DEPARTMENT OF PUBLIC HEALTH

RESEARCH REPORT

A COMPARISON OF TENDER PRICES AND SINGLE-EXIT PRICES FOR MEDICINES IN SOUTH AFRICA FOR THE PERIOD 2018-2022

A research report submitted to the University of the Witwatersrand, Johannesburg, School of Public Health, Faculty of Health Sciences, in partial fulfilment of the requirements for the degree of Master of Public Health (Health Economics)

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DECLARATION

I Kudakwashe Linton Kapfumvuti declare that this Research Report is my own. It is being submitted for the award of the degree of Masters in Public Health in the field of Health Economics at the University of the Witwatersrand, Johannesburg. It has not been submitted before any degree or examination of degree at this or any other University.

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(Candidate Signature)

I make this declaration on the 7th of October 2025 in Johannesburg, South Africa

ABSTRACT

Background: Medicine affordability is a critical concern in South Africa's dual public/private healthcare system, where distinct pricing mechanisms (public tenders, private Single Exit Price (SEP)) aim to lower costs for equitable access. Despite these efforts, significant price differentials persist, with higher private sector prices posing an affordability barrier. This study compares public and private sector medicine prices from 2018-2022, a period strategically chosen to capture the evolving landscape shaped by National Health Insurance (NHI) progression and the COVID-19 pandemic's impact.

Method: A retrospective quantitative analysis was conducted on public tender prices and private Single Exit Prices from 2018-2022. A basket of 31 essential medicines, adapted from WHO/HAI methodology to include South African Essential Medicines Listed drugs selected. Medicines were matched by active ingredient, formulation, and strength, then grouped into acute, anti-infective, anti-retroviral, and chronic categories. Prices were standardised to a per-unit basis. Analysis involved descriptive statistics, trend plots, and annual percentage changes, using public median prices and private median/minimum prices. Quantity-weighted price changes were assessed using Laspeyres, Paasche, and Fisher Price indices providing comprehensive insights into pricing dynamics.

Results: Medicine prices generally increased in both sectors from 2018-2022. Private sector prices were consistently and substantially higher than public sector prices for most medicines, with the private sector median for the total basket averaging 312.2% greater than the public sector median. The public sector's quantity-weighted Fisher index surged in 2021 (from 109.05 to 124.23), indicating notable expenditure escalation, while the private sector's quantity-weighted prices remained remarkably stable relative to its 2018 base.

Conclusion: This study highlights a persistent and concerning disparity in medicine affordability between South Africa's public and private sectors. While both tender prices and SEPs increased, the significant rise in public sector quantity-weighted prices raises public health expenditure concerns, and consistently higher private sector prices continue to impede equitable access to essential medicines. Policymakers are urged to consider strategic interventions to address this price disparity and ensure affordable, equitable access for all South Africans.

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LIST OF ABBREVIATIONS

ATC code	Anatomical Therapeutic Chemical code
EDP	Essential Drug Programme
EML	Essential Medicines List
HAI	Health Action International
HHI	Herfindahl-Hirschman Indices
HJI	Health Justice Initiative
HSF	Helen Suzman Foundation
INN	International Non-proprietary Names
IRPs	International Reference Prices
MPL	Master Product List
MPR	Medicines Pricing Registry
MPRs	Median Price Ratios
MRSCA	Medicines and Related Substances Control Act, (No.101 of 1965 as amended)
NAPPI	National Pharmaceutical Product Index
NDOH	National Department of Health
NDP	National Drug Policy
NHI	National Health Insurance
NPC	National Planning Commission
SAHPRA	South African Health Products Regulatory Authority
SAMF	South African Medicines Formulary
SEP	Single Exit Price
UHC	Universal Health Coverage
WHO	World Health Organisation

CHAPTER 1: INTRODUCTION

1.1. Background

Medicines are a substantial component of global healthcare expenditure, and their affordability is critical for health system outcomes(1). The increasing cost of pharmaceuticals impedes healthcare performance in both developed and developing nations leading to decreased affordability, reduced access, and greater health disparities(2). Governments employ various drug regulatory mechanisms to address these challenges, including price regulation through reference pricing and price ceilings, generic substitution, parallel importation, and public procurement strategies like competitive tendering(1,3). For instance, some Latin American countries focus on improving transparency in medicine pricing and procurement(4), while China and the Netherlands have optimised tender systems to lower prices(5,6). India uses a price control mechanism similar to South Africa's Single Exit Price (SEP) system, setting ceiling prices based on market share(7). The World Bank indicated that private markets often have higher medicine prices than public sectors due to markups, lack of price transparency, and weaker bargaining power(8). However, the effectiveness of these regulatory interventions varies across contexts(9). While these global strategies aim for cost control, their implementation produces context-specific challenges, particularly within dual healthcare systems like South Africa's. Furthermore, while these global interventions highlight regulatory complexity, their specific application and effectiveness must be continually evaluated against local dynamics. Critically, there is a lack of recent longitudinal comparative analysis of public versus private sector medicine prices in South Africa, particularly covering the period following 2018.

South Africa's healthcare landscape is significantly influenced by pharmaceutical spending. In 2018, the nation's expenditure on medicines reached approximately R47.1 billion, representing approximately 11.3% of total health expenditure(10). Rising medicine prices are particularly problematic in South Africa's dual healthcare system, which has significant price differences between the public and private sectors(11). The South African Government’s National Drug Policy provides a framework for addressing these challenges(12). The public sector uses competitive tendering to procure medicines at the lowest possible prices(13), while the private sector is regulated by the SEP policy, which sets the maximum price

manufacturers can charge, in order to promote price transparency and prevent excessive pricing(14,15). While both mechanisms aim to control and reduce medicine prices, they differ in their approach. Local research suggests that SEP has helped reduce prices for some essential medicines(14), and that tendering generally achieves lower public medicine prices than in the private sector(13). A longitudinal analysis of pricing trends spanning 2018–2022, is necessary to capture the influence of post-COVID disruptions and the evolving landscape under the pending National Health Insurance (NHI) implementation.

1.2. Literature Review

Governments worldwide have adopted various drug regulatory mechanisms to control and reduce drug prices(2). This literature review aims to review existing research on medicine pricing regulation in South Africa, and previous studies comparing public and private medicine prices. This review specifically synthesises existing longitudinal data and policy analyses to establish a clear foundation for this study, identifying the critical gap regarding comparative pricing trends post-2018 in the context of post-COVID disruptions and pending NHI implementation. It also briefly considers the impact of Covid-19 on drug pricing and the changing landscape of drug pricing in South Africa as a result of the proposed implementation of a National Health Insurance (NHI) system.

1.2.1. Medicine Pricing Regulation

Governments have implemented various pricing policies to address the challenges of high medicine prices. The World Health Organisation (WHO) recommends that these policies be tailored to the local health system context, coherent with other healthcare policies, and implemented transparently(1). Many countries use a combination of policies to manage drug prices, including external reference pricing, internal reference pricing, value-based pricing, and mark-up regulations(1). Some countries also use tax exemptions or reductions to lower the final cost of medicines to patients(5). Such measures are crucial in enhancing access to medicines while promoting health equity in populations facing affordability challenges(1,2).

International reference pricing (IRP) has been adopted by many countries, particularly in the European Union, to set medicine prices(16). IRP involves comparing drug prices across different countries to derive a benchmark price. However, the applicability of IRP varies, and its effectiveness in reducing drug prices is still debated(16). Some countries also use a *cost-*

plus pricing model, which considers manufacturing costs, R&D expenses, and other operational costs, plus a reasonable profit, to determine medicine prices(5). However, this approach faces challenges due to the difficulty in obtaining reliable cost information from pharmaceutical companies and the complexities in allocating joint costs(1).

1.2.2. South African Medicine Price Regulation

In South Africa, medicines constitute a significant portion of total healthcare costs, and medicine price increases often outpace inflation(17). A report by the National Planning Commission indicated that in 2018, South Africa spent R413.7 billion on healthcare, with R47.1 billion (11.3%) spent on pharmaceutical products(10). The private sector spends ten times more on medicines per capita compared to the public sector(10). Even with medical aid scheme cover and free public health services, South Africans still spent about R7 billion out-of-pocket on medicines(11).

The South African government has implemented a series of policies and laws aimed at controlling and reducing medicine prices The National Drug Policy, established in 1996, laid the foundation for medicine pricing strategies in the public and private sectors(12).

The core pricing mechanisms outlined in the National Drug Policy (NDP) are the SEP in the private sector and competitive tendering in the public sector, which are discussed in more detail in the sections that follow.

1.2.2.1. National Drug Policy

The National Drug Policy (NDP) in South Africa, was a response to the inequities and inefficiencies of the healthcare system inherited from the apartheid era, which was characterised by fragmented health services and unequal access to essential medicines(12). The NDP aimed to ensure an adequate and reliable supply of safe, cost-effective, and quality medicines to all South Africans, and to promote the rational use of medicines by prescribers, dispensers, and consumers(18). To achieve these goals, the NDP outlined several key strategies, including the strengthening of drug regulation, the rationalisation of drug pricing, the development of an essential drugs programme, and the promotion of local drug manufacturing. The policy also emphasised the importance of human resource development, research and development, and collaboration with international partners.

The South Africa's Medicines and Related Substances Control Act (MRSCA), (No.101 of 1965 as amended) incorporates additional policy tools that influence medicine affordability. Key interventions promoting generic substitution include the mandatory offering of generic substitution by all dispensers, which was enabled by Act 90 of 1997 which is the MRSCA which amends the original MRSCA of 1965, and came into effect in 2003(19). This policy encourages the use of more affordable generic alternatives. Overall, the level of generic utilisation in the private sector, as quoted by Gray et al(18) from a report by one medical scheme administrator, increased from 38.3% in 2004 to 56.2% of items claimed by 2015. It was then mentioned that by 2015, in 76.5% of instances where a generic equivalent was available, the generic medicine was used. In accordance with the MRSCA, compulsory licensing allows the government to authorise local production of patented medicines under certain conditions(19). This aims to increase access to affordable generic medicines, particularly for HIV/AIDS treatment(20). Other key interventions promoting generic substitution include medical scheme incentives whereby even before the legal mandate, medical scheme administrators used mechanisms like co-payments to encourage generic substitution(18). Parallel importation permits the import of lower-priced authorised medicines to enhance private sector competition, albeit with quality control concerns(3).

1.2.2.2 Public Medicine Price Interventions

The public sector utilises a competitive tendering process to procure medicines, aiming to secure the lowest possible prices. Tendering enables bulk procurement and price negotiation, resulting in lower medicine prices compared to the private sector. This may be an effective measure to lower drug costs. The tendering system in South Africa involves the National Department of Health (NDOH) advertising tenders for medicines and medical supplies, with pharmaceutical companies submitting bids(10,21). This system relies on sealed, limited competitive bidding, also referred to as transversal tenders. The NDOH then evaluates these bids based on a combination of price and other factors, such as the supplier's capacity and reliability. While the primary goal of tendering is to obtain medicines at the lowest possible price, the South African government also considers broader socio-economic objectives, such as promoting local manufacturing and black economic empowerment, in the tender process(10,21).

Wouters(13) conducted a comprehensive investigation of the South African tendering system for medicines, evaluating the impact of tendering on medicine prices and market concentration over a 14-year time frame whilst analysing the accuracy of government forecasts regarding drug demand. Wouters(13) employed a systematic methodological framework to assess the South African pharmaceutical tendering system from 2003 to 2016. The main analysis was a comparison of medicine price indices over time. He also calculated Herfindahl-Hirschman Indices (HHIs) to evaluate market concentration levels across 8,701 pharmaceutical tender contracts issued by the South African government during this period. Additionally, the study analysed government procurement data for selected drug classes, evaluating the accuracy of drug demand forecasts against actual procurement figures(13).

Wouters(13) calculated Laspeyres, Paasche, and Fisher price indices, revealing notable trends in pharmaceutical prices within the South African public health care system between 2003 and 2016. Across most tender categories, the prices of medicines in the public sector demonstrated a significant decrease, with an average reduction of approximately 40% or more over the 14-year period(11). Specifically, the Fisher index, a useful summary metric being the geometric average of the other two indices, indicated substantial price drops for several medicine categories. For instance, the prices of oncological products fell by an average of 70%, and anti-retroviral therapies saw an even more dramatic decline of around 85% after the introduction of the tender system. Anti-infective medicines also experienced considerable price reductions of about 40%, though with some intermittent price increases. Anti-tuberculosis and semi-solid medicines recorded more modest decreases of approximately 15% (11).

While the market generally exhibited moderate to high competition, as indicated by HHIs below 2500, there was a notable reduction in the number of different firms securing contracts in various categories(13). Furthermore, the study highlighted substantial inaccuracies in government drug demand forecasts; estimates were often more than 50% off in the majority of drug classes assessed, which raises concerns about the reliability of procurement planning(13).

Despite the benefits of tendering, Wouters(13) also discussed potential long-term challenges, such as reduced competition among generic manufacturers and the risk of market exits that

may lead to higher prices in the future. The analysis suggested that while the current model promotes lower costs, there are risks related to forecasting drug demand accurately, which can complicate the tendering process(13). Additionally, issues regarding delays in tender awards and payments can impact the reliability of the supply chain, essential for maintaining consistent access to medicines. Overall, Wouters(13) indicated that while the tendering system has the potential to reduce medicine costs significantly in the South African public health sector, careful consideration of its implications on market dynamics and supply chain stability is necessary for ensuring long-term sustainability(13).

1.2.2.3 Private Medicine Price Interventions

The private sector is regulated by the SEP policy, introduced in 2004, which sets the maximum price manufacturers can charge, promoting price transparency and aiming to prevent excessive pricing(22). The SEP policy was introduced to eliminate price differentiation and to ensure that essential medicines are not sold at excessively high prices(10). The SEP policy was established to regulate the maximum price that manufacturers can charge for medicines, thereby promoting price transparency and aiming to prevent excessive pricing(10,22).

The introduction of the SEP policy in South Africa in 2004 initiated significant discussions regarding its impact on drug pricing and market dynamics, particularly concerning generic medicines(10). A thorough analysis was conducted by Moodley and Suleman(14) in a study where they employed an analytical, quantitative methodology to evaluate the private pricing dynamics of a carefully selected basket of medicines. The selection process was informed by the World Health Organisation/Health Action International (WHO/HAI) list(2), and further adapted to include medicines that were registered within the South African pharmaceutical market. A total of 50 originator medicines were selected, and the corresponding originator products were catalogued by strength, dosage form and pack size using the National Pharmaceutical Product Index (NAPPI) codes. The SEPs were analysed over the period from 1999 to 2014 using an interrupted time series analysis(14). Among the 50 medicines examined, 35 exhibited statistically significant changes in pricing levels. The Regional Core list displayed price change ranging from 1.8% to 42.2%, with a mean of 23.4%; and the Supplementary list exhibited changes between 11.7% and 55.9%, with a mean change of 23.0%(14). Notably, the majority of the medicines demonstrated a reduction in annual price increases compared to the period prior to the implementation of the SEP regulations (14).

These findings suggested that the SEP regulation significantly impacted medicine pricing in South Africa, reflecting both short- and long-term effects.

Another study by Naidoo and Suleman(15) assessed the impact of the SEP on medicine availability in South Africa's private healthcare sector from 2001 to 2014. Employing a descriptive quantitative analysis, they identified 3,691 discontinued stock-keeping units (SKUs), peaking in 2002 with 603 withdrawals. The findings revealed that both generic and innovator manufacturers faced significant product discontinuations, averaging 22.3 and 27.6 SKUs, respectively. The study illuminated the unintended consequence of pricing regulations: while aiming to enhance access, they resulted in fewer new medicine introductions and heightened market vulnerability, leading to potential shortages. This analysis underscored the complex implications of drug price regulations within specific healthcare contexts like South Africa, urging a balanced view of their effects on both accessibility and market stability(15). These effects are heavily influenced by context due to several factors unique to South Africa's healthcare system and economic landscape. For instance, the dual public and private healthcare system with distinct pricing mechanisms (tenders and SEP) creates a unique dynamic. The heavy reliance on imported active pharmaceutical ingredients (APIs) makes the supply chain vulnerable to global disruptions, as seen during the COVID-19 pandemic(23,24). Additionally, socio-economic objectives, such as promoting local manufacturing and black economic empowerment in the tender process, can influence market dynamics and supplier participation(10,18). The historical legacy of fragmented health services and unequal access from the apartheid era also shapes how pricing policies are received and impact different population segments(10,20). Therefore, the specific structure of the market, local manufacturing capacity, import reliance, and broader socio-economic goals all interact to produce context-dependent outcomes from drug price regulations(10,20).

Furthermore, the National Planning Commission (NPC) concluded from its literature review that the SEP has been successful in removing unethical practices and standardising prices across the value chain(10). The NPC also reported that the share of pharmaceutical expenditure as a proportion of total expenditure declined after the implementation of the SEP in 2004(10).

1.2.3 Price Differentials Between Public and Private Sectors

South Africa's healthcare system is characterised by a dual structure, comprising a public sector that serves the majority of the population(13) and a private sector that caters to individuals with medical aid insurance or the ability to afford out-of-pocket payments(14). This dualism is evident in medicine pricing, where significant differentials exist between the two sectors(11).

A comprehensive investigation by Wouters(13) used a systematic methodological framework to assess the South African pharmaceutical tendering system, including a comparison of medicine price indices over a 14-year period. While Wouters'(13) primary focus was on the impact of tendering on prices and market concentration within the public sector, the study explicitly stated that 'the prices of medicines procured for the public system through tenders were almost always lower than those sold in the private system'. For instance, the study found that a 30-tablet pack of atorvastatin 20 mg cost 511% more in the private system in 2009, and 178% more in 2016, than in the public system. Other cholesterol-lowering drugs showed even higher private sector premiums, ranging from 127% (atorvastatin 40 mg in 2014) to 996% (pravastatin 20 mg in 2014) more than in the public system(13). These findings strongly indicate a persistent and substantial price differential in favour of the public sector's procurement methods.

Thaver *et al.*(11) conducted a descriptive, quantitative, and retrospective study to compare price trends of essential medicines in South Africa, focusing on a basket of 32 essential medicines available in both sectors.The analysis found that the majority of brands (87%) displayed higher prices in the private sector compared to the public sector, particularly post-implementation of the SEP regulation(11). On average, the price differential between medicines in the private and public healthcare sectors was 395.47%, though some medicines cost up to 1964.70% more in the private sector(11). However, the study did note complications such as dispensing fees, which complicate the comparative analysis of actual costs to consumers in each sector.

An earlier medicine price survey conducted by Xiphu and Mpanza(25) in the Gauteng Province of South Africa used the WHO/HAI methodology to analyse the availability, affordability, and pricing of medications. This study, conducted before the full implementation of the SEP,

highlighted a lack of transparency and uniformity of mark-ups by retailers and found that most facilities did not adhere to medicine price regulations, resulting in high medicine prices compared to international reference prices or other African public sectors(25). While not a direct comparison of tender vs. SEP prices, it laid foundational work on price transparency issues that subsequent studies would build upon regarding the public-private differential.

The persistent nature of the price differential is also exacerbated by complex market dynamics within the private sector's supply chain. Research by the Helen Suzman Foundation (HSF)(26) indicates that competition in the retail pharmaceutical market plays out in a highly regulated framework established by legislation governing prices, supply chain pass-through, and upper limits to dispensing fees. While the Single Exit Price (SEP) mechanism removes pricing power from private pharmacies and places it in the hands of the state, the HSF (26) highlights that the market is complicated by corporate vertical integration. This vertical integration—where corporates may own manufacturers/importers, distributors, and retail pharmacies—can create anti-competitive dynamics, particularly through exclusive dealing arrangements. Such practices may shut out individually owned retail pharmacies from procuring certain product lines, thereby affecting their ability to compete and influencing the price and availability of medicines across the private sector(26).

1.2.4 Impact of Covid-19 On Drug Supply and Pricing

The COVID-19 pandemic has had profound and multifaceted impacts on healthcare systems in South Africa. While the primary focus has been on managing the immediate health crisis, the pandemic has also exposed vulnerabilities in drug supply chains and exerted upward pressure on medicine prices, further complicating the landscape of medicine access and affordability(23,24). South Africa, heavily reliant on imported active pharmaceutical ingredients (APIs), faced challenges in securing a consistent supply of medicines. Border closures and logistical bottlenecks further exacerbated these issues, leading to stockouts and the need for alternative procurement strategies(10,23,24). The National Drug Policy emphasises the importance of ensuring a reliable supply of medicines, and the pandemic tested the resilience of the existing supply chain mechanisms(12).

The pandemic also led to a surge in demand for specific medicines, particularly those used in the management of COVID-19, creating pressure on their availability and prices. Price

volatility was observed, with potential for price gouging, which refers to retailers or suppliers drastically increasing prices of essential goods beyond reasonable levels during times of crisis or high demand, in both the public and private sectors, especially for medicines with limited availability(23,24). This situation underscored the importance of price monitoring and regulatory mechanisms to ensure affordability, a key objective of South Africa's National Drug Policy(12).

The public sector, with its reliance on tendering and Essential Medicine Lists (EMLs), faced unique challenges. Disruptions in global supply chains affected the availability of medicines procured through tenders(24). The need for flexibility in procurement and the ability to secure alternative sources became crucial. The private sector, while having different procurement mechanisms, was also not immune to the pandemic's effects(23,24).

1.2.5 Drug Pricing and NHI

In an attempt to rectify health system inequities, the South African government has initiated the implementation of the National Health Insurance (NHI) as a strategy to promote Universal Health Coverage (UHC)(27). The proposed National Health Insurance (NHI) system has the potential to significantly reshape medicine pricing dynamics. The NHI Act proposes centralised medicine procurement, potentially increasing the state's purchasing power and driving down prices(28). However, the successful implementation of this system necessitates careful consideration of factors such as the role of private sector providers, reimbursement mechanisms, and the financial sustainability of the NHI fund. Challenges remain, including the need for robust mechanisms to prevent price inflation, ensure a reliable medicine supply, and promote transparency in pricing practices(10,28).

Critically, many aspects surrounding medicine selection, procurement, and pricing under the proposed NHI system remain unclear, a concern highlighted in the Health Justice Initiative's (HJI) Issue Paper 1(29). The HJI argues that the entire shift of the medicine selection, procurement, and reimbursement system to "NHI reimbursement" has not been adequately thought through. The Bill itself contains limited information on the exact mechanics of this transition, leading to many unanswered questions that should not simply be left to future regulations. For example, the Bill proposes a single medicine pricing system for the entire country by converting the existing private sector Single Exit Price (SEP) system for use by the

NHI fund, but the practicalities of this conversion are complex and uncertain. The HJI and other experts warn that simply shifting the current SEP mechanism from the private sector (covering about 25% of people) to the NHI (for everyone) without careful planning could leave the non-NHI market unregulated and introduce numerous challenges.

Medicine pricing is a critical aspect of healthcare policy in South Africa, particularly in the context of the proposed NHI system. Balancing the goals of affordability, access, and sustainability requires careful consideration of various pricing mechanisms, procurement strategies, and the roles of both the public and private sectors(28). South Africa's efforts to achieve UHC through the NHI are further complicated by the challenges exposed by the pandemic. Ensuring access to affordable medicines remains a critical component of UHC, and the lessons learned from the COVID-19 pandemic must inform future policy decisions(28).

1.3. Problem Statement

The dual public and private health care system in South Africa is reflected in the implementation of distinct pharmaceutical pricing policies in the two sectors. The most important of these are tender pricing in the public sector and the SEP in the private sector. Previous studies indicate that these policies have been effective in decreasing medicine prices in both the public and private sectors. However, ongoing monitoring of both public and private medicine prices remains a priority(11).

Despite these efforts, direct comparisons of public and private prices for the same medicines reveal substantial disparities in medicine prices between the two sectors, with significantly higher prices consistently observed in the private sector(11). This differential is partly attributable to the effectiveness of the competitive tendering system in securing lower public prices. However, it also suggests a more complex relationship between prices in the two sectors, with pharmaceutical companies implementing a form of price differentiation between public and private markets.

This persistent price disparity presents a significant challenge as South Africa transitions towards the more integrated health system envisaged by the National Health Insurance (NHI) reforms.

1.4. Justification

This study repeats similar previous analyses(11,13,25). This is justified by the need to continue the evaluation of public and private medicine prices over time, as well as to investigate the specific dynamics of recent years. The period of analysis for this study is from 2018 to 2022. Wouters(13) compared public and private medicine prices in the period from 2003 to 2016, while Thaver *et al.*(11) analysed the period from 2014 to 2018. This study then extends that analysis.

Of particular interest in the period analysed in this study are the possible impacts of the COVID-19 pandemic, and the evolving NHI landscape on medicine pricing. As noted above, the COVID-19 pandemic significantly impacted the pharmaceutical industry due to lockdowns, border closures, and manufacturing shutdowns. The shortages of both raw materials and finished pharmaceutical products affected drug prices both immediately during the pandemic and for some time afterwards(24). The advance towards NHI in South Africa necessitates a critical examination of medicine pricing differentials between tender and single exit prices. If tender prices continue to deviate significantly from single exit prices this may create challenges for an integrated NHI model and impact the financial sustainability and equity goals of NHI.

This study will generate evidence on the magnitude and trends of medicine price differentials from 2018 to 2022. This will support policymakers in the development of pricing strategies that ensure affordability and equitable access to essential medicines through external shocks such as global pandemics, and that facilitate the transition to NHI.

1.5. Research Questions

What is the price differential between the public and private sectors for a basket of essential medicines in South Africa from 2018 to 2022? What has been the evolution of medicine prices in South Africa between 2018 and 2022?

1.6. Research Aim

To evaluate trends in, and quantify differences between, tender prices and single exit prices for essential medicines in South Africa from 2018 to 2022.

1.7. Research Objectives

i. To describe the trends in prices of a basket of essential medicines in South Africa in both the public and private sectors between 2018 and 2022.

ii. To calculate the differences in tender prices and single exit prices of a basket of essential medicines in South Africa between 2018 and 2022.

iii. To determine the change in the quantity-weighted price of a basket of essential medicines for both the public and private sectors in South Africa between 2018 and 2022.

CHAPTER 2: METHODOLOGY

This research employed a descriptive, quantitative, and retrospective study design to compare tender prices and SEP for medicines in both the public and private healthcare sectors of South Africa in the five-year period from 2018 to 2022.

2.1. Primary Study

Primary data for this study were obtained from two datasets. The first dataset comprises tender price data for 2022, sourced from the Master Health Product List (MPL) maintained by the National Department of Health (NDOH). The second dataset contains SEP data for the private sector, spanning 2018 to 2022, obtained from the South African Medicine Pricing Registry (MPR).

2.1.1. Study Design

The primary data sources were longitudinal datasets, with public and private prices for medicines provided over time.

2.1.2. Study Setting

The prices for medicines available in the South African public and private health sectors.

2.1.3. Study Population

The public tender prices in the MPL included over 1000 medicines on the MPL per year for the timeframe 2018 to 2022. The private sector SEP prices in the MPR database included approximately 10000 regulated medicines per year in South Africa from 2018 to 2022. Table 1 below shows the actual numbers of medicines included in the full datasets for each year.

2.1.4. Study Sample

There was no sampling in the primary datasets. The datasets feature South African Health Products Regulatory Authority (SAHPRA) -approved medicines for which a SEP in the private sector and a tender price in the public sector are required.

Table 1:Total Number of Medicines in Datasets Per Year

Year	Sector	No. of Medicines
2018	Public	1173
	Private	9597
2019	Public	1156
	Private	9932
2020	Public	1211
	Private	1004
2021	Public	1128
	Private	10953
2022	Public	1174
	Private	11332

2.1.5. Data Collection

The primary datasets contain longitudinal data on medicine prices in South Africa's public and private healthcare sectors from 2018 to 2022. The NDOH's Affordable Medicines Directorate and the Essential Drug Programme (EDP) manage the Master Product List (MPL). These departments, which are responsible for overseeing the tendering process for public sector medicine procurement, compile and maintain the MPL, which lists the medicines procured through these tenders and their awarded prices. The public sector dataset includes tender prices for over 1000 medicines per year, sourced from the Master Health Product List (MPL) maintained by the National Department of Health (NDOH).

The process of constructing the data sheets involves collecting the awarded tender prices from the tender processes and compiling those prices into the Master product list. The specific medicines included in these datasets are those that were successfully tendered for by pharmaceutical companies for supply to the public sector.

The MPR contains a list of SEPs for medicines, which are the prices at which manufacturers sell medicines to wholesalers, pharmacies, and other private entities. These prices are submitted by pharmaceutical manufacturers and organised into usable datasets by the Pharmaceutical Economic Evaluation Department at the NDOH. The private sector dataset comprises SEPs for approximately 10,000 regulated medicines per year, obtained from the South African Medicine Pricing Registry (MPR).

These datasets provide a comprehensive overview of medicine pricing trends and variations between the public and private sectors over the specified period.

2.2. Secondary Study

2.2.1. Study Design

This was a retrospective, descriptive quantitative analysis of the public and private longitudinal data sets, which encompassed tender prices and single exit prices respectively between 2018 and 2022.

2.2.2. Study Setting

The prices for medicines available in the South African public and private health sectors.

2.2.3. Study Population

The public tender prices in the MPL included over 1,000 medicines on the MPL per year for the timeframe 2018 to 2022. The private sector SEP prices in the MPR database included approximately 10,000 regulated medicines per year in South Africa from 2018 to 2022.

2.2.4. Study Sample

The medicines included in the datasets are those that are awarded tenders and their corresponding SEPs in the private sector, from 2018 to 2022. The methodology for this study utilises a core list of essential medicines commonly used for international comparisons of medicine prices(2). Generally, this is derived from the World Health Organization (WHO) and Health Action International (HAI) methodology which developed a standardised methodology for collecting and analysing medicine prices and availability(2).

This methodology was designed to provide reliable and comparable data across different countries and regions. It involved selecting a basket of medicines that are commonly used and essential for public health and then surveying their prices and availability in various sectors, such as public, private, and non-governmental organizations. The data collected was used to calculate price ratios, median prices, and other statistical measures to assess the affordability and accessibility of medicines(2,30).

Furthermore, I followed Thaver *et al*.'s(11) study which adapted the WHO/HAI methodology to suit the specific context of South Africa. A basket of medicines was selected based on the WHO/HAI core list, which includes essential medicines commonly used for international comparisons. Additionally, I included a supplementary list of medicines that are frequently used in South Africa but not included in the WHO/HAI core list. The final basket consisted of 31 compounds, shown in Table 2, with single or multiple active ingredients.

These compounds are categorised into 4 groups based on their primary therapeutic use and duration of treatment. The four groups are anti-infectives, anti-retrovirals, acute medicines, and chronic medicines. This selection was based on the Essential Medicines List (EML), and the most sold medicines by volume in the private sector. The methodology ensured that the selected medicines were representative of the healthcare needs in South Africa and allowed for meaningful comparisons between public and private sector prices.

2.2.5. Data Management

The data management process involved several key steps to ensure the integrity and comparability of the datasets for analysis. Firstly, data was downloaded from the two sources. The MPL, which contains awarded tender prices for medicines supplied to public healthcare facilities, was obtained directly from the NDOH(31). Data for prior years were archived and not available on the MPL. These archived data were requested directly from the Affordable Medicines unit at the National Department of Health. The MPR data, containing SEPs for medicines sold in the private sector, was downloaded as Excel spreadsheets from the Open Up website(32).

The datasets were then reorganised to ensure a uniform structure suitable for comparative analysis. This involved restructuring the data related to SEPs to facilitate comparisons across different years and formulations of medicines. A set of key variables was then extracted from both the MPL and SEP datasets, as shown in Table 3 and Table 4.

Table 2: Selected Basket of Medicines and their Groups

Group	Basket of Medicines
Anti-infectives	acyclovir 200 mg tab
	amoxicillin 250 mg cap
	ceftriaxone 1 g/vial injection
	ciprofloxacin 500 mg tab
	co-amoxiclav 250 + 125 mg tab
	co-trimoxazole 40 + 200 mg/5 ml suspension
Anti-retrovirals	efavirenz 600 mg tab
	lamivudine 150 mg tab
	nevirapine 200 mg tab
	stavudine 30 mg tab
	zidovudine 100 mg tab
Acute medicines	diazepam 5 mg tab
	loperamide 2 mg tab
	metoclopramide 10 mg tab
	prednisone 5 mg tab
	promethazine 25 mg tab
Chronic medicines	allopurinol 300 mg cap/tab
	amitriptyline 25 mg tab
	atenolol 50 mg tab,
	beclomethasone 50 mcg/dose inhaler
	captopril 25 mg cap/tab
	carbamazepine 200 mg tab
	fluoxetine 20 mg tab
	glibenclamide 5 mg tab
	hydrochlorothiazide 25 mg tab
	losartan 50 mg tab
	metformin 500 mg tab
	methylphenidate 10 mg tab
	nifedipine 10 mg cap
	phenytoin 100 mg cap
	salbutamol 100 mcg/dose inhaler

Table 3: Variables Selected from the MPL Primary Dataset (Public Tender Prices)

Dataset	Variable	Type of Data	Variable Explanation
Master Products List (MPL)	Brand Name	Categorical	Brand name of medicine as per contract
	International Non-proprietary Name (INN) or Generic name	Categorical	Name that identifies the active pharmaceutical ingredient Renamed in STATA to reflect compound name
	Dosage Form	Categorical	Type of dosage form
	Essential Medicine List (EML) category	Categorical	Category of medicine found on the Essential Medicine
	Sector	Categorical	Public Sector for Tender Price Private Sector for Single-Exit Price
	Pack size	Numerical	Standard pack size
	Tender Price	Numerical	Price per standard package, specifically using the median price for Tender Price

Table 4: Variables Selected from the MPR Primary Datasets (Private SEP Prices)

Dataset	Variable	Type of Data	Variable Explanation
Medicine Price Registry (MPR)	Brand Name	Categorical	Brand name of medicine as per contract
	International Non-proprietary Name (INN) or Generic name	Categorical	Name that identifies the active pharmaceutical ingredient Renamed in Stata to reflect compound name
	Dosage Form	Categorical	Type of dosage form
	Essential Medicine List (EML) category	Categorical	Category of medicine found on the Essential Medicine
	Sector	Categorical	Public Sector for Tender Price Private Sector for Single-Exit Price
	Pack size	Numerical	Standard pack size
	SEP	Numerical	Price per standard package, specifically using the median price and minimum unit price for Single-Exit Price

The datasets were cleaned and recoded so that the variables in both the public sector and the private sector databases matched. Any missing values were then identified. This process involved checking the numerical variables such as Pack size and Price using descriptive statistics and by tabulating categorical variables, including Brand Name, Form, Originator or Generic, and Year. Variables were then coded or recoded as necessary to ensure uniformity between the two datasets and to produce the final variables for analysis.

Finally, a robust method was developed to accurately match medicines across the MPL and SEP datasets. First, medicines were matched based on their active ingredient, formulation and strength. This rigorous matching ensured that truly comparable products were analysed. To address variations between brand names (common in private sector data) and generic names (prevalent in public sector data), cross-referencing with the South African Essential Medicines List (EML) and the South African Medicines Formulary (SAMF) was performed. These resources provided standardised drug names, including INNs, which were crucial for identifying equivalents.

A specific basket of 31 essential medicines was selected for analysis. This basket was adapted from the Thaver *et al.*(11) study who utilised the WHO/HAI methodology to ensure both international comparability and local relevance, including drugs from the South African Essential Medicines List. A critical inclusion criterion was that a compound had to appear consistently on both the MPL and MPR datasets for all five study years (2018-2022). Medicines like sulfadoxine/pyrimethamine 500/25mg and fluconazole 150mg were excluded as they did not meet this criterion. The selected compounds were then grouped into four categories based on their therapeutic use: acute, anti-infective, anti-retroviral, and chronic.

2.3. Data Analysis

Analysis was done using Stata v18. The data analysis methods are summarised in Table 5 and explained in more detail below, for each objective.

Table 5: Summary of the Data Analysis by Study Objective

Objective	**Statistical Analysis**
1. To describe the trends in pricing of essential medicines in South Africa in both public and private sector between 2018 and 2022	Time trend plots of public and private prices. Analysis was done for individual medicines, groups of medicines and for the entire basket, separately for each sector.
2. To calculate the differential in tender prices and single exit prices in medicines in South Africa between 2018 and 2022	Price difference: Calculated absolute price difference, ratios and percentage changes. Also price increases, % increases and ratios.
3. To characterise the change in the quantity-weighted price of a basket of essential medicines for the private sector and public sector in South Africa between 2018 and 2022	Laspeyres, Paasche and Fischer indices.

2.3.1. Objective 1: Trends in Essential Medicine Prices (South Africa, 2018-2022)

In the public sector, the median price was calculated from the tender prices for every selected compound in the basket of medicines and was used. Regarding the private sector, the median and minimum prices from the single exit prices of the corresponding compound selected were calculated. Time trend plots of the public and private prices were generated for individual medicines, group of medicines and for the entire basket of medicines to visualise the evolution of unit prices over the study period. Plots were generated using the median price in the private sector and the minimum price in the private sector.

Complementing these visualisations, the annual percentage change in prices was also calculated by compound name quantifying the year-over-year price variations. The formula used to obtain the annual percentage change encompassed the difference between the earliest and the latest annual price available for a medicine, expressed as a percentage(11):

$$\Delta Pa = \frac{Pyc - Pye}{Yc - Ye}\ x\ 100\ \%$$

Where:

Δ Pa represents the annual percentage change
P stands for the medicine price in a given year
Yc stands for the current year
Ye stands for the earliest year

This was done at three levels of aggregation for individual compounds, for pre-defined groups of medicines (acute, anti-infectives, anti-retrovirals, and chronic), and for the entire basket of essential medicines. For each level of aggregation, the annual percentage change was calculated.

2.3.2. Objective 2: Differences in Public Sector Prices and Private Sector Prices

The percentage price differential was calculated by expressing the SEP as a percentage of the tender price. This was calculated as shown in the formula below:

$$Pd\ = \frac{SEPi\ -\ TPi}{TPi}\ x\ 100\ \%$$

Where:

Pd represents for price difference
TP stands for the tender price, which is given as the median price in the public sector
SEP stands for the single exit price, which is given either the median price or the minimum price in the private sector
i stands for year price of medicine in effect

2.3.3. Objective 3: Change in the Quantity-Weighted Price

In economic analysis, price indices are critical tools for quantifying price changes against a baseline. They track the price evolution of a selected basket of goods over time. These indices are especially important for accurately representing price dynamics pertaining to pharmaceutical products, particularly in contexts such as South Africa, where disparities between public and private healthcare pricing are significant.

The price changes were analysed by calculating weighted price indices, giving more weight to the prices of commonly used medicines. This study examined the change in quantity-weighted prices by implementing three distinct price indices: the Laspeyres, Paasche, and Fisher indices. These three indices differ in how they weight quantities. The decision to use a specific index in this study was based on previous findings, particularly from Wouters(13) and Danzon *et al*(13,33,34), who compared the merits of Laspeyres versus Paasche based on observed correlations between price and quantity changes in their analyses. Their consensus recommended employing the Fisher index as the primary measure because it mitigates the biases associated with the individual indices. A critical aspect of this calculation was the data used for the weights. For both public and private sector price indices, public sector quantities were used for quantity weighting. This means that the volumes of medicines purchased by the public sector determined the influence of individual medicine price changes on the overall indices for both sectors. For this analysis, the first tender year was established as the base period with an index value of 100, from which changes in successive years were assessed, focusing on medicines that maintained consistent form, strength, and packaging. (13,33,34).

The three price indices were calculated in Stata by implementing a do-file designed for price index. After importing and preparing the data in Stata, the generation of quantity-weighted indices for both public and private sector prices followed, using public sector quantities as the common weighting factor. The formulae for the three price indices are shown as:

Laspeyres Price index = $\sum \frac{(Pi,t)x(Qi,O)}{(Pi,O)x(Qi,O)} x100$

Paasche Price Index = $\sum \frac{(Pi,t)x(Qi,t)}{(Pi,O)x(Qi,t)} x100$

Fisher Price index = $\sqrt{(PlPp)}$

Where:

Pi,O is the price of the individual item at base period
Pi,t is the price of the individual item at the observation period
Qi,O is the quantity of the individual item at the base period
Qi,t is the quantity of the individual item at the observation period
Pl is the Laspeyres price index
and Pp is the Paasche price index

Laspeyres index uses quantity weights from a previous period. For this study, the quantity weights from the public sector in the base year (2018) were used for all calculations across both the public and private sector price indices. It is relatively straightforward to compute, as it uses fixed base-period quantities. However, it tends to overstate inflation (or price increases) because it does not account for how consumers change their purchasing behaviour in response to price changes(35). Paasche index uses quantity weights from the current period. It reflects current consumption patterns. However, it also tends to understate inflation because it assumes consumers buy less of items with rising price(35). Fisher index is considered the best of the three indices considering that it is a geometric average of the Laspeyres and Paasche indices and provides a closer approximation to a true cost-of-living index (35).

CHAPTER 3: RESULTS

This study investigated the tender prices and single exit prices for a basket of thirty-two key medicines.

3.1. Objective 1: Trends in Essential Medicine Prices (South Africa, 2018-2022)

Table 6 below shows the number of medicines (n) analysed for each compound name and sector (public and private) from 2018 to 2022. This data provides insights into the variety of medicine products included in the analysis for each compound.

Table 6: Number of Medicines for each Compound Name Analysed from 2018-2022

Group	Compound name	Sector	2018	2019	2020	2021	2022
Anti-infectives	Acyclovir 200mg cap/tab	Public	1	1	1	1	1
		Private	9	9	8	9	8
	Amoxicillin 250mg cap/tab	Public	4	6	6	4	4
		Private	28	31	30	32	33
	Ceftriaxone 1g/vial injection	Public	3	3	3	3	3
		Private	19	19	20	21	29
	Ciprofloxacin 500mg cap/tab	Public	2	2	2	2	2
		Private	24	24	24	25	24
	Co-amoxiclav 250+125mg cap/tab	Public	2	2	2	2	2
		Private	14	16	16	14	10
	Co-trimoxazole 40+200mg/5ml susp	Public	2	4	4	2	2
		Private	20	20	20	21	23
Anti-retrovirals	Efavirenz 600mg cap/tab	Public	4	2	2	2	2
		Private	13	16	16	17	17
	Lamivudine 150mg cap/tab	Public	4	3	3	3	2
		Private	10	10	11	11	11
	Nevirapine 200mg cap/tab	Public	3	1	1	1	1
		Private	10	11	12	12	12
	Stavudine 30mg cap/tab	Public	1	1	1	1	1
		Private	6	6	7	6	6
	Zidovudine 100mg cap/tab	Public	1	1	1	1	2
		Private	6	6	6	6	6
Acute medicines	Diazepam 5mg cap/tab	Public	1	2	2	2	2
		Private	7	7	7	7	7
	Loperamide 2mg cap/tab	Public	2	2	2	2	2
		Private	15	15	15	17	17
	Metoclopramide 10mg cap/tab	Public	3	3	3	3	3
		Private	11	13	13	13	13
	Prednisone 5mg cap/tab	Public	5	8	8	4	5
		Private	8	8	8	8	8
	Promethazine 25mg cap/tab	Public	1	1	1	1	1
		Private	3	3	3	3	3
Chronic medicines	Allopurinol 300mg cap/tab	Public	1	1	1	2	2
		Private	10	10	10	12	12
	Amitriptyline 25mg cap/tab	Public	6	11	11	7	7
		Private	6	6	9	6	8

Group	Compound name	Sector	2018	2019	2020	2021	2022
	Atenolol 50mg cap/tab	Public	2	3	3	3	3
		Private	10	11	10	13	11
	Beclomethasone 50mcg/dose inhaler	Public	1	1	1	2	2
		Private	4	4	4	2	5
	Captopril 25mg cap/tab	Public	1	1	1	1	1
		Private	9	9	9	9	1
	Carbamazepine 200mg cap/tab	Public	5	7	7	6	6
		Private	7	7	8	12	12
	Fluoxetine 20mg cap/tab	Public	2	3	3	3	3
		Private	17	5	17	21	22
	Glibenclamide 5mg cap/tab	Public	6	6	6	6	6
		Private	10	10	13	15	13
	Hydrochlorothiazide 25mg cap/tab	Public	2	4	4	3	3
		Private	5	5	8	5	9
	Losartan 50mg cap/tab	Public	1	2	2	1	1
		Private	13	13	13	23	23
	Metformin 500mg cap/tab	Public	5	4	4	6	6
		Private	28	27	28	41	48
	Methylphenidate 10mg cap/tab	Public	1	1	1	1	1
		Private	15	17	17	17	18
	Nifedipine 10mg cap/tab	Public	1	1	1	1	1
		Private	6	6	6	6	6
	Phenytoin 100mg cap/tab	Public	2	2	2	2	2
		Private	8	8	8	8	8
	Salbutamol 100mcg/dose inhaler	Public	2	2	2	2	2
		Private	9	9	9	10	11

A general trend across the table is the consistently higher number of medicines analysed in the private sector compared to the public sector for most compounds. This is particularly pronounced for anti-infectives and chronic medicines. The number for the public sector is sometimes more than one when the public sector tenders are awarded to multiple suppliers. This "split contract" approach is used to ensure security of supply and prevent shortages. For most of the compounds, there are a large number of suppliers for the equivalent compounds in the private sector, indicating significant competition in those markets.

Table 7 shows medicine prices for both the public and private sectors in South Africa for each year from 2018 to 2022. In the public sector, median unit prices are given, while in the private sector, both the median and minimum prices were calculated, offering different comparisons with the public sector. The average price across the five years for each price is also shown in Table 7. These prices are presented graphically in Figure 1 and Figure 2.

3.1.1. Anti-infectives

Price trends vary across different medicine groups. For anti-infectives, a general upward trend was observed in the median prices across both sectors from 2018-2022. For instance, the median price of acyclovir increases from R0.41 in 2018 to R0.53 in 2022 in the public sector, from R3.03 in 2018 to R3.19 in 2022 for the median price in the private sector, and from R2.19 in 2018 to R2.44 in 2022 for the minimum price in the private sector over the same period. Amoxicillin's median price shows an upward trend in the private and public sector though the private sector's minimum price remains constant for several compounds. The median price for the entire anti-infectives group increased from R2.26 in 2018 to R2.27 in 2022 in the public sector, reflecting an average annual price increase of 6.64% for this category. The median price for this group was consistently higher, starting at R5.11 in 2018 and rising to R5.71 in 2022, with a smaller average annual increase of 2.88%. The mean price of all anti-infectives shows a clear and consistent pattern. Public sector prices demonstrate a gradual upward trend over the period. The minimum price in the private sector for anti-infectives fluctuated, starting at 1.71 in 2018 and ending at 1.77 in 2022, with an average increase of 0.58%.

3.1.2. Anti-retrovirals

Anti-retrovirals show a mixed trend, but overall prices increased more rapidly in the public sector. Efavirenz prices fluctuated for the median prices in the public sector and show an upward trend for the median price in the private sector. The private sector's minimum price for anti-retrovirals also showed an upward trend, from 1.89 in 2018 to 2.02 in 2022, with an average annual increase of 1.75%. The public sector median price for the anti-retrovirals group increased from R0.69 in 2018 to R0.82 in 2022, with an average annual price increase of 7.59%. The private sector median price was significantly higher throughout the period, starting at R3.47 in 2018 and rising to R3.84 in 2022, 2ith an average annual increase of 2.40%.

Table 7: Medicine Prices for a Basket of Medicines in South Africa from 2018-2022

Group	Compound name	Sector	Statistic	2018	2019	2020	2021	2022	Average
Anti-infectives	Acyclovir 200mg cap/tab	Public	median	0.41	0.43	0.43	0.53	0.53	0.47
		Private	median	3.03	3.15	3.18	3.18	3.19	3.14
			min	2.19	2.27	2.27	2.36	2.44	2.31
	Amoxicillin 250mg cap/tab	Public	median	0.32	0.32	0.33	0.35	0.47	0.36
		Private	median	0.45	0.50	0.51	0.57	0.56	0.52
			min	0.23	0.23	0.23	0.23	0.23	0.00
	Ceftriaxone 1g/vial injection	Public	median	6.01	5.73	5.94	6.55	6.55	6.16
		Private	median	11.60	12.04	13.43	12.16	13.50	12.55
			min	1.21	1.30	1.31	1.36	0.72	1.18
	Ciprofloxacin 500mg cap/tab	Public	median	0.55	0.57	0.58	0.75	0.75	0.64
		Private	median	2.59	2.68	2.81	2.90	2.89	2.77
			min	1.54	1.59	1.67	1.73	1.78	1.66
	Co-amoxiclav 250+125mg cap/tab	Public	median	1.74	1.56	1.61	1.57	1.76	1.65
		Private	median	3.31	3.40	3.51	3.63	3.40	3.45
			min	2.17	2.26	2.36	3.16	2.53	2.50
	Co-trimoxazole 40+200mg/5ml susp	Public	median	4.53	4.99	5.11	6.57	6.57	5.55
		Private	median	9.65	10.02	10.36	10.65	10.69	10.21
			min	3.15	3.15	3.15	3.15	3.15	3.15
Anti-retrovirals	Efavirenz 600mg cap/tab	Public	median	1.59	1.48	1.64	1.63	1.53	1.58
		Private	median	7.47	7.53	7.86	7.90	8.18	7.79
			min	3.59	3.59	3.59	3.53	3.53	3.56
	Lamivudine 150mg cap/tab	Public	median	0.40	0.55	0.60	0.60	0.53	0.54
		Private	median	2.29	2.38	2.49	2.42	2.42	2.40
			min	0.71	0.73	0.77	0.77	0.77	0.75
	Nevirapine 200mg cap/tab	Public	median	0.54	0.59	0.65	0.64	0.62	0.61
		Private	median	4.47	4.61	4.82	5.00	5.08	4.80
			min	2.28	2.37	2.47	2.56	2.60	2.46
	Stavudine 30mg cap/tab	Public	median	0.31	0.46	0.47	0.47	0.48	0.44
		Private	median	0.92	0.94	1.01	0.96	0.96	0.96
			min	0.67	0.67	0.67	0.67	0.67	0.67
	Zidovudine 100mg cap/tab	Public	median	0.61	0.57	0.65	0.64	0.92	0.68
		Private	median	2.19	2.28	2.38	2.47	2.55	2.37
			min	2.18	2.26	2.36	2.44	2.52	2.35
Acute medicines	Diazepam 5mg cap/tab	Public	median	0.57	0.20	0.20	0.21	0.21	0.28
		Private	median	0.19	0.20	0.21	0.21	0.21	0.20
			min	0.11	0.11	0.12	0.12	0.13	0.12
	Loperamide 2mg cap/tab	Public	median	0.13	0.22	0.24	0.43	0.43	0.29
		Private	median	1.51	1.56	1.63	1.69	1.75	1.63
			min	0.34	0.34	0.34	0.34	0.34	0.34
	Metoclopramide 10mg cap/tab	Public	median	0.07	0.16	0.17	0.16	0.16	0.15
		Private	median	0.15	0.17	0.17	0.18	0.19	0.17
			min	0.11	0.12	0.12	0.13	0.13	0.12
	Prednisone 5mg cap/tab	Public	median	0.14	0.17	0.17	0.19	0.19	0.17
		Private	median	0.32	0.33	0.34	0.35	0.36	0.34
			min	0.14	0.15	0.15	0.16	0.17	0.15
	Promethazine 25mg cap/tab	Public	median	0.22	0.26	0.27	0.33	0.33	0.28
		Private	median	1.43	1.49	1.56	1.61	1.67	1.55
			min	0.28	0.29	0.31	0.32	0.33	0.31

Group	Compound name	Sector	Statistic	2018	2019	2020	2021	2022	Average
Chronic medicines	Allopurinol 300mg cap/tab	Public	median	0.41	0.47	0.47	0.61	0.61	0.51
		Private	median	2.14	2.22	2.32	2.37	2.46	2.30
			min	2.00	2.07	2.17	1.99	1.99	2.04
	Amitriptyline 25mg cap/tab	Public	median	0.13	0.15	0.15	0.17	0.17	0.15
		Private	median	0.94	0.97	1.18	1.05	0.89	1.01
			min	0.64	0.67	0.70	0.72	0.75	0.69
	Atenolol 50mg cap/tab	Public	median	0.09	0.11	0.12	0.12	0.12	0.11
		Private	median	0.73	0.73	0.71	0.84	0.78	0.76
			min	0.49	0.51	0.53	0.55	0.55	0.53
	Beclomethasone 50mcg/dose inhaler	Public	median	24.94	26.85	27.55	27.26	27.62	26.84
		Private	median	74.15	76.95	59.96	84.09	84.09	75.85
			min	60.10	71.70	54.78	46.00	46.00	55.72
	Captopril 25mg cap/tab	Public	median	0.15	0.14	0.15	0.18	0.18	0.16
		Private	median	0.53	0.55	0.58	0.60	0.37	0.53
			min	0.32	0.33	0.35	0.36	0.37	0.35
	Carbamazepine 200mg cap/tab	Public	median	0.32	0.34	0.35	0.48	0.48	0.40
		Private	median	2.41	2.50	2.46	1.62	1.67	2.13
			min	1.22	1.23	1.23	1.38	1.42	1.30
	Fluoxetine 20mg cap/tab	Public	median	0.19	0.20	0.22	0.23	0.23	0.21
		Private	median	1.63	1.10	1.37	1.19	1.22	1.30
			min	0.70	1.04	0.76	0.79	0.82	0.82
	Glibenclamide 5mg cap/tab	Public	median	0.10	0.11	0.12	0.12	0.12	0.11
		Private	median	0.31	0.32	0.34	0.35	0.35	0.33
			min	0.29	0.30	0.30	0.31	0.29	0.30
	Hydrochlorothiazide 25mg cap/tab	Public	median	0.13	0.13	0.13	0.16	0.16	0.14
		Private	median	1.22	1.27	0.82	0.52	1.17	1.00
			min	0.50	0.51	0.50	0.52	0.54	0.52
	Losartan 50mg cap/tab	Public	median	0.24	0.27	0.29	0.29	0.29	0.28
		Private	median	3.20	3.18	3.00	3.08	3.15	3.12
			min	1.82	1.89	1.98	2.05	2.10	1.97
	Metformin 500mg cap/tab	Public	median	0.13	0.14	0.15	0.18	0.18	0.16
		Private	median	0.44	0.44	0.45	0.47	0.51	0.46
			min	0.31	0.31	0.31	0.31	0.31	0.31
	Methylphenidate 10mg cap/tab	Public	median	0.83	0.97	0.97	0.83	0.83	0.89
		Private	median	0.25	0.26	0.27	0.28	0.29	0.27
			min	0.11	0.12	0.12	0.13	0.13	0.12
	Nifedipine 10mg cap/tab	Public	median	0.50	0.45	0.45	0.65	0.65	0.54
		Private	median	1.17	1.20	1.23	1.26	1.29	1.23
			min	0.26	0.26	0.26	0.26	0.27	0.26
	Phenytoin 100mg cap/tab	Public	median	0.72	0.83	0.83	0.64	0.64	0.73
		Private	median	0.62	0.64	0.67	0.69	0.72	0.67
			min	0.14	0.15	0.15	0.16	0.17	0.15
	Salbutamol 100mcg/dose inhaler	Public	median	15.32	15.80	16.97	19.60	19.74	17.48
		Private	median	35.71	37.06	38.73	37.47	37.89	37.37
			min	28.72	28.75	28.75	27.60	28.57	28.48

3.1.3. Acute Medicines

Acute medicines demonstrate a general trend of increasing prices in both the public and private sectors. However, the magnitude of prices differs significantly. The median price for acute medicines showed some fluctuation but generally increased from R0.23 in 2018 to R0.26 in 2022. For diazepam, the median price in the public sector showed fluctuation, decreasing from 0.57 and remaining around 0.20 until a slight increase to 0.21 in 2021, while the private sector's median and minimum prices increased throughout the period. The private sector's median price for acute medicines consistently rose from 0.72 in 2018 to 0.84 in 2022, with an average annual price increase of 3.39%. Loperamide's median prices in both the public sector and private sector increased, whereas the private sector's minimum price remains constant at 0.34 over the same period. Loperamide's public sector median price displayed a strong increase, rising from R0.13 in 2018 to R0.43 in 2022. The private sector's minimum price for acute medicines also increased from 0.20 in 2018 to 0.22 in 2022, with an average annual increase of 3.11%. The overall public sector average annual price increase was the largest among the groups at 14.75%. The private sector average annual increase was 3.39%.

3.1.4. Chronic Medicines

Trends for chronic medications were varied but most compounds showed an increase in the public sector median price. The public sector median price for chronic medicines saw a steady rise from R2.95 in 2018 to R3.47 in 2022, with an average annual price increase of 6.06%. In contrast, the private sector median price for chronic medicines remained relatively stable and high over the period starting at 12.10 in 2018 and ending at 12.06 in 2022, with an average annual increase of 1.27%. Notably, a decrease in the median price for the private sector was observed for carbamazepine and fluoxetine. The private sector's minimum prices for metformin did not change across the five years. Overall, the private sector's minimum price for chronic medicines showed a slight upward trend, from 11.65 in 2018 to 11.71 in 2022, with an average annual increase of 2.40%.

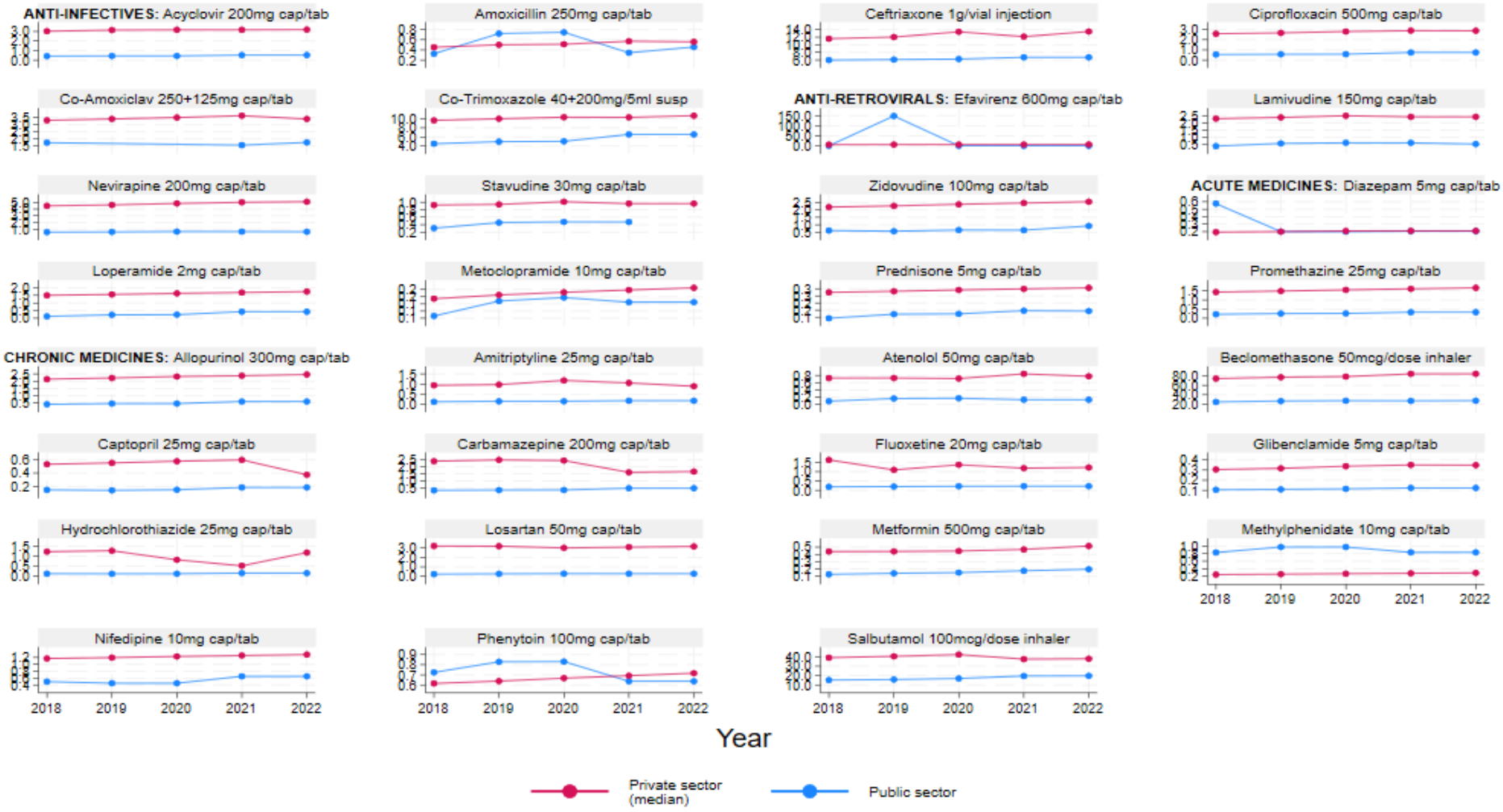

Figure 1:Trends for Public Prices (Median Price) and Private Prices (Median Price)

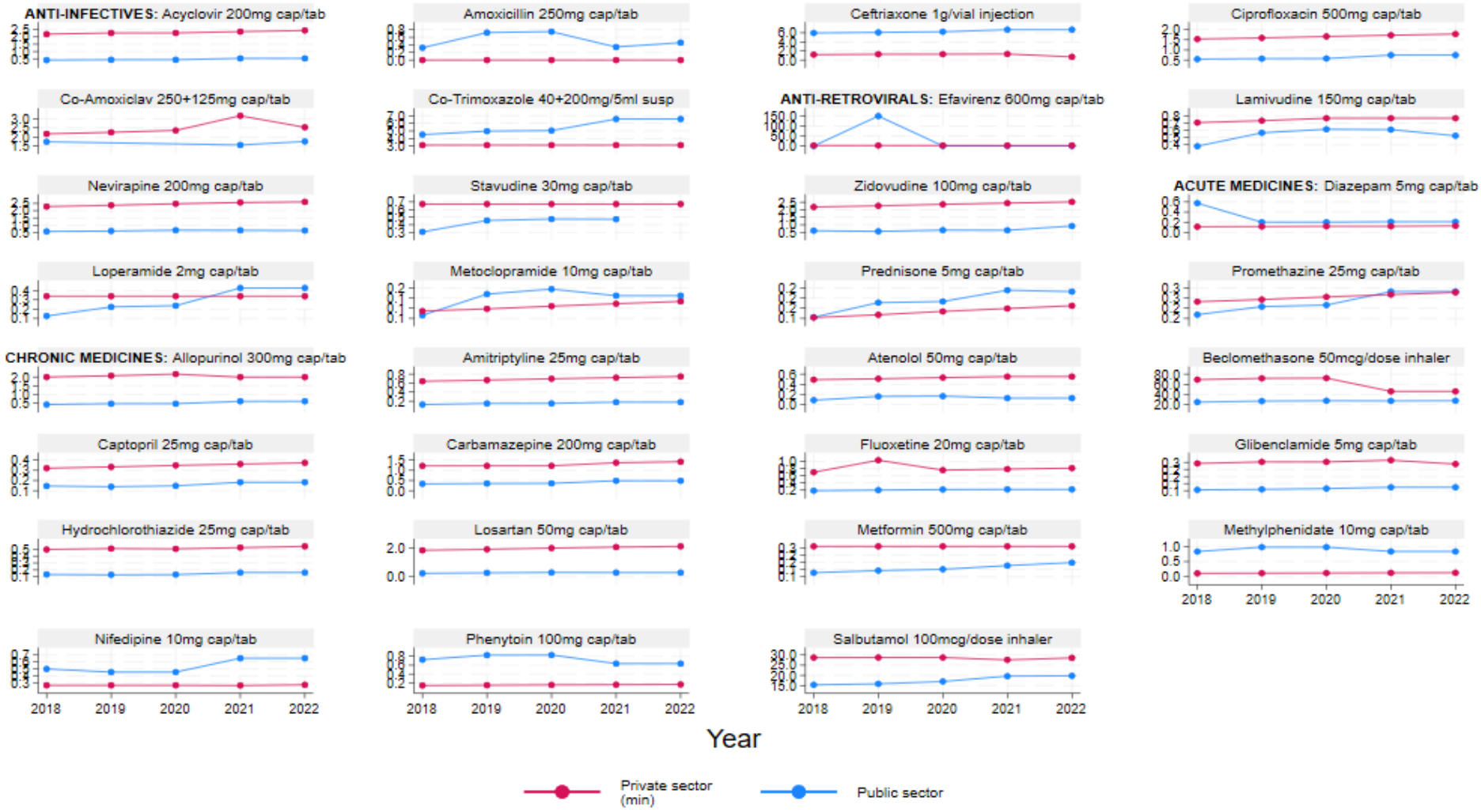

Figure 2:Trends for Public Prices (Median Price) and Private Prices (Minimum Price)

Table 8: Annual Price Increase of Medicines from 2018-2022

Group	Compound name	Sector	Statistic	Annual % Increase				
				2019	2020	2021	2022	Average
Anti-infectives	Acyclovir 200mg cap/tab	Public	median price	5.57	0.00	21.83	0.00	**6.85**
		Private	median price	3.78	0.94	-0.01	0.56	**1.32**
			min price	3.78	0.00	3.86	3.50	**2.78**
	Amoxicillin 250mg cap/tab	Public	median price	0.84	3.53	4.08	36.06	**11.13**
		Private	median price	10.33	2.52	11.26	-1.81	**5.58**
			min price	0.00	0.00	0.00	0.00	0.00
	Ceftriaxone 1g/vial injection	Public	median price	-4.66	3.66	10.27	0.00	**2.32**
		Private	median price	3.76	11.52	-9.44	11.02	**4.22**
			min price	7.68	0.72	3.64	-46.99	**-8.74**
	Ciprofloxacin 500mg cap/tab	Public	median price	4.75	1.40	28.40	0.00	**8.64**
		Private	median price	3.21	5.11	3.11	-0.34	**2.77**
			min price	3.77	4.52	3.60	3.40	**3.82**
	Co-amoxiclav 250+125mg cap/tab	Public	median price	10.73	3.22	-2.33	12.20	**0.59**
		Private	median price	2.95	2.95	3.68	-6.35	**0.81**
			min price	3.78	4.53	33.92	-19.87	**5.59**
	Co-trimoxazole 40+200mg/5ml susp	Public	median price	10.17	2.61	28.54	0.00	**10.33**
		Private	median price	3.78	3.41	-0.27	3.50	**2.60**
			min price	0.00	0.00	0.00	0.00	0.00
Anti-retrovirals	Efavirenz 600mg cap/tab	Public	median price	-6.78	10.66	-0.98	-5.70	**-0.70**
		Private	median price	0.72	4.49	0.45	3.54	**2.30**
			min price	0.00	0.00	-1.54	0.00	**-0.39**
	Lamivudine 150mg cap/tab	Public	median price	38.83	8.84	-0.83	-11.91	**8.73**
		Private	median price	3.78	4.83	-2.87	0.01	**1.44**
			min price	3.78	4.53	0.00	0.00	**2.08**
	Nevirapine 200mg cap/tab	Public	median price	9.99	9.18	-0.86	-2.65	**3.92**
		Private	median price	2.98	4.69	3.60	1.70	**3.24**
			min price	3.76	4.52	3.67	1.56	**3.38**
	Stavudine 30mg cap/tab	Public	median price	48.57	4.08	-0.41	2.27	**13.63**
		Private	median price	1.91	7.60	-4.89	0.00	**1.15**
			min price	0.00	0.00	0.00	0.00	0.00
	Zidovudine 100mg cap/tab	Public	median price	-7.47	14.30	-1.27	43.98	**12.38**
		Private	median price	3.78	4.53	3.68	3.50	**3.87**
			min price	3.67	4.42	3.39	3.28	**3.69**
Acute medicines	Diazepam 5mg cap/tab	Public	median price	-65.19	0.00	3.58	0.00	**-15.40**
		Private	median price	3.64	4.55	0.66	0.00	**2.21**
			min price	3.78	4.76	0.00	7.04	**3.90**
	Loperamide 2mg cap/tab	Public	median price	77.32	5.95	80.00	0.00	**40.82**
		Private	median price	3.78	4.53	3.67	3.50	**3.87**
			min price	0.00	0.00	0.00	0.00	0.00
	Metoclopramide 10mg cap/tab	Public	median price	118.79	5.52	-5.23	0.00	**29.77**
		Private	median price	6.81	4.52	3.67	3.46	**4.61**
			min price	3.78	4.53	3.86	3.50	**3.92**
	Prednisone 5mg cap/tab	Public	median price	18.74	0.00	9.76	-0.40	**7.02**
		Private	median price	2.25	2.74	2.27	2.18	**2.36**
			min price	3.78	4.53	3.68	3.50	**3.87**
	Promethazine 25mg cap/tab	Public	median price	18.01	2.98	25.20	0.00	**11.55**
		Private	median price	3.88	4.43	3.68	3.50	**3.87**
			min price	3.76	4.52	3.67	3.46	**3.85**

Chronic medicines	Allopurinol 300mg cap/tab	Public	median price	12.05	0.00	30.32	0.00	10.59
		Private	median price	3.78	4.53	2.45	3.50	3.56
			min price	3.78	4.53	-7.98	0.00	0.08
	Amitriptyline 25mg cap/tab	Public	median price	13.67	1.89	12.17	0.00	6.93
		Private	median price	3.57	21.38	-10.54	-15.50	-0.27
			min price	3.78	4.53	3.68	3.50	3.87
	Atenolol 50mg cap/tab	Public	median price	25.77	8.20	3.80	0.00	9.44
		Private	median price	0.10	-1.98	18.33	-7.87	2.15
			min price	3.78	4.53	3.68	0.00	3.00
	Beclomethasone 50mcg/dose inhaler	Public	median price	7.66	2.61	-1.03	1.28	2.63
		Private	median price	3.78	1.83	7.31	0.00	3.23
			min price	3.76	0.59	-36.22	0.00	-7.97
	Captopril 25mg cap/tab	Public	median price	-4.91	6.60	23.54	0.00	6.31
		Private	median price	3.78	4.53	3.44	-37.59	-6.46
			min price	3.78	4.53	3.68	3.50	3.87
	Carbamazepine 200mg cap/tab	Public	median price	6.85	3.19	38.21	0.00	12.06
		Private	median price	3.78	-1.80	-34.16	3.50	-7.17
			min price	0.16	0.00	12.27	3.50	3.98
	Fluoxetine 20mg cap/tab	Public	median price	8.68	6.94	5.80	0.00	5.35
		Private	median price	-32.74	24.84	-13.18	3.20	-4.47
			min price	47.90	-26.65	3.68	3.50	7.11
	Glibenclamide 5mg cap/tab	Public	median price	13.80	4.68	1.54	0.00	5.00
		Private	median price	3.78	6.55	3.68	-0.48	3.38
			min price	3.78	0.00	3.86	-8.56	-0.23
	Hydrochlorothiazide 25mg cap/tab	Public	median price	-3.98	4.01	21.81	0.00	5.46
		Private	median price	3.78	-35.58	-35.85	124.37	14.18
			min price	2.87	-1.00	3.68	3.50	2.26
	Losartan 50mg cap/tab	Public	median price	14.60	7.58	-2.30	0.00	4.97
		Private	median price	-0.62	-5.57	2.57	2.27	-0.34
			min price	3.78	4.53	3.68	2.35	3.59
	Metformin 500mg cap/tab	Public	median price	11.55	6.47	14.53	0.00	8.14
		Private	median price	0.24	1.30	4.81	10.11	4.12
			min price	0.00	0.00	0.00	0.00	0.00
	Methylphenidate 10mg cap/tab	Public	median price	17.51	0.00	-14.53	0.00	0.75
		Private	median price	4.69	4.53	3.68	3.50	4.10
			min price	3.78	4.53	3.86	3.50	3.92
	Nifedipine 10mg cap/tab	Public	median price	-9.21	0.00	44.42	0.00	8.80
		Private	median price	2.30	2.79	2.20	2.17	2.37
			min price	0.00	0.00	-0.87	3.50	0.66
	Phenytoin 100mg cap/tab	Public	median price	14.44	0.22	-23.31	0.00	-2.16
		Private	median price	3.78	4.53	3.68	3.50	3.87
			min price	3.78	4.53	3.68	3.50	3.87
	Salbutamol 100mcg/dose inhaler	Public	median price	3.13	7.41	15.53	0.74	6.70
		Private	median price	3.78	4.53	-11.51	1.12	-0.52
			min price	0.10	0.00	-4	3.51	-0.10

*min price = minimum price, green colour depicts an increase and red colour depicts a decrease

Table 8 shows the annual percentage increase or decrease in medicine prices for both the public and private sectors in South Africa from 2018 to 2022. In the public sector, median unit prices are given, while in the private sector, both median and minimum prices are provided.

The final column in Table 8, averages the percentage increases across the five years, colour coded in green for an increase or red for a decrease for the average trend across the five years. Comparing the direction of price changes between the two sectors, the table shows that the public sector displayed a wider range of percentage increases, while the private sector demonstrates a tendency towards more moderate and consistent increases. Loperamide had the largest percentage average increase of 40.82% for the price in the public sector while the largest average increase in the private sector was for hydrochlorothiazide at 14.18%. Diazepam shows the largest percentage decrease of -15.40% in the public sector. Interesting, for a number of medicines, the minimum price in the private sector did not change at all across the five years.

Table 9 and Figure 3 below present the price trends by group of medicines, using the unweighted mean of all the compounds in the group, for the public sector median price and both the median and minimum prices in the private sector for the period 2018 to 2022. The mean price of the entire basket of medicines is also provided.

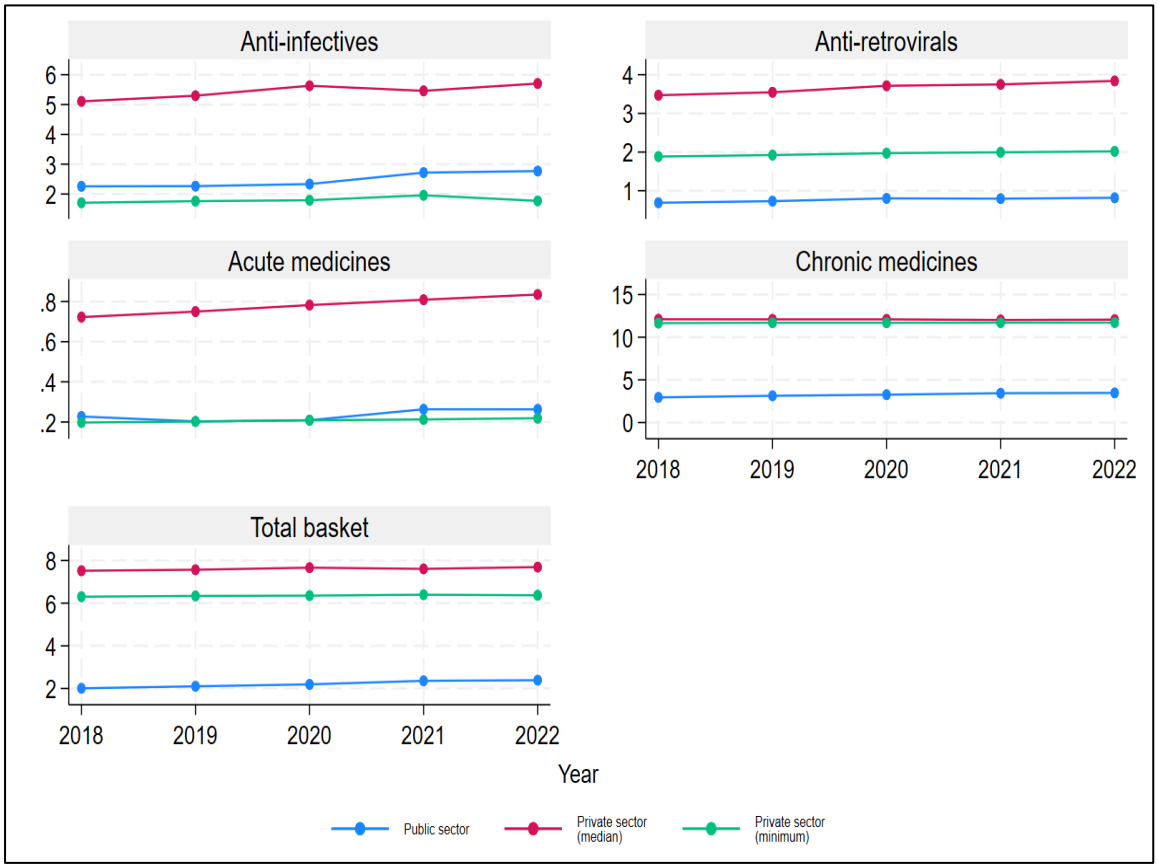

Figure 3:Trends and Differences in Mean Prices by Groups of Medicines for 2018-2022

Table 9: Medicine Prices by Group

			Average prices by group					Average price increase (%) by group					Private-Public difference (%) by group						
Group	**Sector**	**Statistic**	**2018**	**2019**	**2020**	**2021**	**2022**	**2018-2019**	**2019-2020**	**2020-2021**	**2021-2022**	**Average increase**	**Difference**	**2018**	**2018**	**2018**	**2018**	**2018**	**Average difference**
Anti-infectives	**Public**	median price	2.26	2.27	2.33	2.72	2.77	0.99%	2.40%	15.13%	8.04%	**6.64%**							
	Private	median price	5.11	5.30	5.63	5.46	5.71	4.64%	4.41%	1.39%	1.10%	**2.88%**	priv(med)-pub(med)	225.5%	230.1%	236.7%	188.5%	179.2%	**212.0%**
		minimum price	1.71	1.76	1.79	1.96	1.77	3.17%	1.63%	7.50%	-9.99%	**0.58%**	priv(min)-pub(med)	71.7%	72.5%	73.8%	58.3%	51.0%	**65.4%**
Anti-retrovirals	**Public**	median price	0.69	0.730	0.80	0.80	0.82	16.63%	9.41%	-0.87%	5.20%	**7.59%**							
	Private	median price	3.47	3.55	3.72	3.75	3.84	2.63%	5.23%	-0.01%	1.75%	**2.40%**	priv(med)-pub(med)	407.1%	364.8%	344.1%	352.3%	357.1%	**365.1%**
		minimum price	1.89	1.92	1.97	1.99	2.02	2.24%	2.69%	1.10%	0.97%	**1.75%**	priv(min)-pub(med)	180.3%	164.1%	147.0%	154.0%	141.3%	**157.3%**
Acute medicines	**Public**	median price	0.23	0.20	0.21	0.26	0.26	33.53%	2.89%	22.66%	-0.08%	**14.75%**							
	Private	median price	0.72	0.75	0.78	0.81	0.84	4.07%	4.15%	2.79%	2.53%	**3.39%**	priv(med)-pub(med)	362.9%	234.1%	235.7%	155.8%	163.7%	**230.4%**
		minimum price	0.20	0.20	0.21	0.21	0.22	3.02%	3.67%	2.24%	3.50%	**3.11%**	priv(min)-pub(med)	33.8%	-3.8%	-3.9%	-20.6%	-17.9%	**-2.5%**
Chronic medicines	**Public**	median price	2.95	3.13	3.26	3.44	3.47	8.77%	3.99%	11.37%	0.13%	**6.06%**							
	Private	median price	12.10	12.09	12.09	12.02	12.06	0.01%	2.00%	-3.26%	6.31%	**1.27%**	priv(med)-pub(med)	446.9%	394.7%	366.4%	293.8%	308.2%	**362.0%**
		minimum price	11.65	11.69	11.69	11.70	11.71	5.41%	0.27%	2.46%	1.45%	**2.40%**	priv(min)-pub(med)	243.9%	231.8%	214.0%	188.1%	191.1%	**213.8%**
Total basket	**Public**	median price	2.01	2.10	2.19	2.36	2.39	12.53%	4.38%	11.94%	2.45%	**7.82%**							
	Private	median price	7.52	7.57	7.67	7.61	7.69	1.99%	3.34%	-0.86%	3.96%	**2.10%**	priv(med)-pub(med)	384.1%	332.1%	316.6%	260.6%	267.8%	**312.2%**
		minimum price	6.31	6.34	6.35	6.40	6.37	4.08%	1.47%	3.18%	-0.51%	**2.06%**	priv(min)-pub(med)	166.4%	152.1%	140.9%	123.8%	122.2%	**141.1%**

*pub(med) means median prices in the public sector, priv(med) means median prices in the private sector and priv(min) means minimum prices in the private sector

Across the entire basket of medicines, the public sector's median price increased from 2.01 in 2018 to 2.39 in 2022, with an average annual price increase of 7.82%. The private sector's median price for the total basket of medicines was significantly higher than the public sector, starting at 7.52 in 2018 and reaching 7.69 in 2022, with an average annual price increase of 2.10%. The private sector's minimum price for the total basket also showed a slight increase from 6.31 in 2018 to 6.37 in 2022, with an average annual increase of 2.06%.

3.2. Objective 2: Differences Between Public Sector Prices and Private Sector Prices

Table 10 shows the percentage price differences between the tender median price and both the SEP median price and the SEP minimum price for each compound in the basket for each year from 2018-2022. The differences by group of medicines are presented in Table 9 above. The mean percentage difference across the five years is calculated in the last column in both tables.

The analysis of medicine prices by group shows a general pattern of significantly higher costs in the private sector compared to the public sector across all major therapeutic groups for the period between 2018 and 2022 (Table 9 and Figure 3). The ‘Total basket' of medicines, for instance, shows the private sector median price to be, on average, 312.2% greater than that in the public sector median price. On the other hand, the private sector minimum price is, on average, 141.1% greater than that in the public sector median price.

Table 10: Price Differences Between the Public and Private Sectors

Group	Compound name	% Difference	2018	2019	2020	2021	2022	Ave % Diff
Anti-infectives	Acyclovir 200mg cap/tab	pub(med)-priv(med)	640.3	627.7	634.6	502.9	506.3	**582.3**
		pub(med)-priv(min)	434.8	425.7	425.7	348.2	363.9	**399.7**
	Amoxicillin 250mg cap/tab	pub(med)-priv(med)	42.5	55.9	54.4	65.1	19.1	**47.4**
		pub(med)-priv(min)	-99.9	-99.9	-99.9	-99.9	-100.0	**-99.9**
	Ceftriaxone 1g/vial injection	pub(med)-priv(med)	93.1	110.1	126.0	85.6	106.1	**104.2**
		pub(med)-priv(min)	-79.9	-77.3	-78.0	-79.3	-89.0	**-80.7**
	Ciprofloxacin 500mg cap/tab	pub(med)-priv(med)	373.9	366.9	384.0	288.7	287.4	**340.2**
		pub(med)-priv(min)	180.6	178.0	186.6	131.2	139.1	**163.1**
	Co-amoxiclav 250+125mg cap/tab	pub(med)-priv(med)	89.8	119.0	118.4	131.8	93.5	**110.5**
		pub(med)-priv(min)	24.8	45.1	46.9	101.4	43.9	**52.4**
	Co-trimoxazole 40+200mg/5ml susp	pub(med)-priv(med)	113.3	100.9	102.5	57.1	62.6	**87.3**
		pub(med)-priv(min)	-30.4	-36.8	-38.4	-52.1	-52.1	**-42.0**
Anti-retrovirals	Efavirenz 600mg cap/tab	pub(med)-priv(med)	369.2	407.0	378.7	385.6	433.2	**394.8**
		pub(med)-priv(min)	125.1	141.5	118.2	117.0	130.1	**126.4**
	Lamivudine 150mg cap/tab	pub(med)-priv(med)	474.8	329.7	313.9	305.4	360.2	**356.8**
		pub(med)-priv(min)	77.1	32.4	27.1	28.2	45.5	**42.1**
	Nevirapine 200mg cap/tab	pub(med)-priv(med)	731.8	678.7	646.7	680.3	715.1	**690.5**
		pub(med)-priv(min)	324.1	300.0	283.0	300.5	317.8	**305.1**
	Stavudine 30mg cap/tab	pub(med)-priv(med)	200.8	106.3	113.3	103.7	99.2	**124.7**
		pub(med)-priv(min)	118.8	47.3	41.5	42.1	38.9	**57.7**
	Zidovudine 100mg cap/tab	pub(med)-priv(med)	258.8	302.4	268.0	286.5	177.8	**258.7**
		pub(med)-priv(min)	256.5	299.4	264.9	282.1	174.1	**255.4**
Acute medicines	Diazepam 5mg cap/tab	pub(med)-priv(med)	-66.4	-0.1	4.5	1.5	1.5	**-11.8**
		pub(med)-priv(min)	-80.8	-42.8	-40.1	-42.1	-38.1	**-48.8**
	Loperamide 2mg cap/tab	pub(med)-priv(med)	1091.0	597.1	587.7	296.1	310.0	**576.4**
		pub(med)-priv(min)	168.0	51.1	42.6	-20.8	-20.8	**44.1**
	Metoclopramide 10mg cap/tab	pub(med)-priv(med)	107.5	1.3	0.3	9.8	13.5	**26.5**
		pub(med)-priv(min)	53.7	-27.1	-27.8	-20.8	-18.1	**-8.0**
	Prednisone 5mg cap/tab	pub(med)-priv(med)	126.8	95.3	100.7	87.0	91.8	**100.3**
		pub(med)-priv(min)	-1.0	-13.5	-9.6	-14.6	-11.2	**-10.0**
	Promethazine 25mg cap/tab	pub(med)-priv(med)	555.6	477.1	485.2	384.6	401.6	**460.8**
		pub(med)-priv(min)	29.1	13.5	15.2	-4.6	-1.3	**10.3**

Group	Compound name	% Difference	2018	2019	2020	2021	2022	Ave % Diff
Chronic medicines	Allopurinol 300mg cap/tab	pub(med)-priv(med)	414.5	376.5	398.1	291.6	305.3	**357.2**
		pub(med)-priv(min)	381.1	345.6	365.8	228.9	228.9	**310.1**
	Amitriptyline 25mg cap/tab	pub(med)-priv(med)	632.8	567.7	695.4	534.4	436.1	**573.3**
		pub(med)-priv(min)	402.4	358.7	370.6	335.0	350.2	**363.4**
	Atenolol 50mg cap/tab	pub(med)-priv(med)	737.6	566.6	503.9	588.4	534.3	**586.2**
		pub(med)-priv(min)	465.6	366.7	350.9	350.3	350.3	**376.8**
	Beclomethasone 50mcg/dose inhaler	pub(med)-priv(med)	197.3	186.6	184.4	208.4	204.5	**196.2**
		pub(med)-priv(min)	177.1	167.0	161.8	68.7	66.6	**128.2**
	Captopril 25mg cap/tab	pub(med)-priv(med)	266.2	299.7	291.9	228.2	104.8	**238.2**
		pub(med)-priv(min)	120.3	140.5	135.8	97.9	104.8	**119.9**
	Carbamazepine 200mg cap/tab	pub(med)-priv(med)	658.6	636.8	601.2	234.0	245.7	**475.3**
		pub(med)-priv(min)	285.1	261.0	249.8	184.2	194.1	**234.8**
	Fluoxetine 20mg cap/tab	pub(med)-priv(med)	770.3	438.6	528.8	416.0	432.5	**517.2**
		pub(med)-priv(min)	275.9	411.6	250.9	243.9	255.9	**287.6**
	Glibenclamide 5mg cap/tab	pub(med)-priv(med)	208.9	181.7	186.8	192.8	191.4	**192.3**
		pub(med)-priv(min)	195.1	169.2	157.1	163.0	140.5	**165.0**
	Hydrochlorothiazide 25mg cap/tab	pub(med)-priv(med)	807.7	881.1	507.7	220.0	618.0	**606.9**
		pub(med)-priv(min)	268.7	295.0	276.0	220.0	231.2	**258.2**
	Losartan 50mg cap/tab	pub(med)-priv(med)	1241.3	1063.2	921.0	971.9	996.3	**1038.7**
		pub(med)-priv(min)	664.3	592.1	572.5	613.7	630.5	**614.6**
	Metformin 500mg cap/tab	pub(med)-priv(med)	240.1	205.7	190.8	166.1	193.1	**199.2**
		pub(med)-priv(min)	139.6	114.8	101.8	76.2	76.2	**101.7**
	Methylphenidate 10mg cap/tab	pub(med)-priv(med)	-70.1	-73.3	-72.1	-66.2	-65.0	**-69.3**
		pub(med)-priv(min)	-86.2	-87.8	-87.2	-84.5	-83.9	**-85.9**
	Nifedipine 10mg cap/tab	pub(med)-priv(med)	135.3	165.1	172.5	92.9	97.0	**132.6**
		pub(med)-priv(min)	-47.6	-42.2	-42.2	-60.3	-59.0	**-50.3**
	Phenytoin 100mg cap/tab	pub(med)-priv(med)	-15.0	-23.0	-19.6	8.6	12.4	**-7.3**
		pub(med)-priv(min)	-80.4	-82.2	-81.5	-75.0	-74.1	**-78.6**
	Salbutamol 100mcg/dose inhaler	pub(med)-priv(med)	154.9	156.5	149.6	91.2	91.9	**128.8**
		pub(med)-priv(min)	87.5	82.0	69.5	40.8	44.7	**64.9**

*pub(med) means median price in the public sector, priv(med) means median price in the private sector and priv(min) means minimum price in the private sector

Delving into specific medicine groups further elucidates this pattern. For anti-infectives, the private sector's median price averaged 212.0% higher than the public sector's median price.

Similarly, anti-retrovirals presented an even more pronounced disparity, with private sector median prices averaging 365.1% higher than public sector median prices. Acute medicines followed suit, demonstrating a 230.4% average higher median price in the private sector than the median price in the public sector. An exception is observed where the private sector minimum prices are 2.5% lower than the public sector median prices. Lastly, chronic medicines also exhibited a substantial difference, with private sector median prices being, on average, 362.0% higher than in the public sector median prices. These considerable percentage differences, consistently depicted by the wide separation between the public (blue line) and private (red line) median price trends in Figure 3, highlight a systemic pattern where access to medicines via the private sector comes at a significantly elevated cost.

While the general trend points to considerably higher private sector prices, the detailed examination of individual compounds in Table 10 occasionally reveals exceptions or notable deviations from this broad pattern. For instance, within anti-infectives, Acyclovir 200mg cap/tab showed an exceptionally high private median price to public median price difference, averaging 582.3%, indicating a particularly large disparity. Conversely, for Amoxicillin 250mg cap/tab, the percentage difference between private median prices and public median prices was comparatively lower at 47.4% on average. The private minimum price was lower than the public median prices in a few cases, such as Amoxicillin, Ceftriaxone and Cotrimoxazole, resulting in negative differentials. This indicates that these medicines were available from a supplier in the private market at lower prices than were awarded in the state tender system. In acute medicines, Diazepam 5mg cap/tab presented a unique scenario where the average % difference was, on average, -11.8% implying that the public sector median price was higher than the private sector median price for this specific drug. Similarly, within chronic medicines, Methylphenidate 10mg cap/tab also exhibited a negative average difference, -69.3%, again indicating that the public sector median prices were higher than the private sector median prices. However, these specific instances remain outliers within the overall pattern of substantially higher private sector medicine prices across the entire basket of essential medicines.

3.3. Objective 3: Change in the Quantity-Weighted Price

This objective focuses on understanding the overall patterns of change in quantity-weighted medicine prices, providing a more nuanced view than simple average prices. Price indices are essential tools for evaluating the change in prices for a basket of goods over time, offering a better understanding of inflationary or deflationary pressures on medicine costs. This analysis differs from the total basket data in Figure 3 as it incorporates the quantities of medicines to assign "weights" to individual price changes, meaning medicines procured in larger quantities have a greater influence on the overall index.

In this analysis, only public sector quantities were available and were used for the quantity weighting of both public and private sector price indices. Therefore, these indices estimate the relative change in price of the public sector basket of medicines when procured in the public and private sectors. In the private sector, the indices are calculated both relative to the base year prices in the private sector (column 2) and the public sector (column 3). The latter also provides an estimate of the price differential between the two sectors, using the public sector quantity weights.

Table 11 the presents the Laspeyres, Paasche and Fisher price indices for the quantity-weighted basket of medicines from 2018 to 2022, with 2018 serving as the base year (index value of 100).

Table 11: Evolution of Different Price Indices for Quantity-Weighted Basket of Medicines

Year	(1) **Public prices** *Relative to public base year prices*			(2) **Private prices** *Relative to private base year prices*			(3) **Private prices** *Relative to public base year prices*		
	Laspeyres	**Paasche**	**Fisher**	**Laspeyres**	**Paasche**	**Fisher**	**Laspeyres**	**Paasche**	**Fisher**
2018	100.00	100.00	100.00	100.00	100.00	100.00	445.43	445.43	445.43
2019	102.93	102.97	102.95	100.62	100.60	100.61	448.18	439.87	444.00
2020	109.11	108.99	109.05	101.10	101.07	101.09	450.33	441.91	446.10
2021	124.14	124.32	124.23	99.84	99.90	99.87	444.73	410.23	427.13
2022	124.99	124.78	124.88	101.70	102.52	102.11	452.98	423.07	437.77

Quantities from public sector for all calculations

In the public sector (column 1), the Laspeyres index for prices of medicines shows a consistent upward trend over the period. After the base year of 2018 (100.00), there was a moderate initial increase in 2019, reaching 102.93. This was followed by another modest increase in 2020 to 109.11. A significant surge in prices occurred in 2021, with the index jumping to 124.14, indicating a substantial price escalation in that year. From 2021 to 2022, the increase was minimal, reaching 124.99. This pattern of a moderate initial rise, a sharp increase in 2021, and then a flattening out is also reflected in the Paasche and Fisher indices for the public sector, confirming the robustness of this trend regardless of the specific index calculation method.

Conversely, the private sector exhibits much smaller changes in the indices when compared to its own base year prices (column 2, 2018=100). The Laspeyres index for private prices remained remarkably consistent, with a small increase to 100.62 in 2019, a slight rise to 101.10 in 2020, a minor dip to 99.84 in 2021, and then a modest increase to 101.70 in 2022. This pattern of very slight fluctuations, predominantly remaining close to the base year value of 100, is mirrored by the Paasche and Fisher indices for the private sector. This indicates that, relative to their own 2018 base, private sector prices for the quantity-weighted basket of medicines experienced minimal overall change across the period, in contrast to the larger increases observed in the public sector.

The calculation of the private sector indices relative to the public base year prices (column 3) highlight the large price disparity between the sectors. The Laspeyres index of 445.43 in 2018 indicates that the public sector basket of medicines would cost 335.43% more when purchased in the private sector than by public tender. The indices increase only slightly in subsequent years, reflecting the much smaller annual changes in the private sector.

CHAPTER 4: DISCUSSION

This chapter synthesises and discusses the key findings of this study, which compared the public sector tender prices with private sector Single Exit Prices (SEPs) in South Africa for a basket of essential medicines between 2018 and 2022. The findings of this study carry significant implications for South Africa's proposed National Health Insurance (NHI) system, particularly concerning its core objective of ensuring equitable and affordable access to medicines for all citizens. The observed persistent and substantial price differential, where private sector medicine prices are consistently and significantly higher than public sector tender prices, presents a critical challenge for the NHI's envisioned single, integrated health system. The NHI Bill proposes centralised medicine procurement, aiming to leverage increased state purchasing power to drive down prices, essentially extending the public sector's tender-based advantages across the entire healthcare system.

However, the HJI highlights that many aspects of medicine selection, pricing, and procurement under the NHI remain unclear, with ambiguities in the Bill's provisions regarding the exact mechanics of transitioning to a unified system. The HJI also raises concerns that the proposed conversion of the existing private sector Single Exit Price (SEP) system to govern the entire country's medicine pricing under NHI could be problematic, potentially leaving non-NHI markets unregulated or leading to overall elevated medicine costs. This uncertainty, coupled with the notable surge in public sector quantity-weighted prices observed in 2021, underscores the need for robust and transparent mechanisms within the NHI to prevent price inflation and safeguard medicine affordability across all sectors, as envisioned by the NHI's goal of universal health coverage.

4.1. Summary of Study Findings

4.1.1. Medicine Price Trends (2018-2022)

The study's analysis of individual medicine trends observed in Table 7, Figure 1 and Figure 2, coupled with the grouped data in Table 9 and Figure 3, shows distinct patterns in medicine price evolution across South Africa's public and private sectors from 2018 to 2022. While these tables and figures show some fluctuation for individual medicines and groups over time, the quantity-weighted price index information in Table 11 provides a more precise

understanding of the trends, indicating small increases in private prices but a distinct jump in public sector prices in 2021.

Initially, it is important to note the patterns in the number of medicines analysed, as presented in Table 6. A general trend is the consistently higher number of medicines analysed in the private sector compared to the public sector for most compound names, particularly for anti-infectives and chronic medicines. The consistently higher number of medicines observed in the private sector for most compounds, particularly anti-infectives and chronic medicines, suggests a broader range of product availability and potentially more fragmented market structures in the private domain. In contrast, the public sector's occasional multiple awards for a single medicine, reflecting a 'split contract' approach, primarily aims to enhance supply security and prevent shortages.

Overall, medicine prices in both sectors demonstrate an upward trend from 2018 to 2022, aligning with patterns documented by previous studies. However, the characteristics of these price changes differ significantly. In the public sector, individual compounds exhibit more notable fluctuations; for example, Amoxicillin saw a substantial annual increase of 36.06% in 2022, while Co-amoxiclav experienced a period of decrease (-10.73% in 2019) before increasing again. This variability is likely linked to the public sector's reliance on competitive tendering, where prices can shift based on contract terms and supplier competition, a point emphasized by Wouters(13).The public sector's average annual price increase across the total basket was 7.82% (Table 9).

In contrast, private sector prices generally show a slower and more consistent upward trend. For instance, the average annual increase across the total basket in the private sector was 2.10%. This stability is primarily attributed to the Single Exit Price (SEP) mechanism, which regulates maximum manufacturer prices and aims to prevent excessive pricing, as discussed by Moodley and Suleman (14). It may also indicate quite rigorous competition in the private sector. Most of these medicines are generics which are quite competitive. Complaints in the literature often suggest that the annual increases permitted under SEP are insufficient(13). This study's findings for the unweighted analysis in Table 9) align with this, showing that while public sector prices increased by 7.82% on average, private sector prices increased by a lower 2.10%, leading to a decreasing differential between the sectors over time.

Price trends also vary across therapeutic groups. Anti-retrovirals in the public sector showed an average annual increase of 7.59%, while in the private sector, they rose by 2.40%. Despite these increases, the private sector's median prices for anti-retrovirals remained substantially higher than public sector prices (averaging 365.1% difference), reflecting consistent policy efforts to control costs for these essential medications in the public domain. Chronic medicines, on the other hand, exhibited a concerning trend of high private sector prices, which can significantly impact long-term affordability for patients. The private sector median price for all chronic medicines averaged 12.06 from 2018-2022, compared to the public sector median of 3.26.

4.1.2. Price Differentials (Private vs. Public)

The analysis of price differences between the private and public sectors consistently reveals a substantial disparity, with private sector prices significantly exceeding public sector prices for most medicines. This study found an average percentage price difference of 312.2% between public and private median prices across the total basket, indicating that private sector prices are, on average, more than three times higher than public sector median prices. The quantity-weighted comparison produced a differential of 335.4% between the sectors (Table 11, column 3). The private sector minimum price, while obviously lower than the median, was still, on average, 141.1% greater than the public sector median price.

The magnitude of this price difference is striking, with some compounds showing private sector prices many times higher than public sector prices as shown in Table 10. For example, the average percentage difference for Nevirapine 200mg cap/tab (Anti-retrovirals) was 690.5%, and for Losartan 50mg cap/tab (Chronic medicines) it was 1038.7%. This substantial disparity underscores a systemic condition where access to medicines via the private sector comes at an elevated cost.

The analysis of both median and minimum private sector prices adds a layer of complexity. While median private sector prices are consistently higher, there are notable instances where the minimum private sector price is lower than the public sector median price. For example, for Amoxicillin 250mg cap/tab, the public median price was lower than the private minimum on average (-99.9%). Similar patterns were observed for Ceftriaxone (-80.7%), Co-trimoxazole (-42.0%), Metoclopramide (-8.0%), Prednisone (-10.0%), Methylphenidate (-85.9%), and

Nifedipine (-50.3%) when comparing public median to private minimum prices. These specific cases suggest that while average prices are higher in the private sector, cheaper alternatives might be available at the lowest price points, though these may not be representative of typical consumer costs.

4.1.3. Quantity-Weighted Price Changes

Objective 3 focused on understanding the overall patterns of change in quantity-weighted medicine prices, providing a more nuanced view than simple average prices by incorporating quantities to assign "weights" to individual price changes. In this analysis, public sector quantities were used for the quantity weighting of both public and private sector price indices. Table 11 presents the evolution of Laspeyres, Paasche, and Fisher indices for the quantity-weighted basket, with 2018 as the base year (100.00).

The analysis of quantity-weighted price indices (Laspeyres, Paasche, and Fisher), with 2018 as the base year, revealed distinct patterns in medicine price evolution. In the public sector, quantity-weighted prices showed a notable upward trend, particularly a substantial increase in 2021 that was consistently reflected across all three indices, indicating a significant price escalation with implications for public health expenditure. Conversely, the private sector's quantity-weighted prices, when compared to their own 2018 base, exhibited remarkable stability with minimal overall change across the period, suggesting different price control dynamics. However, when private sector prices were compared relative to the public sector's 2018 base, a persistent and substantial disparity was evident, with private prices consistently remaining approximately four to five times higher for the same quantity-weighted basket, irrespective of annual changes within each sector. This enduring high relative price level in the private sector represents a critical overall pattern.

The choice of using Laspeyres, Paasche, and Fisher indices was justified as the Fisher index, being the geometric average of the other two, provides a more balanced and robust estimate by mitigating their respective biases of overstating or understating.

4.2. Comparison with Previous Research

This study's findings on medicine price trends and differentials in South Africa resonate with, and in some cases diverge from, prior research, notably the studies by Thaver *et al.*(11), Wouters(13), and Moodley and Suleman(14).

4.2.1. Comparison of Baskets and Methods

The methodologies for selecting baskets of medicines and the analytical approaches varied across the comparative studies. This study's methodology for selecting a basket of medicines largely followed Thaver *et al.*(11) approach, which adapted the WHO/HAI methodology for South Africa. Both studies compared public and private prices, with Thaver *et al.*(11) using a basket of 32 medicines and focusing on 2014-2018, while this study used 31 compounds for the later period of 2018-2022. The slight difference in the number of compounds was due to the stringent data completeness criterion applied in the current study, requiring that each medicine consistently appeared in both the public and private sector datasets for all five study years to ensure a robust and comparable analysis.

In terms of basket composition, Thaver *et al.*'s(11) original list comprised 42 medicines, derived from both a core list and a supplementary list, adapted to include medicines frequently used in South Africa. This was then further reduced to 32 medicines. Similarly, the current study selected 31 compounds categorised into acute, anti-infective, anti-retroviral, and chronic groups, based on the Essential Medicines List (EML) and most sold medicines by volume in the private sector. The predominance of generics in these essential medicine baskets is a common feature, as these tend to be older, established, and widely used medications.

Moodley and Suleman(14) focused exclusively on the private sector, analysing 50 originator medicines from 1999 to 2014(14). Their selection process was also informed by the WHO/HAI methodology, adapted to include medicines registered in the South African pharmaceutical market, with consideration given to the top 50 medicines dispensed by volume in the private sector in 2014. The study also included a total of 136 generic medicines for comparison against the originators.

Wouters(13) conducted a comprehensive review of public sector tender contracts from 2003 to 2016. While Wouters'(13) study did not use a pre-defined 'basket' in the same way as

Thaver *et al*.(11) or Moodley and Suleman(14) for direct public-private comparisons across specific compounds, it analysed prices across 15 broad medicine tender categories such as Anti-tuberculosis medicines, Anti-infective medicines, Oncological products, and Anti-retroviral medicines. The study then compared these public tender prices to corresponding prices in the private system for selected drug classes.

Regarding analytical methods, both this study and Wouters(13) calculated Laspeyres, Paasche, and Fisher indices for analysing quantity-weighted price changes. Wouters'(13) study also measured market concentration using Herfindahl-Hirschman indexes. Thaver *et al.*(11) identified observations and price trends using Microsoft Excel, calculating average price differences and annual price increases. Moodley and Suleman(14) employed an interrupted time-series analysis (ITS) to evaluate the impact of the SEP on medicine prices before and after the policy change, focusing on changes in slope and level.

4.2.2. Comparison of Price Trends Over Time

This study found an overall upward trend in median medicine prices in both sectors, with the public sector showing an average annual increase of 7.82% and the private sector showing a lower average annual increase of 2.10% across the total basket as shown in Table 9. This finding aligns with the general observation of price increases in both sectors noted in Thaver *et al.*'s (11) study. In terms of price trends over time, this study's quantity-weighted analysis revealed a significant acceleration in public sector prices during 2021, a notable shift from previous years' stability, impacting public health expenditure. Conversely, the private sector's quantity-weighted prices demonstrated remarkable consistency relative to their 2018 baseline, showing only minor fluctuations throughout the study period. This stability in the private sector contrasts sharply with the more pronounced increases observed in the public sector.

Wouters(13) found that between 2003 and 2016, prices in most public sector tender categories dropped by an average of 40% or more, with anti-retroviral therapies falling by 85% and oncological products by 70%(13). This starkly contrasts with this study's findings of an increase in public sector prices between 2018 and 2022. This difference is critical and could be attributed to the differing timeframes of the studies. This starkly contrasts with this study's findings of an increase in public sector prices between 2018 and 2022. This difference is

critical and can be attributed to the differing timeframes of the studies: Wouters'(13) period (2003-2016) captured the initial, significant cost-reduction impact of establishing the tendering system and potentially the introduction of generics, while this study's period (2018-2022) reflects a more mature tendering environment. Notably, the massive jump in public sector quantity-weighted prices in 2021, which significantly influenced the higher annual average increase, coincided with the impact of the COVID-19 pandemic. The pandemic disrupted global supply chains and manufacturing, creating upward pressure on medicine prices. The public sector, with its reliance on tendering and procurement through central government processes, may have been more acutely affected by these global supply shocks and the need for urgent, sometimes off-contract, procurement(13,24), leading to price escalations that outpaced the private sector's more regulated and often stable SEP increases during this period.

Moodley and Suleman(14) observed that the SEP regulation led to a reduced rate of annual price increases in the private sector compared to pre-SEP periods. This aligns with the current study's finding of relatively low average annual increases in the private sector (2.10%) for the total basket.

4.2.3. Comparison of Price Differentials:

This study's most striking finding is the persistent and substantial price differential, where private sector median prices are, on average, 312.2% higher than public sector median prices across the total basket as shown in Table 9. This aligns with Thaver *et al*.(11), who found an average price differential of 395.47%(11). The slightly smaller average difference in this study (312.2% vs. 395.47%) suggests a potential, albeit modest, narrowing of the gap or differences in basket composition and timeframe. Wouters(13) consistently found that publicly procured medicine prices were 'almost always lower than those sold in the private system', with the magnitude of this differential being substantial. For instance, his study reported that a 30-tablet pack of atorvastatin 20 mg cost 511% more in the private system in 2009 and 178% more in 2016 than in the public system. Other cholesterol-lowering drugs showed private sector premiums ranging from 127% (atorvastatin 40 mg in 2014) to 996% (pravastatin 20 mg in 2014) more than their public sector counterparts(13).This finding is strongly corroborated by the present study.

The comparison of private sector minimum prices to public sector median prices in this study as shown in Table 10 revealed specific instances where the private minimum was lower for instance Diazepam, Methylphenidate and Phenytoin, indicating a more complex pricing landscape at the lowest price points in the private sector. This complexity was not explored in previous studies.

4.2.4. Contextual Factors Influencing Price Trends:

While this study and Wouters(13) both utilised Laspeyres, Paasche, and Fisher indices, their respective findings on price trends in the public sector are divergent, likely due to the different study periods. Wouters'(13) period captured the initial steep declines from tendering, while this study captures a period of subsequent increases. This highlights that while the methodology for index calculation might be similar, the context of the study period significantly influences the observed trends. The current study, specifically covering 2018-2022, uniquely captures the impact of the COVID-19 pandemic, which disrupted supply chains and created upward pressure on prices. These external factors were not present in previous studies and could partially explain the observed public sector price increases despite the tendering system's inherent cost-containment potential. It is also important to consider the CPI for medical costs. For the study period, the overall CPI was 4.6% in 2018, 4.1% in 2019, 3.3% in 2020, 4.6% in 2021, and 6.9% in 2022. Healthcare cost CPIs can vary but generally tend to be higher than general inflation. If the public sector prices increased at 7.82% (total basket average indicated in Table 9), it suggests that some public sector price increases outpaced general inflation, particularly during the high inflation period of 2022.

The significant variability in price trends observed across different therapeutic groups within this study (e.g., anti-infectives vs. chronic medicines) suggests that other factors beyond just pricing mechanisms (tendering vs. SEP) are at play. These might include global supply-demand dynamics for specific compounds, changes in local manufacturing capabilities, or the introduction of new generic competitors which could impact price elasticity and market behaviour. Such detailed market-specific analyses were beyond the scope of this study but could be a subject of future speculative discussion, noting that Wouters(13) also highlighted varying market concentration levels across different medicine categories

4.3. Limitations

The selection of medicines in the basket influences the study's findings. While the basket was chosen following a methodology similar to Thaver *et al*. 's (11) study to ensure international comparability and local relevance, it may not be fully representative of all medicines consumed in South Africa, thereby limiting the generalisability of the findings. This is partly because the essential medicine baskets, by design, tend to predominantly feature older, established, and widely used generic medicines. The dynamics of the originator market and newer, often high-cost, patented drugs are quite distinct from those of generics. Consequently, the study's findings might not fully reflect the pricing complexities or affordability challenges within these other market segments, which have their own specific supply, demand, and competitive behaviours.

Furthermore, the study utilises Laspeyres, Paasche, and Fisher price indices to analyse quantity-weighted price changes which is a strength of this analysis. However, these indices have inherent limitations, as discussed in the report; the choice of the base year and the weighting of medicines in the indices can affect the results. The use of public sector quantities for weighting both public and private sector price indices mean the results represent the public and private prices for public sector consumption patterns. Unfortunately, we did not have access to private volume data.

The study focuses specifically on the comparison of tender prices and SEPs and does not encompass all aspects of medicine pricing in South Africa. Several other factors can influence the final price paid by consumers, such as distribution costs, wholesaler markups, pharmacy dispensing fees, and patient co-payments. Critically, the SEP mechanism includes a mandatory logistics fee. The veracity of the logistics fee component as disclosed in the Medicines Pricing Registry (MPR) is of doubtful accuracy and relevance, as there is no transparency on whether this fee is genuinely passed on or retained by the manufacturer. This study's reliance on the published SEP data, including the bundled logistics fee, is therefore a key limitation. Furthermore, we did not have data to fully disaggregate local costs (such as formulation and packaging) from the cost of imported Active Pharmaceutical Ingredients (APIs). Since none of the APIs for the therapeutic groups analysed are manufactured locally, the high manufacturer price represents a significant imported component, which complicates precise local cost attribution. These factors are not

considered in the analysis, which limits the study's ability to provide a complete picture of medicine affordability. Furthermore, the study does not delve into the relative quality of different products, which can be an important consideration in price comparisons.

Medicine prices are influenced by a multitude of factors, and this study could not control for all of them. Economic factors, such as inflation rates, exchange rate fluctuations, and changes in GDP, can affect both public and private sector prices. Regulatory changes, such as amendments to the SEP regulations or changes in tendering procedures, can also impact prices. Market dynamics, such as the entry of new competitors or changes in market share, can influence pricing decisions by pharmaceutical companies. These confounding factors could explain some of the observed price trends and differences, and the study's findings should be interpreted considering these potential influences.

4.4 Conclusion

This study identifies a trend of increasing medicine prices in South Africa, particularly in the public sector's quantity-weighted index. The consistent and substantial price gap between tender prices and SEPs raises concerns about the affordability and accessibility of essential medicines for individuals relying on private healthcare. While several factors may contribute to these trends, including inflation, rising input costs, and market dynamics, the implications for public health are important. It is crucial for policymakers and stakeholders to manage these issues to ensure equitable access to medicines for all South Africans.

The findings of this study have important implications for public health policy in South Africa, underscoring the need for ongoing monitoring of medicine prices and the development of comprehensive strategies to ensure affordability and access for all. As Gray and Suleman (18) noted, the National Drug Policy (NDP) has not been fully implemented as originally envisaged, with policy details emerging over time, particularly in relation to medicine pricing. Further research is needed to explore the long-term implications of these trends and to evaluate the effectiveness of policy interventions aimed at promoting medicine affordability.

CHAPTER 5: RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made to enhance medicine pricing policies and improve access to affordable essential medicines in South Africa. These recommendations encompass policy interventions and areas for further investigation; all aimed at ensuring that all South Africans have access to affordable and essential medicines.

Given the evidence of persistent price differentials between the public and private sectors, as highlighted by Thaver *et al.* (11) and further substantiated in this study, it is recommended that the regulatory framework governing pharmaceutical pricing be strengthened. This should involve a comprehensive review of the SEP mechanism to identify and address any factors that contribute to inflated private sector prices. Enhanced price monitoring mechanisms should be implemented to track price changes in both sectors and ensure compliance with regulations.

To effectively enhance medicine pricing policies and improve access to affordable essential medicines in South Africa, the National Department of Health should establish a dedicated unit for the continuous monitoring of medicine prices within both the public and private sectors. This unit should be responsible for tracking price trends, identifying potential disparities, and providing regular reports to inform necessary policy adjustments.

Furthermore, to promote fair competition and ensure cost-effective procurement within the public sector, information pertaining to tender selection criteria and outcomes should be readily accessible to the public.

The government should also continue to support the use of generic medicines by ensuring their sustained availability and affordability. This support should encompass measures to encourage the registration of generic medicines, promote generic prescribing practices among healthcare professionals, and address any supply-side constraints that may impede the availability of generic medications.

Conducting regular evaluations of policy interventions is crucial to assessing their impact on medicine prices and affordability. This practice will help identify effective interventions and inform future policy development, ensuring that policies remain relevant and impactful.

Conducting comparative studies of medicine prices across different countries could provide valuable insights into the factors influencing price variations. These insights could inform policy development in South Africa and promote more effective pricing strategies.

Qualitative research should be conducted to explore the perspectives of various stakeholders, including patients, healthcare professionals, and pharmaceutical companies, on medicine pricing and affordability. This could provide valuable insights into the challenges and potential solutions related to medicine pricing in South Africa. By understanding the perspectives of those most affected by medicine pricing policies, more effective and equitable solutions can be developed.

To gain a deeper understanding of the complexities of pharmaceutical pricing and to inform evidence-based policy decisions, further research is essential. A more in-depth analysis of the factors driving price differentials between the public and private sectors will be imperative. It may also be crucial to dwell on an assessment of the impact of pharmaceutical pricing policies on patient access to medicines and health outcomes. Finally, it may also be critical to work on Comparative studies of pharmaceutical pricing policies in South Africa and other countries.

Finally, the findings of this study have profound implications for the impending implementation of the National Health Insurance (NHI). The NHI's proposed centralized medicine procurement aims to increase the state's purchasing power, essentially extending the public sector's tender-based advantages across the entire healthcare system. The NHI must strategically leverage its anticipated increased purchasing power to negotiate lower prices for the entire population. This will involve applying best practices from public sector tendering, potentially leading to substantial cost reductions for the NHI fund by procuring medicines closer to current tender rates.

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ANNEXURE I: PLAGIARISM DECLARATION

PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I _Kudakwashe Linton Kapfumvuti_ (Student number: __1936664_____) am a student registered for the degree of _Masters in Public Health in Health Economics__ in the academic year _2024/2025.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.
- I have included as an appendix a report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature: _____ Date: _____31-March-2025_____

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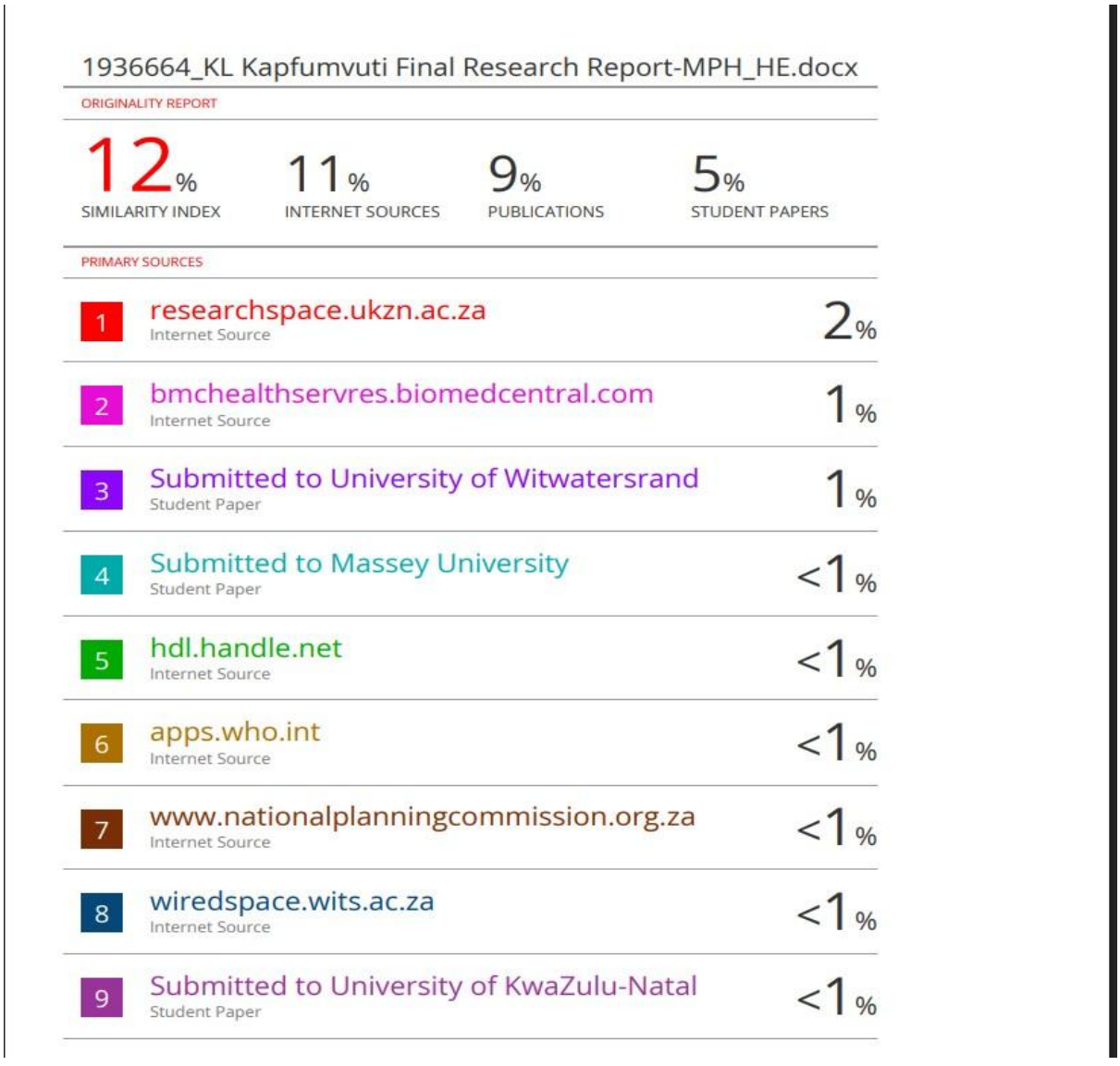

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ANNEXURE III: ETHICS WAIVER CERTIFICATE

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Research Office Secretariat:
Faculty of Health Sciences, Phillip Tobias Health Sciences Building, 3rd Floor, Office 301/2/4, 29 Princess of Wales Terrace, Parktown, 2193
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Ref: W-CBP-230421-01 21/04/2023

TO WHOM IT MAY CONCERN:

Waiver:	This certifies that the following research does not require clearance from the Human Research Ethics Committee (Medical)
Investigator:	Mr Kudakwashe Kapfumvuti (Student No.: 1936664)
Supervisor:	Dr Duane Blaauw
Department:	Health Economics
Project title:	*A comparison of public prices and private prices for medicines in South Africa for the period 2018 - 2022*
Reason:	A review of information in the public domain. No human participants will be involved in the study.

Dr CB Penny

Chairperson: Human Research Ethics Committee (Medical)

Copy – HREC (Medical) Secretariat: Ms Zanele Ndlovu, Ms Mapula Ramaila and Mr Rhulani Mkansi