devices that would not have been registered with the national regulatory authority. This phenomenon was cited by 3.7% of the participants. Three participants (2.2%) stated that unregistered medicines are booming on the local market because the industry is being penetrated by non-professionals who are only driven by profits. They stated that these non-professional look for cheaper versions of medicines and sell them at the same price as the original or brand medicines, however, the cheaper versions of the medicines may not have been evaluated and acquired registration status from the national regulatory authority.

Poor health insurance coverage was cited as contributing to the proliferation of unregistered medicines by 2.9% of the respondents. The respondents who were of this perception went on further to state that people who are not on health insurance only rely on out of pocket spending and might not be able to pay for the registered medicines accessed through formal channels and might opt for unregistered medicines that are

relatively cheaper compared to similar registered medicines. The complexity of the section 75 ordering process, which allows people to access unregistered medicines after prior approval by the authority, was cited by 1.5% of the respondents. Only six participants (4.4%) were not sure of the factors that are contributing to the proliferation of illegal, substandard, counterfeit and unregistered pharmaceuticals and medical devices on the local market. Table 4 shows the identified factors contributing to the proliferation of unregistered medicines in Zimbabwe.

Table 4: Factors contributing to the proliferation of unregistered medicines

	n	%
Corruption by law enforcement agencies e.g. police officers	9	6.6
Lack of medicines on the local market	22	16.2
Unemployment, poverty and economic hardships	31	22.8
Unethical practices by some health workers	10	7.5
Lack of strict regulations	14	10.3
Lack of public awareness	11	8.1
Highly priced medicines	13	9.6
Limited pharmaceutical manufacturing	6	4.4
Competition in the pharmaceutical industry	5	3.7
Penetration into the pharmaceutical sector by non-professionals	3	2.2
Poor health insurance coverage	4	2.9
Complexity of the section 75 ordering process	2	1.5
Not sure	6	4.4

4.2.5 Perspectives on medicine prices

Majority of the respondents (70.6%) had the viewpoint that unregistered medicines were cheaper than registered similar medicines. About a quarter of the respondents (25.7%) were not sure of the price difference between registered and unregistered medicines. Among the potential factors contributing to the booming of unregistered medicines, 87.5% of the respondents stated that they considered the price of the medicine when dispensing or prescribing medicines to patients.

Interestingly, 3.7% of the respondents were of the viewpoint that there exist no price difference between registered and unregistered medicines. Some of the respondents stated that actually some of the unregistered medicines are more expensive than the registered medicines found on the local market. Additionally, 12.5% of the respondents indicated that they did not consider price when prescribing or dispensing medication, but instead considered the safety and effectiveness of the medicine that they will be prescribing or dispensing. Table 5 below shows the perspectives on medicine prices of the respondents.

Table 5: Perspectives on medicine prices

	n (%)	n (%)	n (%)
	Yes	No	Maybe
Unregistered medicines are cheaper than registered similar medicines	96(70.6)	5(3.7)	35(25.7)
	Yes	No	
Do you consider price when prescribing or dispensing medicines	119(87.5)	17(12.5)	

4.2.6 Demand and implications of unregistered medicines

While 16.2% of the respondents stated lack of medicines as the contributing factor to the proliferation of unregistered medicines, 36% of the health workers who participated agreed to have encountered circumstances where they needed an unregistered medicine to diagnose, treat or monitor a patient, table 6 below. Approximately a quarter of the respondents (25.4%) agreed to have experienced an adverse drug reaction in a patient following the use of an unregistered medicine. About a fifth of the respondents (18.3%) stated that their patients had experienced treatment failure after using an unregistered medicine. Only 14.1% of the respondents felt that all unregistered medicines are of poor quality.

Table 6: Demand and implications of unregistered medicines

	n (%)	n (%)
	Yes	No
Have you encountered circumstances, during your practice, where you needed an unregistered medicine to diagnose, treat or monitor a patient?	49(36)	87(64)
Have any of your patients, to your knowledge, ever experienced an adverse drug reaction following use of an unregistered medicine?	33(25.4)	97(74.6)
Have you ever experienced treatment failure due to the use of unregistered medicines?	24(18.3)	107(81.7)
	Agree	Disagree
All unregistered medicines are of poor quality	19(14.1)	116(85.9)

4.2.7 Comparison of Market Prices

4.2.7.1 Wholesale Medicine Prices

The study looked at wholesale prices of selected medicines and compared unregistered vs registered medicine prices. In most cases, registered medicines had higher prices compared to similar unregistered medicines. This trend was true for both acute and chronic medicines.

The wholesale medicine price comparison was done by looking at the prices of medicines from local registered pharmaceutical wholesalers and distributors and compared the prices with wholesale prices from unregistered distributors. Comparison was made between similar dosage forms, strength as well as pack size.

In general, unregistered medicines were cheaper compared to similar registered medicines. However, a comparison of acute medicine prices such as antibiotics and analgesic, anti-inflammatory and antipyretic medicines revealed that most unregistered medicines were more expensive compared to similar registered medicines. On the other hand, a closer look at chronic medicines such as antihypertensive medicines, antidiabetic medicines and anti-hyperlipidaemic medicines revealed that registered medicines were more expensive that similar unregistered medicines.

In some instances, there was no price difference between registered and unregistered medicines, or the price difference was so insignificant such that the retail prices for such medicines was likely going to be the same. The researchers also noted some products which were being sold illegally which had no similar alternatives on the local market and

their prices could not get similar products to compare with. These included skin bleaching creams and skin bleaching tablets.

Other products that were noted that had no similar registered alternatives include male and female sex enhancing drugs as well as antihistamine drugs that boost appetite. Table 7 below gives a comparison of wholesale medicine prices for registered and unregistered medicines.

Table 7: Wholesale medicine price comparison

Medicine	Registration status	Cost price ($)	Price difference ($) (Registered – Unregistered)
Ibuprofen 200mg 100s	Unregistered	4.49	-1.99
	Registered	2.5	
Cafemol adult tablets 100s	Unregistered	2.30	1.4
	Registered	3.7	
Aspirin 300mg 100s	Unregistered	1.99	0.01
	Registered	2.00	
Neutracid tablets 100s	Unregistered	2.29	0.89
	Registered	3.18	
Diclofenac 50mg 100s	Unregistered	2.00	0.45
	Registered	2.45	
Ibuprofen 400mg 100s	Unregistered	5.50	-1.5
	Registered	4	
Atorvastatin 20mg 100s	Unregistered	10.00	3.21
	Registered	13.21	
Ciprofloxacin 500mg 100s	Unregistered	15.00	-5.51
	Registered	9.49	
Amlodipine 10mg 100s	Unregistered	5.00	2.5
	Registered	7.5	

Figure 4 below gives a graphical comparison of the medicine prices, with regards to their registration status. A positive difference indicates that the registered medicine is more expensive than the unregistered brand. On the other hand a negative difference indicates that the unregistered medicine is more expensive than the registered brand. In most cases, however, the unregistered medicines tend to be cheaper compared to the registered medicines.

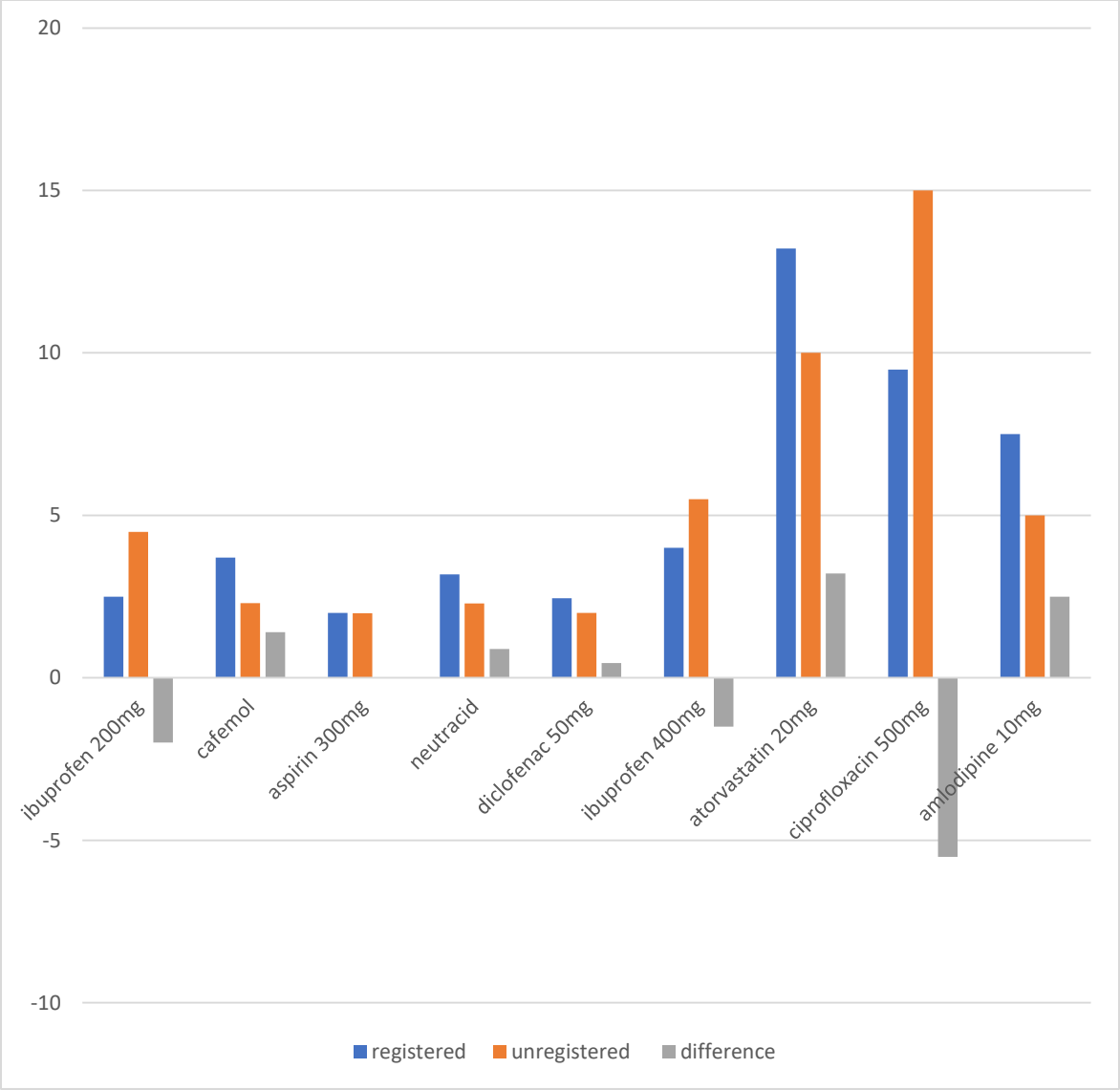


Figure 4: Graphical comparison of wholesale medicine prices

4.2.7.2 Retail Medicine Prices

Medicine prices in retail pharmacies and street markets were gathered. Comparison was made looking at similar dosage forms, pharmacological activity, and the strength of the medicine as well as the pack size of the medicine. As with the wholesale prices, most of the unregistered medicines are cheaper compared to similar registered medicines.

The retail medicine price comparison was made by comparing medicine prices from retail pharmacies located at hospitals, located in the central business district and those in residential suburbs with the prices of unregistered medicines being sold at street stalls, tuckshops, and bus termini and in the backyards.

Although a general trend was noted that registered medicines were more expensive than similar unregistered medicines, it was noted that some of the registered acute medicines were actually less expensive compared to similar unregistered medicines. In some cases, registered and similar unregistered medicines had the same retail price, for example, Diclofenac tablets, or the retail price difference was very insignificant as with the case with combined oral contraceptives.

It was also noted that huge price differences exist between registered and unregistered retail prices of some medicines such as Azithromycin 500mg tablets and Ibucap/Ibucet capsules. Besides oral dosage forms, the same observation was also noted with registered versus unregistered topical creams such as Clobetasol cream.

As with the wholesale comparison, some medicines were noted at the unregistered retail outlets which were being sold illegally and had no local registered alternatives to make comparisons with. In addition to male and female sex enhancing oral drugs, some topical

powders for sex enhancement were also noted. Table 8 below provides a summary of the comparison between the formal and informal outlets.

Table 8: Comparison of retail prices of medicines

Medicine	Registration status	Cost price ($)	Price difference ($) (Registered – Unregistered)
Ibuprofen 200mg 10s	Unregistered	0.38	0.12
	Registered	0.50	
Sildenafil 500mg 1s	Unregistered	0.42	0.58
	Registered	1.00	
Ciprofloxacin 500mg 10s	Unregistered	0.94	1.06
	Registered	2.00	
Azithromycin 500mg 3s	Unregistered	2.50	2.83
	Registered	5.33	
Doxycycline 100mg 10s	Unregistered	1.00	1.00
	Registered	2.00	
Ibucap/Ibucet	Unregistered	1.25	3.92
	Registered	5.17	
Sildenafil 100mg 1s	Unregistered	0.29	1.71
	Registered	2.00	
Metronidazole 200mg 30s	Unregistered	1.25	0.58
	Registered	1.83	
Control 28s	Unregistered	0.46	0.04
	Registered	0.50	
Secure 28s	Unregistered	0.33	0.17
	Registered	0.50	
Clobetasol/Betasol	Unregistered	0.83	2.42
	Registered	3.25	
Amoxicillin 500mg 30s	Unregistered	3.00	-1.00
	Registered	2.00	

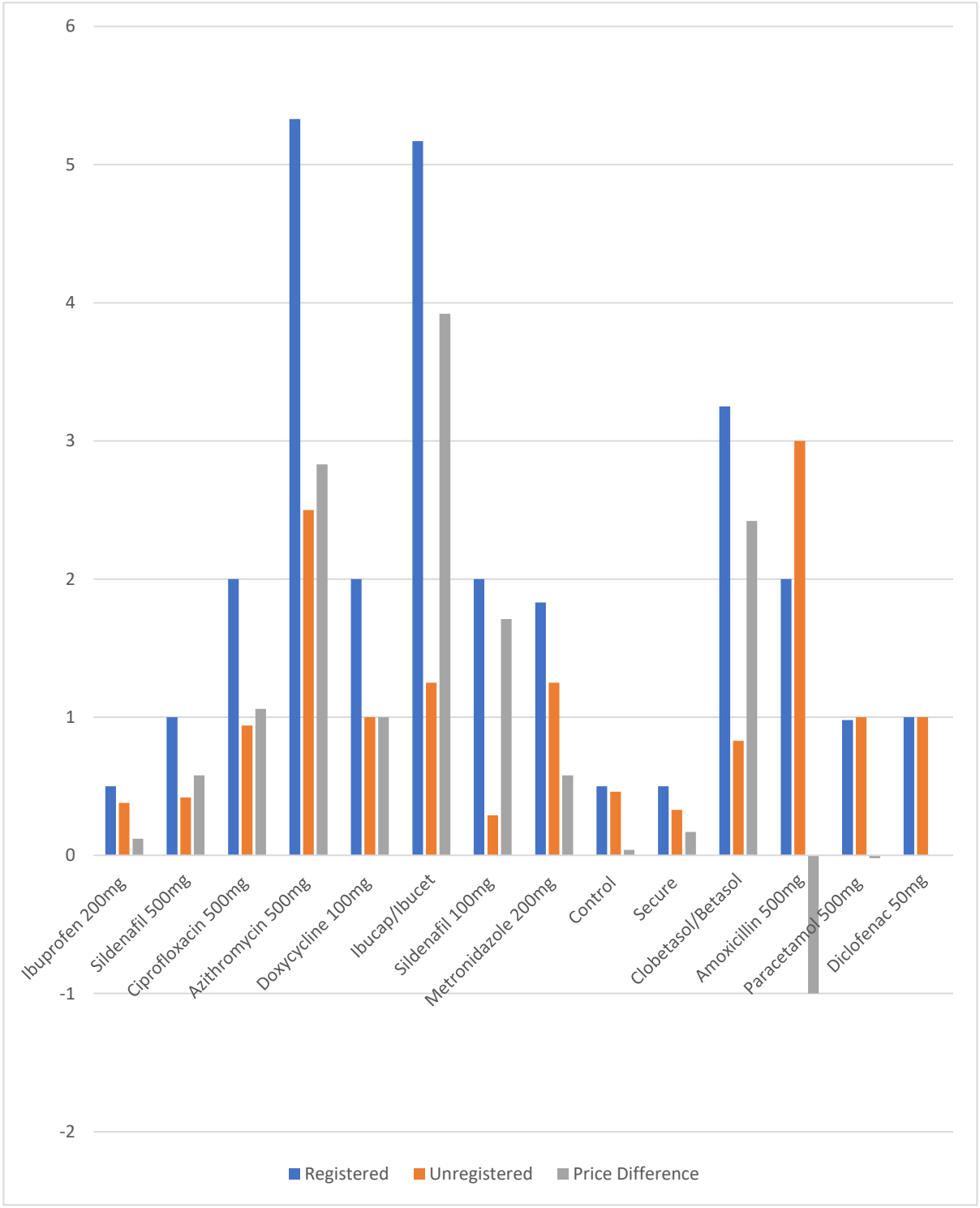
Paracetamol 500mg 30s	Unregistered	1.00	-0.02
	Registered	0.98	
Diclofenac 50mg 20s	Unregistered	1.00	0.00
	Registered	1.00	

Medicines from all categories were found on the informal outlets. These include analgesics, antibiotics, antifungals, oral contraceptives, topical creams and sex enhancing creams and pills. It was also discovered that medicines used for abortion are being sold on the informal market. In the majority of the cases, unregistered medicines were found to be cheaper than registered similar medicines, with the exception of abortion pills and a few other medicines.

Figure 5 below provides a graphical comparison of the retail prices for the registered and unregistered medicines. Although registered medicines are more expensive than unregistered medicines in most of the cases, it is interesting to note that the retail price for some unregistered medicines is more than similar registered medicines. This is true for some antibiotics, pain killers and medicines used or illegal abortion. Some pain killers such as Diclofenac and Paracetamol have the same retail price regardless of the registration status.

An interesting observation made by the researchers is that some registered medicines are being sold on the informal markets at lower prices compared to the formal outlets. Registered medicines that are being sold on the informal markets include antifungal tablets, analgesics such as Paracetamol and Diclofenac, oral contraceptives and antibiotics such as Ciprofloxacin.

Figure 5: Graphical comparison of retail medicine prices



4.3 Discussion and Interpretation

This descriptive cross-sectional study was conducted to analyse the drivers for the proliferation of unregistered medicines in Harare, 2023. The study sought to explore the perspectives of health workers on unregistered medicines, compare the cost of unregistered medicines being sold in Harare with similar registered medicines, and determine if health workers encounter circumstances where they need unregistered medicines to treat, diagnose and monitor patients.

The majority of the respondents felt that unregistered medicines are booming on the local market because registered medicines that are accessed through formal channels are expensive beyond the reach of many. On the other hand, unregistered medicines are smuggled into the country thus bypassing the payment of duty tax. As a result of that, the market price of smuggled medicines tends to be lower than that of formally imported medicines.

Drug shortages and erratic supply were also found to contribute to the rise in use of unregistered medicines. The pharmaceutical sector experiences perennial shortages of medicines in both the private and public sectors. These shortages create an opportunity for informal traders to chip in and improve access to life saving medicines. These shortages are even made worse by the limited capacity for local manufacture of medicines in the country. The reliance on imported medicines compromises commodity security. When there is critical need of these medicines, for example, lifesaving antibiotics, family planning pills and chronic medication, people end up sourcing these medicines from informal markets.

The majority of the respondents also felt that unregistered medicines are becoming increasingly common on the market because of porous borders. This is further worsened by rampant corruption by law enforcement agents at the country's borders.

Unregistered medicines on the local market are smuggled from neighbouring countries such as Zambia, Mozambique, South Africa and Malawi. The close proximity of these countries to Zimbabwe makes it easier for cross border traders to access these medicines and sell them on the Zimbabwean market.

The investigation compared the prices of unregistered medicines with similar registered medicines. In most cases, unregistered medicines were found to be cheaper than registered medicines. This may be attributed to the fact that unregistered medicines bypass a number of legal channels such as the payment of duty tax and proper transportation channels. This makes the acquisition cost significantly cheaper when compared to that of registered medicines. As a result of that, unregistered medicines sell at a cheaper price compared to similar registered medicines. A combination of low health insurance coverage and unemployment, poverty and economic hardships further compel people to look for medicines that are cheaper, due to affordability reasons. In addition, a comparison of both the wholesale and retail prices for registered and unregistered medicines revealed that unregistered medicines are cheaper on both wholesale and retail outlets.

Majority of the respondents indicated that they had encountered circumstances where they needed an unregistered medicines to diagnose, treat and monitor a patient. Conditions for which unregistered medicines were required include hypertension, diabetes, acne, epilepsy, idiopathic pulmonary fibrosis, cancer, psychosis, covid-19, rheumatoid arthritis, leukaemia, lymphoma and Peyronie's disease. This clearly shows that the medical

fraternity is in need of medicines outside the essential medicines list and the approved medicines list.

However, some respondents who are involved in importation of medicines through the Section 75 ordering process indicated that the process is complicated. This results in people making use illegal and informal channels to get access to lifesaving medicines.

At least a quarter of the respondents indicated that they had experienced an adverse reaction following the use of an unregistered medicine. This translates to 40 in every 1000 people. This shows that unregistered medicines are a threat to public health because their safety and effectiveness cannot be guaranteed. Furthermore, the channels through which they are accessed do not provide enough information on the use of medicines which may result in harm on the patient. About eighteen percent of the respondents also indicated that they had experienced treatment failure following the use of unregistered medicines. This further confirms that the quality of unregistered medicines may be compromised.

4.4 Summary

The investigation found out that high medicine prices and perennial medicine shortages are some of the contributing factors to the proliferation of unregistered medicines on the local market. Porous borders together with rampant corruption by law enforcement agencies also contribute to the booming of unregistered medicines. The study also found out that health workers are in need of medicines that are outside the approved medicines list. However, use of these medicines has been associated with adverse drug reactions and treatment failure.

CHAPTER 5 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The analysis of the drivers of the proliferation of unregistered medicines revealed that high medicine prices, perennial medicine shortages and low health insurance coverage are some of the contributing factors to the booming of unregistered medicines on the Zimbabwean market. The study also revealed that health workers are in need of some of the medicines that are not registered to diagnose, treat and monitor patients. However, it was also discovered that the use of unregistered medicines that have not been evaluated is associated with adverse drug reactions and treatment failure.

5.2 Discussion

This study aimed to explore the perspectives of health workers on unregistered medicines, compare the cost of registered medicines with that of unregistered medicines, and to determine if health workers encounter circumstances where they needed unregistered medicines to treat, diagnose and monitor patients. Overall, most health workers agree that not all unregistered medicines are of poor quality.

Most respondents felt that high drug prices beyond the reach of many are contributing to the rise in use of unregistered medicines. This was further confirmed when a comparison of wholesale and retail prices for registered and unregistered medicines was made. With the majority of the population living on informal trading, most people cannot afford the expensive health care services. These findings are consistent with discoveries by Barton et al (2019) who found out that in low- and middle-income countries, particularly in Sub-Saharan Africa, many life-saving drugs are still inaccessible and unaffordable.

Although registered medicines are generally more expensive compared to similar unregistered medicines, it is not sorely the issue of medicine prices that is driving the proliferation of unregistered medicines on the local Zimbabwean market. This is because of the comparison of both retail and wholesale prices for registered and unregistered medicines which explicitly showed that some registered medicines are actually cheaper than unregistered medicines that are accessed on the informal markets. Therefore, other factors like consumer preference, or lack of knowledge might be contributing to the proliferation of unregistered medicines on the local market.

Majority of the respondents cited drug shortages and erratic supply as one of the contributing factors to the rise in use of unregistered medicines. The general population face challenges in accessing medicines from the country's public and private health facilities. At the same time, availability of medicines on the informal market compels the public to purchase unregistered medicines from the informal market. These results are similar to conclusions drawn out by Yenet et al (2023) who stated that over 30% of the world's population does not have fixed access to essential medicines and that more than half of the African population lacks access to essential medicines.

In addition, these drug shortages compel the government into accepting medicine donations from other countries for use by the country's population. Although these donations are done officially, these medicines would not have been registered with the national regulatory authority and it is highly likely that their assessment would not have been done properly, either because of the political interference into the donations, or because of overwhelming volumes of medicines that come as donations.

Incapacitation of the regulatory authority was also cited as a contributing factor to the proliferation of unregistered medicines. The Medicines Control Authority of Zimbabwe is located in Harare, but regulates pharmacies and registered personnel operating in the country's 10 provinces. Lack of decentralisation and inadequate human and financial resources results in inadequate regulation both at the country's borders and market places. This was confirmed by Yenet et al (2023) who highlighted that inadequate human resources and financial constrains are some of the obstacles to the availability of essential medicines in many African countries.

The incapacitation of the national regulatory authority is not only restricted to inadequate human and financial resources, but also includes technological and legal capacity to execute their function. Regarding technological capacity, the national regulatory authority does not have adequate and recent technology to test and detect falsified and counterfeit medicines. This is evidenced by recalls that have been done several months after the product has been in use for some time, the defect or lack of therapeutic effectiveness only to be reported by vigilant health workers who would have noticed an unusual trend associated with the use of a particular batch of medicine.

Regarding legal capacity, the national regulatory authority is not capable of dealing with individuals illegally dealing in pharmaceutical drugs and medical devices. They have to engage the Zimbabwe Republic Police. This scenario creates a bureaucratic structure and creates inefficiency in executing the roles of the national regulatory authority. It follows that if the Zimbabwe Republic Police is incapacitated in terms of human resources, the national regulatory authority will not be in a position to deal with illegal traders of pharmaceutical drugs and medical devices.

Most participants had the perception that regulatory authorities create an environment that discourages registration of medicines. Besides the long registration process, keeping a medicine on the approved medicines register is very expensive due to the hefty application, inspection and retention fees that are required by regulatory authorities. Barton et al (2019) made a similar observation and stated that as national regulatory authorities carry out certain functions and advance their legitimacy, they often create a regulatory environment that discourages manufacturers from entering, or staying in certain markets. Consequently, drug prices remain high leading to shortages and the proliferation of informal markets of unregistered drugs.

This phenomenon has been mainly responsible for the proliferation of unregistered complementary medicines of Zimbabwean origin. Most people who develop these complementary medicines do not have the capacity to pay for the inspection and retention fees and opt to get their products on the local market without prior registration with the authority. This promotes rampant proliferation of unregistered medicines on the local market.

Porous borders are also contributing to the proliferation of unregistered medicines. This is further worsened by corruption by law enforcement agents at the country's borders. A combination of factors such as poor remuneration of border authorities and a high unemployment rate promotes rampant corruption at the country's borders. This finding is consistent with findings by Dégardin et al (2014) who stated that issues such as corruption are imperative causes of poor affordability, availability, and quality of medicines.

The issue of corruption not only affects pharmaceutical drugs and medical devices that are sold in the private sector, but also affects the quality of medicines and medical devices

in the country's public health system. Corruption during the procurement process by top government officials who are in decision making positions may result in counterfeit and substandard medicines being used for disease treatment and management in the country's public health system. As highlighted by the Committee on understanding the global public health implications of substandard, falsified, and counterfeit medical products (2013), good procurement puts a strong emphasis on controlling corruption and promoting transparency.

Porous borders have also contributed to the influx of totally new pharmaceutical products such as male and female sex enhancing drugs. Because they are sole products on the market with no registered alternatives, these products are being sought after by people who abuse sex enhancing drugs. This leads to the proliferation of such unregistered medicines.

Unemployment, poverty and economic hardships also make a contribution to the booming of unregistered medicines which may be substandard or falsified. According to the World Bank, the unemployment rate in Zimbabwe was at 7.9% in 2022. Most of the unemployed individuals end up engaging in illegal informal businesses. This may include the sale of illegal, unregistered, substandard and falsified drugs. These findings are consistent with observations by Chinnock (2009) who stated that an increasing number of drugs circulating in most low and middle income countries are substandard. Although countries in the developed world are concerned about substandard and falsified drugs, it is people from poor countries who are most likely to suffer the consequences of unregistered, substandard and falsified drugs.

The economic hardships being experienced in the country have also resulted in people either dropping off medical insurance or not affording medical insurance. This means that most people rely on out of pocket spending on health services. As a result of the combination of highly priced medical services in the private sector and unavailability of quality medical services in the public sector, most individuals end up purchasing medicines from illegal outlets due to the relative affordability of medical products from illegal outlets.

Economic hardships on the side of the health workers has also pushed health workers into irrational prescribing through the prescribing of too many medicines for minor ailments in a bid to increase the bill for the patient and make them pay more. For example, a simple flu may see a patient getting prescribed an assortment of both injectable and oral antibiotics. In particular, a single dose of Ceftriaxone 1g injection which costs less than $1 from the local wholesalers may be administered at a cost that ranges from $10 to $20. This practice has pushed many people from private health facilities, and since they cannot get meaningful health services from the country's public health facilities, they end up making use of unregistered medicines that are found on illegal and informal markets.

Another troubling factor that was cited by the respondents as contributing to the proliferation of unregistered medicines was unethical practices by some health workers. This includes health workers who are involved in illegal importation of unregistered medicines and health workers who purchase unregistered medicines and medical products from unlicensed distributors. The importation and purchase of unregistered medicines is common among medicines that are difficult to access on the local market. This finding is consistent with discoveries by DuBois et al (2019) who noted other unethical practices in

health practice such as prescribing opioids for profit to people with substance use disorders, and performing unnecessary invasive procedures for profit.

Most respondents stated that lack of strict regulations was making a contribution to the rise in use and marketing of unregistered medicines. The regulatory authorities target registered personnel only and leave out unregistered persons who deal in unregistered medicines. There are no strict regulations that restrict street vendors from selling medicines and they are left to do as they wish. As stated by Kuanpoth (2018), governments are obliged to ensure the safety, efficacy and quality of medicines that are available to the public by regulating the manufacture and distribution of medicines and by exercising legal power to prevent the proliferation of unsafe, unregistered, falsified and counterfeit medicines.

The lack of strict regulations has also resulted in the sprouting of herbal clinics that are offering alternative health services to unsuspecting members of the public. At these clinics, they are offered dubious biological/biochemical tests to assess various body system parameters. Additionally, members of the public are offered various herbal medicines that would not have been assessed for their safety and effectiveness by the national regulatory authority. It is of no doubt that lack of strict regulations has contributed to the use of unregistered medicines.

Limited capacity for local manufacture of medicines and penetration into the pharmaceutical sector by non-professionals is also contributing to the proliferation of unregistered medicines. Dependence on imported medicines creates a risk of product stock outs. When medicines are not available, the market is complemented with unregistered medicines that may not be safe. As stated by Newton et al (2006), when effective and

legitimate medicines are not accessible or when they are unaffordable, demand is quickly filled with illegitimate medicines. The illegitimate medicines may be substandard or falsified.

The unavailability of locally produced medicines produces a dependency on imported medicines to manage the country's population. Most of the country's medication needs are met by donations from other countries. The capacity to negotiate for more potent molecules is limited. The inability to meet the local population's needs through locally produced medicines coupled with lack of capacity to regulate pharmaceutical products and medical devices may result in falsified, substandard, counterfeit and unregistered medicines being used in the country's public health institutions.

Another contributing factor that was noted is poor health insurance coverage. Chipunza & Nhamo (2023) stated that private health insurance in Zimbabwe caters for about 10% of the population. This means that majority of the population is dependent on out of pocket expenditure. As such accessing proper health services is out of the reach of many, who resort to seeking health services from informal channels. This creates demand for informal health services and unregistered medicines, leading to the proliferation of informal markets.

Majority of the respondents had the perspective that unregistered medicines are cheaper than registered similar medicines. This was further confirmed when a price comparison for registered and unregistered medicines was made. Of the 14 products whose retail prices were compared, 12 (85.71%) of the registered products were more expensive than the similar unregistered products. With the economic hardships affecting the country,

people are compelled to opt for cheaper medical products when looking for healthcare services.

Most respondents (87.5%) indicated that they consider price when prescribing or dispensing medicines. This promotes affordability of medicines and in turn enhances compliance with prescribed medication. These results are similar to findings by Reichert et al (2000) who reported that in their study, most respondents (88%) felt that cost was an important consideration when making medication choices. Additionally, they stated that if physicians have inadequate knowledge on medication costs, it may unwittingly contribute to the problem of compliance.

Worryingly is the finding that some respondents cited that they experienced treatment failure due to the use of unregistered medicines. Additionally, about a quarter of the respondents indicated that they had experienced an adverse drug reaction following use of an unregistered medicine. This shows that unregistered medicines are a risk to public health as they are not properly monitored through post market surveillance. As reported by Kelesidis & Falagas (2015), unregistered medicines are likely to cause poisoning, lead to treatment failure and result in premature death.

On the other hand, most respondents indicated that they had encountered circumstances where they needed an unregistered medicine to diagnose, treat or monitor a patient. This shows that the current register of approved medicines is not broad enough to cover most of the conditions affecting majority of the population. As a result of this, patients and health workers end up making use of unregistered medicines which may not be safe for use, to manage certain health conditions. However, as highlighted by Panda et al (2017),

illegitimate and unregistered medicines are likely to cause drug resistance thereby forcing additional costs in coming up with new drug entities to replace ineffective medicines.

The investigation managed to identify sources where unregistered medicines are purported to be coming from. Majority of the respondents cited that unregistered medicines are finding their way onto the local market through cross border traders or smugglers, commonly known as runners. Persons with a know-how of pharmacy practice were also cited as being involved in smuggling unregistered medicines into the country. These medicines also find their way to street vendors who sell unregistered medicines on street stalls to the general public.

The most commonly cited country as the source of unregistered medicines is Zambia. This is because of the close proximity of the Zambian capital to Harare. Additionally, there is more trading activities between Zambia and Zimbabwe in terms of basic goods and services. This makes it easier to bring in other products such as unregistered medicines. Mozambique, India and Malawi were also cited by most respondents as the source countries of unregistered medicines.

The investigation also managed to identify that unregistered medicines are proliferating due to lack of public awareness. Despite recommendations made by the national regulatory authority to purchase pharmaceutical products only from approved and registered premises, members of the public continue to look for pharmaceutical products from unregistered outlets. This may be attributed to the general lack of public awareness of the dangers and risks associated with the use of unregistered pharmaceutical products and medical devices. One of the risks, as cited by the respondents, is treatment failure following use of unregistered pharmaceutical products.

Another contributing factor to the booming of unregistered medicines on the local Zimbabwean market is competition within the pharmaceutical sector. The growing demand for pharmaceutical products and medical devices, especially during the COVID – 19 era, saw increasing competition from people intending to get into the pharmaceutical supply chain. Consequently, some suppliers had a tendency of smuggling pharmaceutical products and get them on the local market without them having been evaluated by the national regulatory authority.

The investigation identified that there are some registered pharmaceutical products that are being sold on the informal market. This is a clear indication that there are loopholes which are getting these products on the informal market yet they are supposed to be sold in registered and licensed premises. Examples of such medicines include Griseofulvin 250mg tablets (an oral antifungal medicine), Control and Secure pills (which are both oral contraceptives) and Neutracid tablets (an antacid). Although these products are registered, they are sold by unqualified personnel who do not understand the correct dosing requirements and the drug interactions that may arise.

Of interest to note is that 14.1% of the respondents were of the opinion that all unregistered medicines are of poor quality. Although there is a high risk of unregistered medicines being substandard, counterfeit or falsified, some unregistered medicines are of good quality. Such medicines only need assessment to ascertain their safety and effectiveness. This is further confirmed by the finding that 36% of the respondents had encountered circumstances during their practice where they needed an unregistered medicine to diagnose, treat or monitor their patients. At the same time, unregistered medicines need to be assessed for safety and effectiveness before they are used because this investigation

also found out that 25.4% of the respondents had had patients who experienced an adverse drug reaction following the use of an unregistered drug.

5.3 Conclusions

The analysis of the drivers of unregistered medicines managed to identify ways through which unregistered medicines are finding their way to the local market. Identified sources include cross border traders/smugglers, professionals with some knowledge of pharmacy practice as well as pharmaceutical wholesalers, health shops and private surgeries. Source countries of unregistered medicines were also identified. These were identified as neighbouring countries to Zimbabwe such as Mozambique, South Africa and Zambia. Other source countries were identified as those with high economic trade with Zimbabwe such as China and India.

Price comparisons indicated that unregistered medicines were relatively cheaper than registered similar medicines. There were cases, however, were unregistered medicines were more expensive than similar registered medicines. Additionally, there were cases were unregistered medicines had the same price as their registered alternatives. In general, unregistered medicines were found to be cheaper compared to similar registered medicines.

It was also found out that health workers encounter circumstances, at times, where they need medicines outside the approved medicines register to diagnose, treat and monitor their patients. These include biosimilar molecules for rheumatoid arthritis, and medicines for conditions such as blood disorders, cancer and trace elements for supplementation.

Overall, the respondents had the viewpoint that not all unregistered medicines are of poor quality.

5.4 Implications

The identification of the drivers of unregistered medicines will assist in addressing these factors and warrant that medicines that are used by the public are safe, affordable and effective. The lack of strict regulations, for example, may inform policy so as to draft rules and regulations that ensure that medicines are accessed from formal channels only. Price differences between registered and unregistered medicines may be used to apprise decision makers so as to make it cheaper and easier to import pharmaceutical raw materials, medicines and diagnostic devices. The results of this investigation may also inform regulatory authorities to create an environment that makes it easier for manufacturers to enter and stay in the local market, through affordable application and retention fees.

The lack of local capacity to manufacture pharmaceutical products has been shown to be contributing to the increased influx of unregistered medicines that are on the local market. Identification of this contributing factor may act as evidence to prompt decision makers to increase local capacity to manufacture pharmaceutical products through incubation of new ideas, attracting foreign investors as well as crafting policies that promote local start-ups. The capacity to manufacture pharmaceutical products locally may as well be improved through putting in place measures that make it easy to import manufacturing equipment, raw materials as well as packaging material.

Most of the unregistered pharmaceutical products and medical devices that are found on the local market have been found to be coming from neighbouring countries within the region. Harmonisation of regional registration of medicines may be implemented so as to eliminate all potential sources of unregistered medicines that may be found in the region, as well as tightening regional borders.

5.5 Recommendations

After having done an analysis of the drivers of the proliferation of unregistered medicines, the researchers recommend that a review and strict application of the law by parliament and law enforcement agents, respectively. This will help eliminate the channels through which unregistered medicines are finding way to the market. An expanded role of the regulatory authorities as well as their decentralisation is also recommended. Regulatory authorities, instead of focusing on regulation of registered persons only, must also regulate and enforce regulations that restrict the sale of medicines, whether approved or not, from unapproved premises.

It is also recommended that government put in policies that promote local manufacture of medicines. Limited capacity of local manufacture was identified as one of the factors contributing to the booming of unregistered medicines. If the market if flooded with affordable, safe and effective medicines, it becomes difficult for smuggled medicines to penetrate the local market. Local manufacture will also address the problem of product stock outs. Additionally, policies must be put in place to make it cheaper and easier to import medicines and pharmaceutical raw materials.

Most of the source countries for the unregistered medicines that are on the local market are neighbours to Zimbabwe. It is therefore recommended that harmonisation of medicine registration be done at regional level. This will make it easier for manufacturers to get their products registered in the region which will ultimately reduce medicine prices.

Lack of knowledge by the public has been shown to contribute to them purchasing pharmaceutical products and medical devices from unregulated and informal outlets. The health ministry in collaboration with the national regulatory authority may engage in public awareness programs so as to educate the general public on the risks associated with the use of unregistered medical products and medicines that are purchased from unregulated and unlicensed premises.

Unregistered medicines have been found to make their way into the country through porous borders as a result of corruption by law enforcement agents like police officers. This may be attributed to low remuneration of the law enforcement agents, which when addressed, may contribute to low corruption levels at the country's entry points.

Unemployment, poverty and economic hardships have been noted to make a contribution to the booming of unregistered medicines on the local market. People are resorting to illegal dealing in drugs and medicines in a bid to make a living. It is therefore recommended that the government establish skill development centres where they capacitate and empower unemployed individuals so that they can engage in legal economic activities. This way, individuals may fend for their families without having to engage in illegal activities such as smuggling drugs and medicines. This intervention is likely to reduce the illegal importation of pharmaceutical products and medical devices.

As the national regulatory authority seeks to extend its regulatory role into the regulation of cosmetics, there is need to exercise its regulatory powers over all distribution channels, whether or not such outlets are registered with the authority or not. This ensures that cosmetic products that are being sold to the public are safe and effective.

5.6 Suggestions for Further Research

Further research must focus on the implications of the use of unregistered medicines on the local market. Although some medicines may be unregistered, they may be safe and effective. Factors that are inhibitory to the registration of medicines must also be investigated.

References

Acosta, A., Vanegas, E. P., Rovira, J., Godman, B., & Bochenek, T. (2019). Medicine shortages: Gaps between countries and Global Perspectives. *Frontiers in Pharmacology, 10*. https://doi.org/10.3389/fphar.2019.00763

Akuse, R. M., Eke, F. U., Ademola, A. D., Fajolu, I. B., Asinobi, A. O., Okafor, H. U., Adeleke, S. I., Audu, L. I., Otuneye, A., Disu, E., Idis, H., Aikhonbare, H., Yakubu, A., Ogala, W., Ogunrinde, O., Wammanda, R., Orogade, A., Anyiam, J., Eseigbe, E., Umar, L., Musa, H., Onalo, R., West, B., Paul, N., Lesi, F., Ladapo, T., Boyede, O., Okeowo, R., Mustapha, A., Akinola, I., Chima – Oduko, O., Awobusuyi, O. (2012). Diagnosing renal failure due to diethylene glycol in children in a resource – constrained setting. *Paediatric Nephrology*, 27(6):1021-1028

Barton, I., Avanceña, A. L., Gounden, N., & Anupindi, R. (2019). Unintended consequences and hidden obstacles in medicine access in Sub-Saharan Africa. *Frontiers in Public Health, 7*. https://doi.org/10.3389/fpubh.2019.00342

Cappella, E., & Godfrey, E. B. (2019). New Perspectives on the child- and youth-serving workforce in Low-resource communities: Fostering best practices and professional development. *American Journal of Community Psychology*, 63(3–4), 245–252. https://doi.org/10.1002/ajcp.12337

César, C. C., & Carvalho, M. S. (2011). Stratified sampling design and loss to follow-up in survival models: Evaluation of efficiency and Bias. *BMC Medical Research Methodology*, 11(1). https://doi.org/10.1186/1471-2288-11-99

Cislaghi. B., & Heise, L. (2018). Using social norms theory for health promotion in low-income countries. *Health Promotion International,* 34(3), 616-623.

Elfil, M., & Negida, A. (2017). Sampling methods in Clinical Research; an Educational Review. *Emergency,* 5(1).

Gwatidzo, S. D., Murambinda, P. K., & Makoni, Z. (2017). Medicines counterfeiting in Africa: A view from Zimbabwe. *Medicine Access @ Point of Care, 1*. https://doi.org/10.5301/maapoc.0000017

Guzman, J., O'Connell, E., Kikule, K., & Hafner, T. (2020). The WHO Global Benchmarking Tool: A game changer for strengthening national regulatory capacity. *BMJ Global Health, 5*(8). https://doi.org/10.1136/bmjgh-2020-003181

Institute of Medicine. Countering the Problem of Falsified and Substandard Drugs. Washington, DC: *National Academies Press* (2013).

Iyengar, S., Hedman, L., Forte, G., & Hill, S. (2016). Medicine shortages: A commentary on causes and Mitigation Strategies. *BMC Medicine*, *14*(1). https://doi.org/10.1186/s12916-016-0674-7

Jakaza, T.N., Nyoni, C. (2018). Emerging dynamics of substance abuse among street children in Zimbabwe. A case of Harare central business district. *African Journal of Social Work*, 8(2), 63–70.

Jansen, T., Rademakers, J., Waverijn, G., Verheij, R., Osborne, R., & Heijmans, M. (2018). The role of Health Literacy in explaining the association between

educational attainment and the use of out-of-hours primary care services in chronically ill people: A survey study. *BMC Health Services Research*, *18*(1). https://doi.org/10.1186/s12913-018-3197-4

Joseph, B., & Joseph, M. (2016). The health of the healthcare workers. *Indian Journal of Occupational and Environmental Medicine*, 20(2), 71-72.

Kuanpoth J. (2018). Combatting counterfeit drugs: Case studies of Cambodia, Vietnam and Thailand. *Journal of Generic Medicines*, 14(1), 4-15. doi:10.1177/1741134317728403

Kelesidis, T., Kelesidis, I., Rafailidis, P. I., & Falagas, M. E. (2007). Counterfeit or substandard antimicrobial drugs: A review of the scientific evidence. *Journal of Antimicrobial Chemotherapy*, 60(2), 214–236. https://doi.org/10.1093/jac/dkm109

Keyter, A., Banoo, S., Salek, S., & Walker, S. (2018). The South African regulatory system: Past, present, and future. *Frontiers in Pharmacology*, 9, 418714. https://doi.org/10.3389/fphar.2018.01407

Fielding, J. E., Teutsch, S., & Breslow, L. (2010). A framework for public health in the United States. *Public Health Reviews,* 32(1), 174–189. https://doi.org/10.1007/bf03391597

McAuslane, N., Cone, M., Collins, J., & Walker, S. (2009). Emerging markets and emerging agencies: A comparative study of how key regulatory agencies in Asia, Latin America, the Middle East, and Africa are developing regulatory processes

and review models for new medicinal products. *Drug Information Journal*, *43*(3), 349–359. https://doi.org/10.1177/009286150904300314

Medicines Control Authority of Zimbabwe (MCAZ). MCAZ. (n.d.). Retrieved May 8, 2023, from https://www.mcaz.co.zw/who-we-are/

Morowatisharifabad, M. A., Rahimi, T., Farajkhoda, T., & Zadeh, H. F. (2019). Understanding Interpersonal Influences on the Use of Formal Health Services among a Population of Iranian Women in Reproductive Age: A Qualitative Study. *Open access Macedonian journal of medical sciences*, *7*(9), 1531–1535. https://doi.org/10.3889/oamjms.2019.301

Mukwenha, S., Murewanhema, G., Madziva, R., Dzinamarira, T., Herrera, H., & Musuka, G. (2021). Increased illicit substance use among Zimbabwean adolescents and youths during the COVID-19 ERA: An Impending Public Health Disaster. *Addiction*, 117(4), 1177–1178. https://doi.org/10.1111/add.15729

Mumphansha, H., Nickerson, J. W., Attaran, A., Overton, S., Curtis, S., Mayer, P., & Bould, M. D. (2017). An analysis of substandard propofol detected in use in Zambian anesthesia. *Anesthesia & Analgesia*, 125(2), 616–619. https://doi.org/10.1213/ane.0000000000002226

Murewanhema, G., & Makurumidze, R. (2020). Essential Health Services delivery in Zimbabwe during the COVID-19 pandemic: Perspectives and recommendations. *Pan African Medical Journal, 35*. https://doi.org/10.11604/pamj.supp.2020.35.2.25367

Ndomondo-Sigonda, M., & Ambali, A. (2011). The African Medicines Regulatory Harmonization initiative: Rationale and benefits. *Clinical Pharmacology & Therapeutics*, 89(2), 176–178. https://doi.org/10.1038/clpt.2010.299

Ndomondo-Sigonda, M., Miot, J., Naidoo, S., Dodoo, A., & Kaale, E. (2017). Medicines regulation in Africa: Current state and opportunities. *Pharmaceutical Medicine*, 31(6), 383–397.

Nyika, A., Ngara, B., Mutingwende, I., & Gwaza, L. (2022). Importation and distribution of unregistered medicines in the public sector: Similarities, differences and shared challenges among Southern African Development Community (SADC) countries. *BMC Health Services Research*, 22(1), 570.

Parsons, V. L. (2017). Stratified sampling. Wiley StatsRef: Statistics Reference Online, 1–11. https://doi.org/10.1002/9781118445112.stat05999.pub2

Pistikou, A.M., Zyga, S., Sachlas, A., Efthymia-Katsa, M., Daratsianou, M., Andrea-Paola, R.G. (2014). Determinative Factors of being an Effective Health-care Role Model. *Intl J Occup Health Public Health Nursing.* 1(3):3–14.

Ratanawijtrasin, S., & Wondemagegnehu, E. (2002). *Effective drug regulation: A multicountry study*. World Health Organisation.

Reggi, V. (2016). Medicines regulatory harmonization: International collaboration as a key to improve public health. *Medicine Access @ Point of Care, 1.* https://doi.org/10.5301/maapoc.0000001

Regitz-Zagrosek, V. (2012). Sex and gender differences in health. *Science &Society Series on Sex and Science. EMBO Rep.*13 (7):596–603.

Polgreen, L. (2009). 84 Children are killed by medicine in Nigeria. *New York Times*, A7.

Pombo, M., Porrás, A., Saidón, P., & Cascio, S. (2016). Regulatory convergence and harmonization: barriers to effective use and adoption of common standards. *Rev Panam Salud Pública.*39 (5):217–225.

Pombo, M. L., Di Fabio, J. L., & Cortés, M. de. (2009). Review of regulation of biological and biotechnological products in Latin American and Caribbean countries. *Biologicals*, *37*(5), 271–276. https://doi.org/10.1016/j.biologicals.2009.07.003

Rojas-Cortés, R. (2020). Substandard, falsified and unregistered medicines in Latin America, 2017-2018. *Revista panamericana de salud publica = Pan American journal of public health*, *44*, e125. https://doi.org/10.26633/RPSP.2020.125

Shamu, S., January, J., & Rusakaniko, S. (2016). WHO benefits from public health financing in Zimbabwe? Towards universal health coverage. *Global Public Health*, *12*(9), 1169–1182. https://doi.org/10.1080/17441692.2015.1121283

Shi, F. (2015). Study on a stratified sampling investigation method for resident travel and the sampling rate. *Discrete Dynamics in Nature and Society*, 2015, 1–7. https://doi.org/10.1155/2015/496179

Sillo, H., Ambali, A., Azatyan, S., Chamdimba, C., Kaale, E., Kabatende, J., Lumpkin, M., Mashingia, J. H., Mukanga, D., Nyabenda, B., Sematiko, G., Sigonda, M., Simai, B., Siyoi, F., Sonoiya, S., Ward, M., & Ahonkhai, V. (2020). Coming

together to improve access to medicines: The genesis of the east african community's medicines regulatory harmonization initiative. *PLOS Medicine*, 17(8). https://doi.org/10.1371/journal.pmed.1003133

Sutherland, A., & Waldek, S. (2015). It is time to review how unlicensed medicines are used. *European journal of clinical pharmacology*, *71*(9), 1029–1035. https://doi.org/10.1007/s00228-015-1886-z

Valaitis, R., Meagher-Stewart, D., Martin-Misener, R., Wong, S. T., MacDonald, M., & O'Mara, L. (2018). Organisational factors influencing successful primary care and public health collaboration. *BMC Health Services Research*, 18(1). https://doi.org/10.1186/s12913-018-3194-7

Vlassoff, C. (2007). Gender differences in determinants and consequences of health and illness. *Journal of Health, Population and Nutrition.* 25(1):47–61.

Wang, X., & Cheng, Z. (2020). Cross-sectional studies: strengths, weaknesses and recommendations. *Chest,* 158(1), S65-S71.

World Health Organisation. (n.d.). *A study on the public health and socioeconomic impact of substandard and falsified medical products*. World Health Organisation. Retrieved May 8, 2023, from https://fctc.who.int/publications/i/item/study-on-public-health-socioeconomic-impact-substandard-falsified-medical-products-978-92-4-151343-2

Yadav, P., Smith, R. D., & Hanson, K. (2011). Pharmaceuticals and the Health Sector. *Health Systems in Low- and Middle-Income Countries*, 146–169. https://doi.org/10.1093/acprof:oso/9780199566761.003.0061

Yang, C., Wu, L., Cai, W., Zhu, W., Shen, Q., Li, Z., & Fang, Y. (2016). Current situation, determinants, and solutions to drug shortages in Shaanxi Province, China: A qualitative study. *Plos One*, *11*(10). https://doi.org/10.1371/journal.pone.0165183

Appendices

APPENDIX 1: Informed Consent Form

About the researcher

My name is Nyasha Chiteka, a final year Masters in Public Health student from Africa University. I am conducting research on the drivers of unregistered medicines proliferation on the Zimbabwean market. I am kindly asking you to participate in this study by filling in the questionnaire provided.

What you should know about the study:

Purpose of the study:

The purpose of the study is to find out what is driving the increased rate of unregistered medicines on the Zimbabwean market. You were selected for the study because you have valuable information on the subject under investigation.

Procedures and duration

If you decide to participate you will fill in a questionnaire that will be provided to you. It is expected that this will take about five (5) minutes to complete the questionnaire.

Risks and discomforts

There are no any reasonable foreseeable risks, discomforts or inconveniences that you may be subjected to if you decide to take part in this study.

Benefits and/or compensation

There are no direct benefits to you for your participation. However, this research may help to make safe and affordable medicines accessible to the public.

Confidentiality

Information that you provide will not be disclosed without your permission. Your name and any other identification will not be asked for in the questionnaires.

Voluntary participation

Participation in this study is voluntary. If you decide not to participate in this study, your decision will not affect your future relationship with the researcher or Africa University. If you choose to participate, you are free to withdraw your consent and to discontinue participation without penalty.

Offer to answer questions

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

Authorization

If you have decided to participate in this study please sign this form in the space provide below as an indication that you have read and understood the information provided above and have agreed to participate.

---------- ----------

Name of Research Participant (please print) Date

Signature of Research Participant or legally authorized representative

If you have any questions concerning this study or consent form beyond those answered by the researcher including questions about the research, your rights as

a research participant, or if you feel that you have been treated unfairly and would like to talk to someone other than the researcher, please feel free to contact the Africa University Research Ethics Committee on telephone (020) 60075 or 60026 extension 1156 email aurec@africau.edu

Name of Researcher: Nyasha Chiteka

APPENDIX 2: Questionnaire

RESEARCH TOPIC: ANALYSIS OF THE DRIVERS FOR THE PROLIFERATION OF UNREGISTERED MEDICINES IN HARARE, 2023

ABOUT THE RESEARCHER

My name is Nyasha Chiteka, a final year Masters in Public Health student at Africa University. I am conducting research on the drivers of unregistered medicines proliferation on the Zimbabwean market. I am kindly asking you to participate by providing answers to the following questions.

SECTION A: DEMOGRAPHIC INFORMATION

1. What is your gender

☐ Male

☐ Female

2. Sate your age in years

……

3. What is your profession

☐ Nurse

☐ Pharmacist

☐ Doctor

☐ Pharmacy Technician

☐ Dispensary Assistant

☐ Other, specify…….

4. Number of years in practice as a health professional

…….. Years.

5. Sector in which you are employed

☐ Government

☐ Urban council

☐ Private

☐ NGO

☐ Other, specify…….

SECTION B: PERCEPTIONS ON SOURCES OF UNREGISTERED MEDICINES

6. What do you think are the sources of unregistered medicines on the Zimbabwean market?

……
……

7. Do you think health workers are involved in the illegal importation of unregistered medicines?

☐ Yes

☐ No

8. Do you think health workers are purchasing unregistered medicines and medical products from unlicensed distributors?

☐ Yes

☐ No

9. Do you think drug shortages and erratic supply are contributing to the rise in use of unregistered medicines?

☐ Yes

☐ No

10. Do you think high drug prices beyond the reach of many are contributing to the rise in use of unregistered medicines?

☐ Yes

☐ No

11. Do you think incapacitation of the regulatory authority is contributing to the proliferation of unregistered medicines?

☐ Yes

☐ No

12. Regulatory authorities create a regulatory environment that discourages manufacturers from entering, or staying in the market which limits competition, keeps drug costs high, and leads to shortages and the proliferation of unregistered drugs.

☐ Agree

☐ Do not agree

13. Do you think porous borders are contributing to the proliferation of unregistered medicines?

☐ Yes

☐ No

14. What other factors do you think are contributing to the proliferation of unregistered medicines?

……
…….

15. Are unregistered medicines cheaper than registered similar medicines?

☐ Yes

☐ No

16. Why do you think they are cheaper or more expensive than similar registered medicines?

……
….

17. Do you consider price when prescribing or dispensing medicines?

☐ Yes

☐ No

18. Have you encountered circumstances, during your practice, where you needed an unregistered medicine to diagnose, treat or monitor a patient?

☐ Yes

☐ No

19. If your answer to the above question is yes, what was your diagnosis or indication?

……
……..

20. All unregistered medicines are of poor quality

☐ Agree

☐ Disagree

21. Have any of your patients, to your knowledge, ever experienced an adverse drug reaction following use of an unregistered medicine?

☐ Yes

☐ No

☐ Not sure

22. Have you ever experienced treatment failure due to the use of unregistered medicines?

☐ Yes

☐ No

THANK YOU FOR YOUR PARTICIPATION

APPENDIX 3: AUREC Approval letter

Investing in Africa's future

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare-Tel (+263-20) 60075/60026/61611 Fax: (+263 20) 61785 website: www.africau.edu

Ref: AU2925/23 9 August, 2023

NYASHA CHITEKA

C/O Africa University Box 1320

MUTARE

RE: ANALYSIS OF THE DRIVERS FOR THE PROLIFERATION OF UNREGISTERED MEDICINES IN HARARE, 2023

Thank you for the above-titled proposal that you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

The approval is based on the following.

a) Research proposal

- **APPROVAL NUMBER** AUREC 2925/23

This number should be used on all correspondences, consent forms, and appropriate documents.

- **AUREC MEETING DATE** NA
- **APPROVAL DATE** August 8, 2023

- **EXPIRATION DATE** August 8, 2024
- **TYPE OF MEETING** Expedited

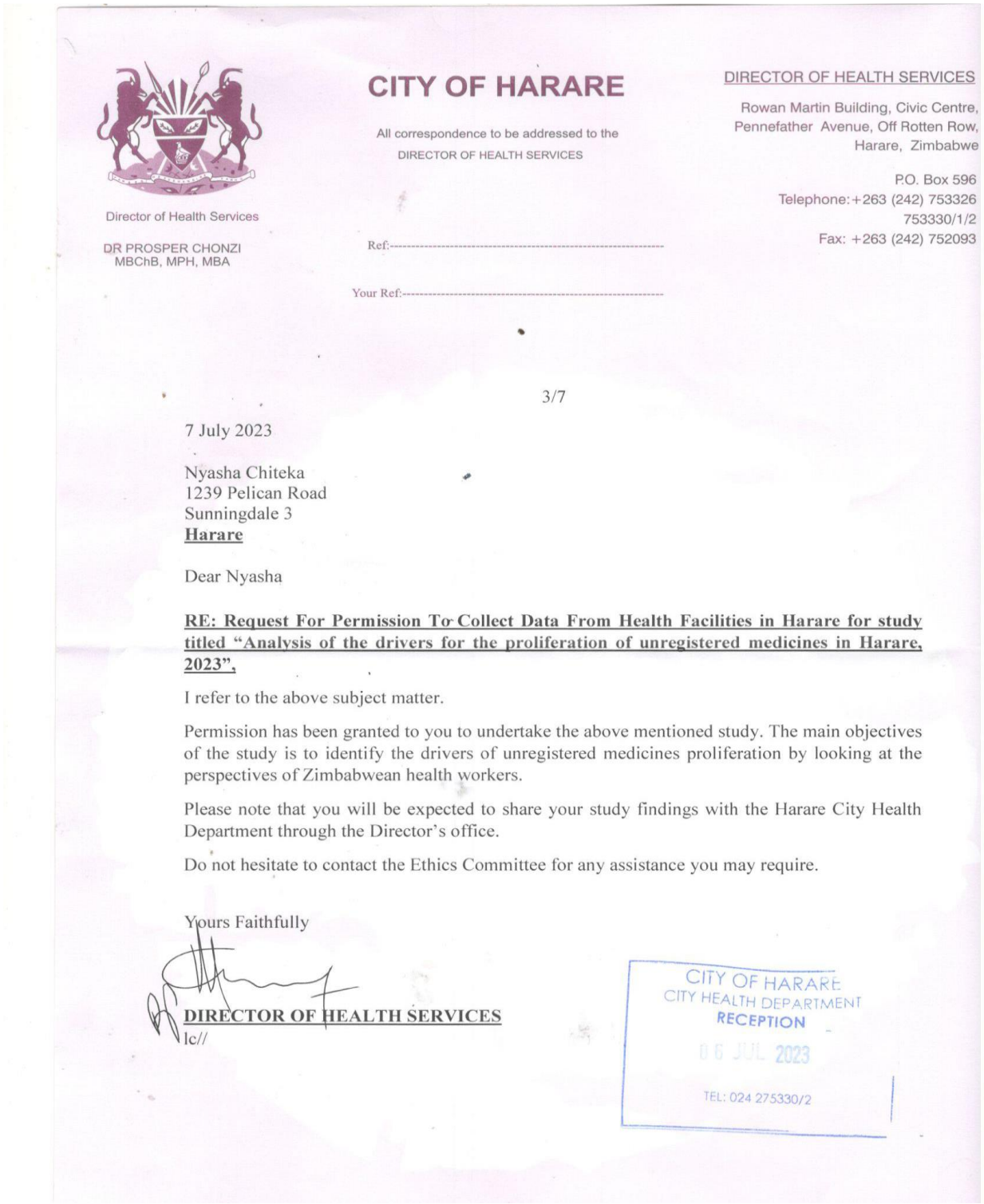
After the expiration date, this research may only continue upon renewal. A progress report on a standard AUREC form should be submitted a month before the expiration date for renewal purposes.

- **SERIOUS ADVERSE EVENTS** All serious problems concerning subject safety must be reported to AUREC within 3 working days on the standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.

MARY CHINZOU

ASSISTANT RESEARCH OFFICER: FOR CHAIRPERSON AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE

APPENDIX 4: City of Harare Approval Letter



CITY OF HARARE

All correspondence to be addressed to the
DIRECTOR OF HEALTH SERVICES

DIRECTOR OF HEALTH SERVICES
Rowan Martin Building, Civic Centre,
Pennefather Avenue, Off Rotten Row,
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Director of Health Services

DR PROSPER CHONZI
MBChB, MPH, MBA

Ref:----------

Your Ref:----------

3/7

7 July 2023

Nyasha Chiteka
1239 Pelican Road
Sunningdale 3
Harare

Dear Nyasha

RE: Request For Permission To Collect Data From Health Facilities in Harare for study titled "Analysis of the drivers for the proliferation of unregistered medicines in Harare, 2023",

I refer to the above subject matter.

Permission has been granted to you to undertake the above mentioned study. The main objectives of the study is to identify the drivers of unregistered medicines proliferation by looking at the perspectives of Zimbabwean health workers.

Please note that you will be expected to share your study findings with the Harare City Health Department through the Director's office.

Do not hesitate to contact the Ethics Committee for any assistance you may require.

Yours Faithfully

DIRECTOR OF HEALTH SERVICES
lc//

CITY OF HARARE
CITY HEALTH DEPARTMENT
RECEPTION
06 JUL 2023
TEL: 024 275330/2