

Research Paper

# A comparison study between public and private healthcare sector medicine prices in South Africa

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## Abstract

**Objectives** The objectives of the study were to compare price trends, determine price differentials, and equate the average price index of a basket of medicines between the public and private healthcare sectors in South Africa.

**Methods** A price list consisting of 32 essential medicines available in both the public and private healthcare systems of South Africa was chosen for this study. The price of medicines for the private sector were obtained from the Medicine Price Registry-Open Up website for the period 2014–2018. Public sector medicine prices were obtained from the Department of Health website for the corresponding period. Observations and price trends were identified and analyzed using Microsoft Excel version 2016.

**Key findings** A total of 74 medicine brands were analyzed in the study. It was found that the prices across both sectors had increased over time, however, the majority of brands (87%) displayed higher prices in the private sector in comparison to the public sector. On average, the price differential between the private and public sector medicines were 395.47%.

**Conclusions** The study found varying price differences between medicines in the public and private sectors because of the different methodologies used in each. The reasons for changes in medicine prices across the years in both sectors, could not always be clearly determined as both sectors lacked complete transparency in the processes applied to establish medicine prices. Therefore, more transparent medicine price systems need to be considered for the future of South Africa's healthcare system as the country transitions toward universal health coverage.

**Keywords:** public tender prices; single exit price (SEP); medicine price trends

## Introduction

The regulation of medicine prices is a complex economic process. Globally there have been several policies and regulatory interventions that have been implemented to improve medicine price.<sup>[1]</sup> In South Africa (SA), previous health system disparities, and

increasing medicinal costs warranted the need for better medicine price systems.<sup>[2]</sup> Efforts to achieve this included the development of the National Drug Policy (NDP), which laid the foundation for medicine price strategies in both the public and private healthcare sectors.<sup>[3]</sup>

The South African healthcare system is divided into two sectors which have different funding sources, that is, the public sector (government funding) and the private sector (private medical aid insurances and out-of-pocket funding). The public and private sectors warrant different pharmaceutical price regulations as the fundamental practise in each sector are different and are therefore regulated accordingly (for example, the different funding methods for each). Additionally medicine and healthcare resource distribution is also unbalanced across the both sectors. The accessibility and availability of healthcare in this polarised system, therefore, provides unequal health benefits to patients being treated in each sector.<sup>[4]</sup>

Measures to regulate medicine prices in the private sector required the construction of greater transparency in the South African pharmaceutical price system. In the past, drug prices in SA had inflated artificially through bonuses, discounts, rebates and other incentives schemes that led to the dispensing of more expensive drugs.<sup>[5]</sup> This led to the introduction of several regulatory mechanisms to improve transparency which included the banning of sampling; mandatory offering of generic substitution; removal of discounts, bonuses and rebates; and among these, the introduction of the single exit price (SEP) intervention.<sup>[6]</sup>

The SEP can be defined as a mechanism that regulates the maximum price at which a medication can be charged.<sup>[7]</sup> All medicines in the private sector are governed by the SEP regulation with two exceptions, this being, veterinary medicines and over-the-counter schedule zero medicines.<sup>[2]</sup> The SEP undergoes an annual regulated maximum increase which is set by the Minister of Health. This increase is based on several provisions which include the average consumer price index (CPI) and the average producer price index (PPI) for the preceding year.<sup>[8]</sup> The final SEP of a medicine is made up of three components, that is, the ex-manufacturer price (set by the manufacturer), logistics fee (set by the manufacturer); and value-added-tax (15%).

In the public sector, medicine prices are regulated by a tender system which is also available as an exit price. The pharmaceutical tenders are advertised on a public forum where several pharmaceutical companies bid on the tender.<sup>[9]</sup> The medicine quantity and the type of medicine required for each tender depend on the need of each province and the overall process is monitored by the National Department of Health (NDoH).<sup>[9]</sup> The Government purchases the medicine at the specific price stipulated by the pharmaceutical company that was awarded the tender.<sup>[9]</sup> This price is exclusive only to the government (for the tender) and is not available in the private sector. In some instances, the same tender can be awarded to multiple pharmaceutical companies to prevent medicine shortages.<sup>[10]</sup> This tender system has been in use in the public sector for several years with not many variations to the systems applied.

Medicines procured in the public sector are based on an Essential Medicine List (EML). The EML contains a list of the safest and most effective medicines that satisfy the priority health needs of a country.<sup>[11]</sup> The essential medicine list contains the list of medicines in its active ingredient form. Globally, issues concerning essential medicine access led to the development of the World Health Organisation (WHO)/Health Action International (HAI) methodology, which aimed to publish a country's survey data on a publicly accessible website. This project intended to improve medicine price transparency.<sup>[12]</sup> The methodology was applied by Xiphu and Mpanza in SA and resulted in the following findings relating to medicine prices: there was a lack of transparency and uniformity of mark-ups by retailers and; most facilities did not adhere to medicine price regulations and had high medicine prices in comparison to international reference price.<sup>[13]</sup>

The global market has also made several attempts to regulate medicine prices. In several low and middle-income countries, such as Brazil and Argentina, pricing policies were introduced to reduce medicine prices. It was found however, that despite an initial decrease in prices, these reductions were not sustainable, eventually leading to prices increasing over time.<sup>[14, 15]</sup> Similarly, a study conducted in Spain to analyse the interventions implemented to control pharmaceutical expenditure revealed that 12 out of 16 interventions did not effectively decrease medicine prices in the short term and the remaining four interventions did not have a sustainable effect thus only resulting in moderate annual savings.<sup>[16]</sup> Therefore, there is a need to employ transparency measures that will ensure sustainability of reduced medicine prices.

Achieving price transparency is the aim of medicine price regulations in SA, hence the progress of these interventions needs to be monitored. Since the introduction of the SEP in SA, there have been some studies that looked at the effect and outcomes of this price mechanism.<sup>[2, 17]</sup> A study on the impact of the SEP established that since the introduction of the SEP there was a 22% decrease in the average prices of medicines.<sup>[17]</sup> Another recent study evaluated the impact of the SEP policy on a series of originator medicine products and determined that the SEP impacted medicine prices both short term and long term.<sup>[2]</sup> Tender medicine systems were evaluated in other countries such as the Netherlands and China, where it was found to reduce medicine prices, however these findings cannot be generalized to all other countries due to the several differences in regulatory practise as well as political economies of each healthcare system.<sup>[18, 19]</sup> The studies conducted in SA focused on the progress of the SEP system however the comparison of both price systems was not extensively investigated.

As SA transitions towards universal health coverage via the National Health Insurance (NHI), medicine price mechanisms between the two healthcare sectors need to be re-evaluated and reviewed to improve systems for future use. Therefore, the objectives of this study were to compare price trends, determine price differences, and equate the average price index of medicines between the public and private healthcare sectors in SA.

## Research Methods

### Study design

The study was descriptive, quantitative, and retrospective in nature. It was a comparison between tender and SEP medicine prices in both the public and private health sectors of South Africa for a 5-year period, that is, between 2014 and 2018.

### Definitions

For this study,

Branded medicines were defined as 'medicines which have a name given to them by a company for the purpose of advertising. The names of branded medicines are different from the International Non-proprietary Name (INN). Branded medicines may be the original medicine developed by a company, or several companies may make the same medicine in the generic form to which each company will give its own brand name.'<sup>[20]</sup>

Active ingredients were defined as 'any component of a drug product intended to furnish pharmacological activity or other direct effects in the diagnosis, cure, mitigation, treatment, or prevention of disease, or to affect the structure or any function of the body of humans or other animals. Active ingredients include those components of the product that may undergo chemical change during

the manufacture of the drug product and be present in the drug product in a modified form intended to furnish the specified activity or effect.’<sup>[21]</sup>

### Selection of medicines

The basket of medicines chosen was based on that of a study conducted by Xiphu and Mpanza which used the WHO/HAI methodology to explore medicine availability, affordability and prices.<sup>[13]</sup> The medicine list in the Xiphu and Mpanza study was based on a core list and supplementary list as per the standards specified in the WHO/HAI methodology.<sup>[12]</sup> The core list was developed to facilitate international comparisons and could be adjusted to suit each country's pattern of medicine use.<sup>[13]</sup> The supplementary list allowed for each country to add more medicines that were relevant to it but did not appear in the core list. In SA the Pharmaceutical Economic Evaluation directorate at the National Department of Health, created a supplementary list of 14 medicines that were based on the most sold medicines by volume in the private sector and the occurrence of the medicine in the EML.<sup>[13]</sup> The medicine list used in the Xiphu and Mpanza study therefore consisted of 42 medicines (28 from the core list and 14 from the supplementary list), however, this list was amended in line with the following inclusion criteria for this study:

1. For an active ingredient to be included in the final medicine basket, it had to appear on the tender medicine list for all 5 years (2014–2018) chosen for the study. The following active ingredients were therefore omitted, that is, fluconazole 150 mg cap/tab, fluphenazine 25 mg/ml injection, ibuprofen 400 mg cap/tab, indinavir 400 mg cap/tab, nifedipine 20 mg tab retard, omeprazole 20 mg cap/tab, ranitidine 150 mg cap/tab, stavudine 40 mg cap/tab and sulfadoxine+pyrimethamine 500 + 25 mg cap/tab.
2. Single exit prices were compared to the corresponding branded medicines that appeared on the tender list. Therefore, the active

ingredient fluconazole 200 mg cap/tab was excluded because it did not appear on both lists.

Table 1 presents the final basket of 32 active ingredients that were investigated.

### Medicine price data analysis

The tender medicine prices were sourced from the Department of Health website,<sup>[22]</sup> whereas the SEP's for the private sector were obtained from the 'Medicine Price Registry- Open Up website.'<sup>[23]</sup> All medicine prices used in the study were in South African Rands (ZAR). Due to the differences in pack sizes between the tender price system and the SEP system, the price per standard unit (that is, per tablet or capsule) was computed.

All data were analyzed using Microsoft Excel version 2016. The tender medicine prices and SEP's were compared to identify the trends that exist between each price system. Comparisons were made using the following calculations:

1. The average price difference between the branded medicine prices of the tender and SEP systems was determined over the 5-year period. The calculation was based on the following criteria:

- Medicine prices compared were calculated and represented as per standard unit pack size.
- The price difference was calculated by expressing the difference between the SEP and tender price as a percentage of the tender price for each year in the 5-year period:

$$\varepsilon_{i,b} = \frac{SEP_{i,b} - TP_{i,b}}{TP_{i,b}} \times 100 \% \quad (1)$$

where

$\varepsilon$  is the price difference, SEP is the single exit price,

**Table 1** Basket of active ingredients (in each category)

Active ingredients			
	<i>Anti-infective medicines (that is, antibiotic, antifungal, antiprotozoal and antiviral agents)</i>	16	fluoxetine 20 mg cap/tab
1	acyclovir 200 mg cap/tab	17	glibenclamide 5 mg cap/tab
2	amoxicillin 250 mg cap/tab	18	hydrochlorothiazide 25 mg cap/tab
3	ceftriaxone 1 g/vial injection	19	loperamide 2 mg cap/tab
4	ciprofloxacin 500 mg cap/tab	20	losartan 50 mg cap/tab
5	co-amoxiclav 250 + 125 mg cap/tab	21	metformin 500 mg cap/tab
6	co-trimoxazole 40 + 200 mg/5 ml suspension	22	methylphenidate 10 mg cap/tab
	<i>Drops, aerosols, inhalers and inhalants</i>	23	metoclopramide 10 mg cap/tab
7	beclomethasone 50 mcg/dose inhaler	24	nifedipine 10 mg cap/tab
8	salbutamol 100 mcg/dose inhaler	25	phenytoin 100 mg cap/tab
	<i>Solid-dose medicines and transdermal patches</i>	26	prednisone 5 mg cap/tab
9	allopurinol 300 mg cap/tab	27	promethazine 25 mg cap/tab
10	amitriptyline 25 mg cap/tab		<i>Antiretroviral medicines</i>
11	atenolol 50 mg cap/tab	28	efavirenz 600 mg cap/tab
12	captopril 25 mg cap/tab	29	lamivudine 150 mg cap/tab
13	carbamazepine 200 mg cap/tab	30	nevirapine 200 mg cap/tab
14	diazepam 5 mg cap/tab	31	stavudine 30 mg cap/tab
15	diclofenac 25 mg cap/tab	32	zidovudine 100 mg cap/tab

The table contains 32 active ingredients divided into four categories according to type and/or to the dosage form of the medicine. The first category (numbers 1–6) represent Anti-infectives. The second category (numbers 7–8) represents drops, aerosols, inhalers, and inhalants. The third category (numbers 9–27) represent Solid-dose medicines and transdermal patches. The fourth category represents Antiretrovirals (28–32).

**Table 2** Tender medicine prices from 2014 to 2018 for the basket of 32 medicine active ingredients\*\*

Branded medicine name	Active ingredient	2014 price	2015 price	2016 price	2017 price	2018 price
Acitab_200_DT 200 mg Tablets 25	Aciclovir	–	R 0.40	R 0.48	–	–
Lovire 200 mg Tablets 25	–	R 0.40	–	–	R 0.41	R 0.41
Adco-Allopurinol 300 mg Tablets 28	Allopurinol	R 0.39	–	–	–	–
Adco-Allopurinol 300 mg Tablets 30	–	–	R 0.40	R 0.47	R 0.44	R 0.42
Puricos 300 mg Tablets 28	–	R 0.43	R 0.44	–	–	–
Gulf_Amitriptyline 25 mg Tablets 100	Amitriptyline	–	–	R 0.15	R 0.14	R 0.13
Gulf_Amitriptyline 25 mg Tablets 168	–	–	R 0.12	R 0.13	R 0.13	R 0.12
Gulf_Amitriptyline 25 mg Tablets 500	–	–	–	R 0.10	R 0.09	R 0.09
Sandoz_Amitriptyline_HCL 25 mg Tablets 28	–	R 0.09	R 0.09	–	–	–
Trepiline 25 mg Tablets 100	–	R 0.13	R 0.13	–	–	–
Trepiline 25 mg Tablets 28	–	–	–	R 0.16	R 0.15	R 0.15
Trepiline 25 mg Tablets 56	–	R 0.13	R 0.13	R 0.13	R 0.13	R 0.13
Trepiline 25 mg Tablets 84	–	R 0.10	R 0.10	R 0.13	R 0.13	R 0.13
Allmox 250 mg Capsules 100	Amoxicillin	–	–	–	R 0.29	R 0.29
Allmox 250 mg Capsules 15	–	–	–	–	R 0.32	–
Amoxicap 250 mg Capsules 15	–	–	R 0.31	R 0.39	–	–
Amyn 250 mg Capsules 100	–	R 0.22	–	–	–	–
Amyn 250 mg Capsules 15	–	R 0.23	–	–	–	–
Austell_Amoxicillin 250 mg Capsules 15	–	–	–	–	R 0.37	R 0.37
Indo_Amoxycillin 250 mg Capsules 15	–	–	–	–	R 0.32	–
Moxymax 250 mg Capsules 15	–	R 0.23	R 0.28	R 0.35	–	–
Austell_Atenolol 50 mg Tablets 28	Atenolol	R 0.08	–	–	–	–
Austell_Tenopress 50 mg Tablets 28	–	–	R 0.09	–	–	–
Bio-Atenolol 50 mg Tablets 28	–	R 0.07	R 0.07	–	–	–
Bio-Atenolol 50 mg Tablets 30	–	–	–	R 0.09	R 0.08	R 0.08
Zetenol 50 mg Tablets 28	–	–	–	R 0.10	R 0.10	R 0.09
Beceze 50 mcg Inhaler 200	Beclometasone	R 0.13	R 0.13	–	–	–
Beclate 50 mcg Inhaler 200	–	–	–	R 0.16	R 0.13	R 0.13
Bio-Captopril 25 mg Tablets 60	Captopril	R 0.11	R 0.11	R 0.17	R 0.16	R 0.15
Degranol 200 mg Tablets 100	Carbamazepine	–	–	R 0.36	R 0.35	R 0.34
Degranol 200 mg Tablets 28	–	R 0.26	R 0.27	R 0.46	R 0.45	R 0.45
Degranol 200 mg Tablets 56	–	R 0.22	R 0.23	R 0.34	R 0.33	R 0.32
Degranol 200 mg Tablets 84	–	R 0.21	R 0.23	R 0.32	R 0.31	R 0.30
Gulf_Carbamazepine 200 mg Tablets 100	–	R 0.24	R 0.26	–	–	–
Gulf_Carbamazepine 200 mg Tablets 28	–	R 0.24	R 0.26	–	–	–
Gulf_Carbamazepine 200 mg Tablets 84	–	–	–	–	R 0.28	R 0.26
Austell_Ceftriaxone 1 g Vial 1	Ceftriaxone	–	R 5.69	R 7.18	–	–
Fraxone 1 g Vial 1	–	–	–	–	R 5.86	R 5.86
Kocef-1000 1 g Vial 1	–	R 4.50	R 5.21	R 6.50	R 6.01	R 6.01
Rociject 1 g Vial 1	–	R 4.57	–	–	–	–
Rociject 1 g Vial 10	–	–	–	–	R 0.61	R 0.61
Biotech_Ciprofloxacin 500 mg Tablets 10	Ciprofloxacin	R 0.48	R 0.56	R 0.68	–	–
Cifran 500 mg Tablets 10	–	–	–	–	R 0.48	R 0.48
Profloxin 500 mg Tablets 10	–	R 0.61	R 0.56	R 0.69	R 0.61	R 0.61
Auro_Amoxiclav 375 mg Capsules 100	Co-amoxiclav	R 1.05	–	–	–	–
Auro_Amoxiclav 375 mg Capsules 15	–	R 1.12	–	–	–	–
Austell_Co-Amoxiclav 375 mg Tablets 15	–	–	–	–	R 1.90	R 1.90
Sandoz_Co-amoxycylav 375 mg Tablets 15	–	R 1.00	R 1.39	R 1.68	R 1.58	R 1.58
Doctrim 240 mg/5 ml Suspension 100	Co-trimoxazole	R 0.04	R 0.05	R 0.06	–	–
Doctrim 240 mg/5 ml Suspension 50	–	–	R 0.06	R 0.07	R 0.07	R 0.07
Ilvitrim_Suspension 240 mg/5 ml Suspension 100	–	R 0.04	R 0.04	R 0.05	R 0.06	R 0.06
Ilvitrim_Suspension 240 mg/5 ml Suspension 50	–	R 0.05	R 0.06	R 0.07	–	–
Resmed_Cotrimoxazole 240 mg/5 ml Suspension 100	–	R 0.04	–	–	–	–
Resmed_Cotrimoxazole 240 mg/5 ml Suspension 50	–	R 0.05	–	–	–	–
Betapam 5 mg Tablets 100	Diazepam	R 0.09	R 0.09	–	–	–
Valium 5 mg Tablets 100	–	–	–	R 0.57	R 0.57	R 0.58
Biotech_Diclofenac 25 mg Tablets 15	Diclofenac	R 0.12	R 0.12	–	–	–
Mylan_Diclofenac 25 mg Tablets 500	–	–	–	R 0.08	–	R 0.07
Mylan_Diclofenac 25 mg Tablets 56	–	–	–	–	R 0.71	–
Adco-Efavirenz 600 mg Tablets 128	Efavirenz	R 0.26	–	–	–	–
Adco-Efavirenz 600 mg Tablets 28	–	–	R 1.56	R 1.75	R 1.63	R 1.69
Cipla_Efavirenz 600 mg Tablets 28	–	R 1.30	R 1.23	R 1.52	R 1.52	R 1.53
Cipla_Efavirenz 600 mg Tablets 30	–	–	–	–	–	–
Efavirenz_Winthrop 600 mg Tablets 28	–	R 1.30	–	–	–	–
Efrin 600 mg Tablets 28	–	R 1.22	R 1.49	R 1.77	R 1.69	R 1.60

Table 2 Continued

Branded medicine name	Active ingredient	2014 price	2015 price	2016 price	2017 price	2018 price
Sonke_Efavirenz 600 mg Tablets 28	–	–	R 1.62	R 1.81	R 1.69	R 1.76
Auro_Fluconazole 200 mg Capsules 28	Fluconazole	–	–	–	R 0.86	–
Gulf_Fluconazole 200 mg Capsules 28	–	–	R 0.86	R 0.94	–	–
Flucoric 200 mg Capsules 28	–	R 0.82	–	–	–	–
Nuzak 20 mg Capsules 100	Fluoxetine	R 0.11	R 0.12	R 0.22	–	–
Nuzak 20 mg Capsules 28	–	–	R 0.14	R 0.21	–	–
Nuzak 20 mg Capsules 30	–	R 0.12	–	–	–	–
Prolax 20 mg Capsules 100	–	–	–	–	R 0.20	R 0.20
Prolax 20 mg Capsules 28	–	–	–	–	R 0.20	R 0.20
Bio-Glibenclamide 5 mg Tablets 100	Glibenclamide	R 0.07	R 0.07	R 0.11	R 0.10	R 0.09
Bio-Glibenclamide 5 mg Tablets 28	–	R 0.07	R 0.07	R 0.14	R 0.14	R 0.13
Bio-Glibenclamide 5 mg Tablets 56	–	R 0.07	R 0.04	R 0.11	R 0.10	R 0.09
Bio-Glibenclamide 5 mg Tablets 84	–	R 0.05	R 0.05	R 0.09	R 0.09	R 0.08
Glycomin 5 mg Tablets 28	–	R 0.08	R 0.07	R 0.14	R 0.14	R 0.14
Glycomin 5 mg Tablets 56	–	R 0.07	R 0.07	R 0.10	R 0.10	R 0.10
Ridaq 25 mg Tablets 28	Hydrochlorothiazide	R 0.09	R 0.09	R 0.14	R 0.14	R 0.14
Ridaq 25 mg Tablets 500	–	–	–	R 0.13	R 0.13	R 0.13
Adco-Lamivudine 150 mg Tablets 56	Lamivudine	R 0.29	R 0.44	R 0.49	R 0.46	R 0.47
Aspen_Lamivudine 150 mg Tablets 56	–	R 0.35	R 0.29	R 0.32	R 0.30	R 0.29
Cipla_Lamivudine 150 mg Tablets 56	–	R 0.34	R 0.32	R 0.40	R 0.40	R 0.40
Sonke_Lamivudine 150 mg Tablets 56	–	R 0.35	R 0.39	R 0.44	R 0.41	R 0.43
Adco-Loperamide 2 mg Tablets 300	Loperamide	–	–	R 0.07	R 0.07	R 0.07
Adco-Loperamide 2 mg Tablets 6	–	–	–	R 0.21	R 0.20	R 0.19
Cipla_Loperamide 2 mg Tablets 8	–	R 0.11	R 0.13	–	–	–
Austell-Losartan 50 mg Tablets 28	Losartan	–	–	R 0.27	R 0.26	R 0.24
Ciplazar 50 mg Tablets 30	–	R 0.21	R 0.21	–	–	–
Austell_Metformin 500 mg Tablets 56	Metformin	–	–	R 0.15	R 0.16	R 0.13
Austell_Metformin 500 mg Tablets 84	–	–	–	R 0.15	R 0.14	R 0.13
Forminal 500 mg Tablets 56	–	R 0.12	R 0.13	–	–	–
Forminal 500 mg Tablets 84	–	R 0.12	R 0.13	–	–	–
Indo_Metformin 500 mg Tablets 56	–	R 0.12	R 0.13	R 0.16	R 0.15	R 0.15
Indo_Metformin 500 mg Tablets 84	–	R 0.11	R 0.09	–	–	–
Mylan_Metformin 500 mg Tablets 500	–	–	–	R 0.13	R 0.12	R 0.12
Mylan_Metformin 500 mg Tablets 84	–	–	–	R 0.15	R 0.14	R 0.14
Ritalin 10 mg Tablets 30	Methylphenidate	R 0.82	R 0.82	R 0.82	R 0.82	R 0.83
Adco-Contromet 10 mg Tablets 10	Metoclopramide	R 0.16	R 0.17	R 0.19	R 0.18	R 0.17
Adco-Contromet 10 mg Tablets 100	–	–	–	R 0.08	R 0.08	R 0.07
Bio_Metoclopramide 10 mg Tablets 10	–	R 0.16	R 0.16	–	–	–
Clomax 10 mg Tablets 100	–	R 0.05	R 0.05	–	–	–
Clomax 10 mg Tablets 500	–	–	–	R 0.07	R 0.07	R 0.07
ACRIPTAZ 200 mg Tablets 56	Nevirapine	R 0.38	R 0.57	R 0.68	R 0.65	R 0.61
Adco-Nevirapine 200 mg Tablets 56	–	R 0.38	R 0.53	R 0.58	R 0.55	R 0.57
Aspen_Nevirapine 200 mg Tablets 56	–	R 0.39	R 0.54	R 0.59	R 0.56	R 0.54
Bio-Nifedipine 10 mg Capsules 100	Nifedipine	R 0.49	R 0.49	R 0.56	R 0.53	R 0.50
Epanutin 100 mg Capsules 100	Phenytoin	R 0.44	R 0.44	R 0.86	R 0.86	R 0.86
Phenytoin 100 mg Capsules 84	–	–	–	R 0.73	R 0.72	R 0.59
Phenytoin_Sodium 100 mg Tablets 84	–	R 0.59	R 0.58	–	–	–
Be-Tabs_Prednisone 5 mg Tablets 100	Prednisone	R 0.12	R 0.12	R 0.15	R 0.15	R 0.15
Be-Tabs_Prednisone 5 mg Tablets 1000	–	–	–	–	R 0.16	R 0.15
Be-Tabs_Prednisone 5 mg Tablets 28	–	R 0.12	R 0.12	R 0.15	R 0.15	R 0.15
Be-Tabs_Prednisone 5 mg Tablets 500	–	–	–	–	R 0.16	R 0.15
Be-Tabs_Prednisone 5 mg Tablets 56	–	R 0.11	R 0.11	R 0.14	R 0.15	R 0.14
Phenergan 25 mg Tablets 100	Promethazine	R 0.15	R 0.15	R 0.22	R 0.22	R 0.22
Asthavent_Ecohaler 100 mcg Inhaler 200	Salbutamol	R 0.06	R 0.07	R 0.09	R 0.07	R 0.08
Ventimax 100 mcg Inhaler 200	–	R 0.08	R 0.08	R 0.10	R 0.08	R 0.08
Aspen_Stavudine 30 mg Capsules 56	Stavudine	–	R 0.31	R 0.34	R 0.32	R 0.31
Sonke_Stavudine 30 mg Capsules 56	–	R 0.27	–	–	–	–
Cipla-Zidovudine 100 mg Capsules 100	Zidovudine	R 0.43	–	–	–	–
Zidomat 100 mg Tablets 100	–	–	R 0.56	R 0.67	R 0.64	R 0.61

The table contains medicine prices from the tender price system. There are prices for each branded medicine name for the corresponding year in the 5-year period, that is, 2014–2018. The letter R represents the South African currency in Rands.

**Table 3** Single Exit Price (SEP) from 2014 to 2018 for the list of medicines

Manufacturer product name	Active ingredient	2014 price	2015 price	2016 price	2017 price	2018 price
Acitab_200_DT 200 mg Tablets 25	Aciclovir	–	R 2.56	R 2.76	–	–
Lovire 200 mg Tablets 25	–	R 2.22	–	–	R 2.77	R 2.82
Adco-Allopurinol 300 mg Tablets 28	Allopurinol	–	–	–	–	–
Adco-Allopurinol 300 mg Tablets 30	–	R 1.80	R 1.80	R 1.94	R 2.09	R 2.11
Puricos 300 mg Tablets 250	–	R 1.80	–	–	–	–
Puricos 300 mg Tablets 28	–	–	R 1.94	–	–	–
Puricos 300 mg Tablets 30	–	R 1.80	–	–	–	–
Gulf_Amitriptyline 25 mg Tablets 500	Amitriptyline	–	R 0.54	R 0.58	R 0.63	R 0.64
Sandoz_Amitriptyline_HCL 25 mg Tablets 100	–	R 0.60	R 0.64	–	–	–
Sandoz_Amitriptyline_HCL 25 mg Tablets 500	–	R 0.54	R 0.58	–	–	–
Trepiline 25 mg Tablets 100	–	R 0.87	R 0.94	R 1.01	R 1.08	R 1.11
Trepiline 25 mg Tablets 500	–	R 0.87	–	R 1.01	R 1.08	R 1.11
Allmox 250 mg Capsules 1000	Amoxicillin	–	–	–	R 0.37	R 0.37
Allmox 250 mg Capsules 500	–	–	–	–	R 0.37	R 0.37
Amoxicap 250 mg Capsules 500	–	–	R 0.32	R 0.34	–	–
Amyn 250 mg Capsules 500	–	R 0.33	–	–	–	–
Austell_Amoxicillin 250 mg Capsules 15	–	–	–	–	–	R 0.00
Austell_Amoxicillin 250 mg Capsules 500	–	–	–	–	R 0.59	–
Moxymax 250 mg Capsules 500	–	R 0.33	R 0.35	R 0.37	–	–
Austell_Atenolol 50 mg Tablets 28	Atenolol	R 0.66	–	–	–	–
Austell_Atenolol 50 mg Tablets 30	–	R 0.66	–	–	–	–
Austell_Tenopress 50 mg Tablets 28	–	–	R 0.41	–	–	–
Bio-Atenolol 50 mg Tablets 30	–	R 0.55	R 0.59	R 0.64	R 0.69	R 0.70
Zetenol 50 mg Tablets 28	–	–	–	–	R 0.65	–
Zetenol 50 mg Tablets 30	–	–	–	R 0.61	–	R 0.67
Beceze 50 mcg Inhaler 200	Beclometasone	R 0.31	R 0.33	–	–	–
Beclate 50 mcg Inhaler 200	–	–	–	R 0.39	R 0.42	R 0.43
Bio-Captopril 25 mg Tablets 60	Captopril	R 0.29	R 0.32	R 0.34	R 0.37	R 0.37
Degranol 200 mg Tablets 100	Carbamazepine	R 1.89	R 2.04	R 2.20	R 2.36	R 2.41
Gulf_Carbamazepine 200 mg Tablets 84	–	–	–	–	–	R 0.00
Austell_Ceftriaxone 1 g Vial 10	Ceftriaxone	–	R 2.40	R 2.59	–	–
Kocef-1000 1 g Vial 3.5	–	R 16.30	R 17.52	R 18.89	R 20.31	R 20.75
Rociject 1 g Vial 3.5	–	R 3.89	–	–	R 4.12	R 4.00
Biotech_Ciprofloxacin 500 mg Tablets 10	Ciprofloxacin	R 1.72	R 1.85	R 1.99	–	–
Cifran 500 mg Tablets 10	–	–	–	–	R 1.50	R 1.54
Profloxin 500 mg Tablets 10	–	R 2.11	R 2.27	R 2.37	R 2.55	R 2.61
Auro_Amoxiclav 375 mg Capsules 15	Co-amoxiclav	R 2.25	–	–	–	–
Austell_Co-Amoxiclav 375 mg Tablets 15	–	–	–	–	R 2.75	R 2.81
Sandoz_Co-amoxycyclav 375 mg Tablets 100	–	R 2.53	R 2.71	R 2.93	R 3.15	R 3.22
Sandoz_Co-amoxycyclav 375 mg Tablets 15	–	R 2.58	R 2.76	R 2.98	R 3.21	R 3.27
Doctrim 240 mg/5 ml Suspension 100	Co-trimoxazole	R 0.08	R 0.08	R 0.09	R 0.10	R 0.10
Doctrim 240 mg/5 ml Suspension 50	–	R 0.08	R 0.08	R 0.09	R 0.10	R 0.10
Ilvitrim_Suspension 240 mg/5 ml Suspension 100	–	R 0.08	R 0.09	R 0.09	R 0.10	R 0.10
Ilvitrim_Suspension 240 mg/5 ml Suspension 50	–	R 0.08	R 0.09	R 0.09	R 0.10	R 0.10
Ilvitrim_Suspension 240 mg/5 ml Suspension 500	–	R 0.08	R 0.09	R 0.09	R 0.10	R 0.10
Betapam 5 mg Tablets 1000	Diazepam	R 0.09	R 0.09	–	–	–
Valium 5 mg Tablets 100	–	–	–	R 3.68	R 3.96	R 4.05
Biotech_Diclofenac 25 mg Tablets 500	Diclofenac	R 0.13	R 0.14	–	–	–
Mylan_Diclofenac 25 mg Tablets 500	–	–	–	R 0.15	R 0.15	R 0.15
Adco-Efavirenz 600 mg Tablets 30	Efavirenz	R 3.55	R 3.55	R 3.55	R 3.55	R 3.59
Cipla_Efavirenz 600 mg Tablets 28	–	–	–	–	R 5.54	–
Cipla_Efavirenz 600 mg Tablets 30	–	R 4.45	R 4.78	R 5.15	–	R 5.66
Efavirenz_Winthrop 600 mg Tablets 28	–	R 5.94	–	–	–	–
Efrin 600 mg Tablets 28	–	–	–	–	R 7.41	–
Efrin 600 mg Tablets 30	–	R 5.95	R 6.39	R 6.89	–	R 7.57
Sonke_Efavirenz 600 mg Tablets 28	–	–	–	–	R 5.01	–
Sonke_Efavirenz 600 mg Tablets 30	–	–	R 4.32	R 4.66	–	R 3.26
Nuzak 20 mg Capsules 30	Fluoxetine	R 1.36	R 1.46	R 1.58	–	–
Prolax 20 mg Capsules 28	–	–	–	–	R 0.94	R 0.96
Bio-Glibenclamide 5 mg Tablets 100	Glibenclamide	R 0.23	R 0.25	R 0.27	R 0.29	R 0.29
Bio-Glibenclamide 5 mg Tablets 500	–	R 0.23	R 0.25	R 0.27	–	R 0.29
Glycomin 5 mg Tablets 100	–	R 0.24	R 0.25	R 0.27	R 0.29	R 0.30
Glycomin 5 mg Tablets 30	–	R 0.24	R 0.25	R 0.27	R 0.29	R 0.30
Glycomin 5 mg Tablets 500	–	R 0.24	R 0.25	R 0.27	R 0.29	R 0.30



Table 3 Continued

Manufacturer product name	Active ingredient	2014 price	2015 price	2016 price	2017 price	2018 price
Ridaq 25 mg Tablets 500	Hydrochlorothiazide	R 0.82	R 0.88	R 0.95	R 1.03	R 1.05
Adco-Lamivudine 150 mg Tablets 60	Lamivudine	R 0.70	R 0.70	R 0.70	R 0.70	R 0.71
Aspen_Lamivudine 150 mg Tablets 56	—	R 1.84	—	—	—	—
Aspen_Lamivudine 150 mg Tablets 60	—	—	R 1.98	R 2.13	R 2.29	R 2.34
Cipla_Lamivudine 150 mg Tablets 60	—	R 1.22	R 1.31	R 1.41	R 1.52	R 1.55
Adco-Loperamide 2 mg Tablets 300	Loperamide	—	—	R 1.37	R 1.47	R 1.51
Adco-Loperamide 2 mg Tablets 6	—	—	—	R 1.37	R 1.47	R 1.51
Cipla_Loperamide 2 mg Tablets 8	—	R 1.15	R 1.24	—	—	—
Austell-Losartan 50 mg Tablets 28	Losartan	—	—	—	—	R 3.20
Austell-Losartan 50 mg Tablets 30	—	—	—	R 2.92	R 3.14	—
Ciplazar 50 mg Tablets 30	—	R 2.93	R 3.15	—	—	—
Austell_Metformin 500 mg Tablets 100	Metformin	—	—	R 0.46	R 0.46	R 0.42
Austell_Metformin 500 mg Tablets 500	—	—	—	R 0.46	R 0.46	R 0.42
Forminal 500 mg Tablets 100	—	R 0.38	R 0.41	—	—	—
Forminal 500 mg Tablets 500	—	R 0.38	R 0.41	—	—	—
Forminal 500 mg Tablets 60	—	R 0.38	R 0.41	—	—	—
Indo_Metformin 500 mg Tablets 100	—	R 0.36	R 0.38	R 0.40	R 0.43	R 0.44
Indo_Metformin 500 mg Tablets 500	—	R 0.36	R 0.38	—	—	—
Mylan_Metformin 500 mg Tablets 500	—	—	—	R 0.40	R 0.43	R 0.44
Mylan_Metformin 500 mg Tablets 90	—	—	—	R 0.40	R 0.43	R 0.44
Ritalin 10 mg Tablets 30	Methylphenidate	R 6.23	R 6.70	R 7.22	R 7.76	R 7.93
Adco-Contromet 10 mg Tablets 500	Metoclopramide	R 0.11	R 0.12	R 0.13	R 0.14	R 0.14
Bio_Metoclopramide 10 mg Tablets 500	—	R 0.09	R 0.10	—	—	—
Clomax 10 mg Tablets 500	—	R 0.10	R 0.11	R 0.12	R 0.13	R 0.13
ACRIPTAZ 200 mg Tablets 56	Nevirapine	—	—	—	R 4.50	—
ACRIPTAZ 200 mg Tablets 60	—	R 3.61	R 3.88	R 4.18	—	R 4.60
Adco-Nevirapine 200 mg Tablets 60	—	R 2.38	R 2.38	R 2.38	R 2.38	R 2.40
Aspen_Nevirapine 200 mg Tablets 56	—	—	—	—	R 4.40	—
Aspen_Nevirapine 200 mg Tablets 60	—	R 3.61	R 3.88	R 4.19	—	R 4.49
Bio-Nifedipine 10 mg Capsules 250	Nifedipine	R 0.26	R 0.26	R 0.26	R 0.26	R 0.26
Epanutin 100 mg Capsules 100	Phenytoin	R 2.26	R 2.43	R 2.50	R 2.68	R 2.74
Phenytoin 100 mg Capsules 100	—	—	—	R 0.56	—	—
Phenytoin 100 mg Capsules 90	—	—	—	—	R 0.60	R 0.62
Phenytoin_Sodium 100 mg Tablets 100	—	—	R 0.52	—	—	—
Phenytoin_Sodium 100 mg Tablets 1000	—	R 0.48	—	—	—	—
Be-Tabs_Prednisone 5 mg Tablets 1000	Prednisone	R 0.12	R 0.16	R 0.17	R 0.20	R 0.21
Phenergan 25 mg Tablets 100	Promethazine	R 1.13	R 1.21	R 1.31	R 1.40	R 1.43
Asthavent_Ecohaler 100 mcg Inhaler 200	Salbutamol	R 0.12	R 0.13	R 0.13	R 0.14	R 0.15
Ventimax 100 mcg Inhaler 200	—	R 0.13	R 0.13	R 0.14	R 0.16	R 0.16
Aspen_Stavudine 30 mg Capsules 56	Stavudine	—	—	R 0.91	—	—
Aspen_Stavudine 30 mg Capsules 60	—	—	R 0.85	—	R 0.98	R 1.00
Sonke_Stavudine 30 mg Capsules 60	—	R 0.54	—	—	—	—
Cipla-Zidovudine 100 mg Capsules 100	Zidovudine	R 1.94	—	—	—	—
Zidomat 100 mg Tablets 100	—	—	R 1.84	R 1.99	R 2.14	R 2.18

This table contains medicine prices from the SEP system. There are prices for each branded medicine name for the corresponding year in the 5-year period, that is, 2014–2018. The letter R represents the South African currency in Rands.

TP is the tender price  
*i* is the year in which the price was in effect and  
*b* represents the branded medicine at a specific pack size

- The price difference calculation was applied for each medicine for the corresponding year in the 5-year period. The calculated percentage per year ( $\varepsilon_{i,b}$ ) was used to calculate the average price difference

$$\bar{\varepsilon}_b = \frac{\sum_{i=2014}^{2018} \varepsilon_{i,b}}{n} \quad (2)$$

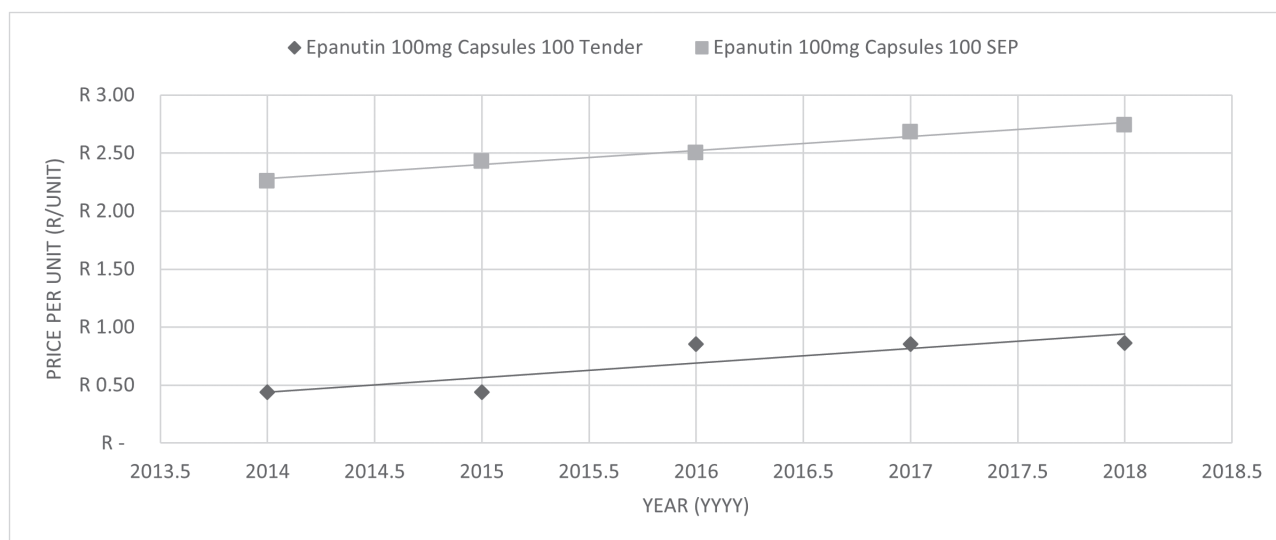
where

$\bar{\varepsilon}$  is the average price difference and  
*n* represents the number of years with available price data

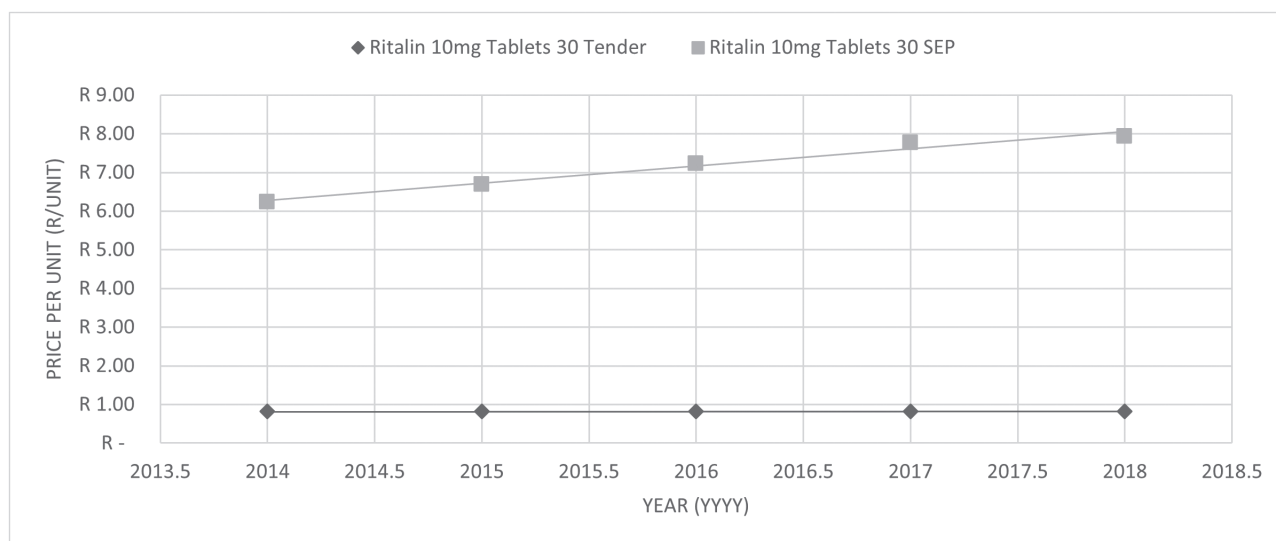
- The average price index was calculated using the following criteria:

- The average annual price increase was calculated for each branded medicine within its pack size over the 5-year period. Only branded medicines that had a price value for two or more years could be used. The difference between the earliest and the latest annual price available for a medicine was used to determine the average price index:

$$API = \frac{P_{y_l} - P_{y_e}}{y_l - y_e} \times 100 \%$$



**Figure 1** Medicine prices of Epanutin 100 mg versus time. Figure 1 represents the price increases over the 5-year period (2014–2018) for both tender (gradient 0.126) medicine prices and SEP's (gradient 0.121).



**Figure 2** Medicine prices of Ritalin 10 mg versus time. Figure 2 tender prices remaining the same with time (2014–2018) while the SEP increases and is represented by medicine Ritalin 10 mg- gradient for tender 0.001 and gradient for SEP 0.447.

where

API is the Average Price Index  
 $P$  represents the price of a medicine in a specific year,  
 $y_l$  represents the latest year and  
 $y_e$  represents the earliest year

### Ethical considerations

Ethical approval for this study was obtained from the relevant University Institution (HSS/0421/019M) under the exempt approval as the nature of the study involved data/materials available to the public domain.

### Results

The findings relate to the prices of the final basket of 32 active ingredients that yielded a total of 74 branded medicines.

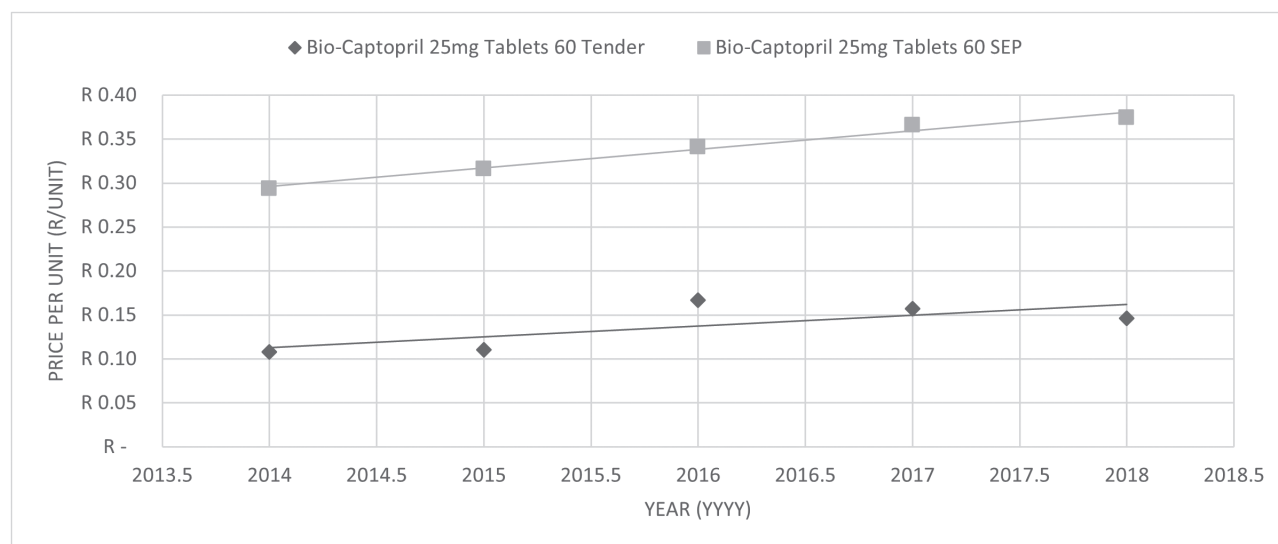
The tender medicine price and SEPs for each medicine brand were tabulated (see [Supplementary Appendix A, Tables 2, and 3](#)) and then graphed for comparisons.

The first trend visually observed that medicine prices increased with time for both tender medicine prices and the SEPs (found in 36 out of 74 branded medicine graphs). Trend lines were added to each branded medicine graph to assess the level of the price increase which was represented by the gradients of the slope (see [Figure 1 – Epanutin 100 mg tender gradient 0.126 and SEP gradient 0.121](#)).

The next trend visually displayed that the tender medicine prices for some branded medicine items remain the same or decrease in price for the 5-year period, while the SEPs for the same branded medicine increase. This was shown for 31 of the total branded medicine graphs (see [Figure 2 – graph of Ritalin 10 mg: gradient for tender 0.001 and gradient for SEP 0.447](#)).

The most prominent observation was that SEP's were consistently higher than the tender medicine prices throughout the study





**Figure 3** Medicine prices of Bio-captopril 25 mg versus time. Figure 3 represents the SEP's being more than tender price by the example of the medicine Bio-captopril 25 mg- gradient of tender 0.123 and gradient of SEP 0.002.

period. The majority, 87.84% (65 out of 74), of the branded medicine items exhibited this behaviour (see Figure 3 – graph of Bio-captopril 25 mg: gradient for tender 0.123 and gradient for SEP 0.002). This was further substantiated by the price difference calculation that was computed. For the calculation between the two price systems to be completed, only 36 medicine brands could be used based on the calculation criteria (see Methods section). All 36 items consistently showed higher SEPs than tender prices during this observation. The lowest price difference was 33% (Be-tabs prednisone 5 mg) and the highest price difference was 1964.70% (Adco-loperamide 2 mg 300 s) shown in Supplementary Appendix A and Table 4. The average percentage price difference was 395.47% with an interquartile range of 490.35%.

The average price index (API) calculation was the final observation. From the basket of 32 active ingredients (with some brands having multiple pack sizes) only those items fitting the required criteria (see Methods section) were used in the calculation. The calculation was to establish the average price increase (in %) displayed by the specific medicine brand (in each pack size) within each price system. The purpose of displaying the data as such was to establish the price change patterns that could be observed in each respective price system. By virtue of differing data sets in each price system, annual price changes could not be compared directly between SEP and tender systems. The graph shows a more consistent price increase in the SEP system while the tender system showed a more sporadic price change pattern. In the tender system, 15 branded medicines (out of 47) showed a price decrease while 32 showed an increase in price (see Figure 4). Out of 81 branded medicines for the SEP system, 78 items demonstrated an increase in price while three demonstrated a decrease.

## Discussion

Globally, medicine price regulations are implemented with the intent of containing medicine costs. In SA, the medicine price systems implemented differ across the private and public sectors. Despite both having the same intention of lowering medicine costs, the degree to which this is achieved requires further investigation. The article was thus written with the intent of identifying the price trends between

the two systems by calculation of the price difference and price increases.

At the outset, the study revealed that prices between the two healthcare sectors for the same medicine were glaringly different. Medicine prices in the private sectors were consistently higher than tender prices. This was similar to findings in other studies that proved tender medicine prices showed an overall decrease in medicine price.<sup>[7, 9, 17, 24, 25–29]</sup> The most probable reason for this difference is the methodology adopted for the tendering process in the public sector. This was elaborated upon in a study by Wouters *et al.*, which observed the impact of the tender medicine system in SA over a 14-year period: 2003–2016.<sup>[10]</sup> According to Wouters *et al.* pharmaceutical tenders are bought after a confidential bidding process in bulk, usually from a central buyer which accounts for the fixed prices that are awarded.<sup>[9]</sup> This indicates that the volumes procured largely influence the prices at which it will be available on the tender system. In the private sector, medicine prices are prohibited from being influenced by volume purchases by the price regulations applied. These regulations were permitted to improve price transparency in the private sector, especially where price negotiations (rebates and bonuses) promoted previous discounts from manufacturers to retailers and not awarded to patients.

The selection criteria adopted in the tendering process could also attribute to the price differences seen in this study. The WHO defines the tendering process as a form of strategic purchasing based on several input factors.<sup>[30]</sup> Every country, therefore, establishes what factors strategically form their tender criteria. Competitive bidding,<sup>[10, 31]</sup> price negotiations,<sup>[32]</sup> medicine efficacy, safety, quality and cost<sup>[33]</sup> – are some of the factors used in the South African selection process. While these factors could be contributing to the low costs exhibited in the tender system as compared to the SEP system, there is no certainty that the tendering process has indeed led to the lowest possible prices. In SA, the Government occasionally uses an ad hoc based criterion to promote local economic growth by favouring local manufactures for the tender.<sup>[9]</sup> This indicates that the medicines supplied by the local manufacturers may not always be the most cost-effective, as seen in the Xiphu and Mpanza study where prices even in the public domain did not compare well with international reference prices or with prices in other African public

**Table 4** The price difference between tender price and SEP from 2014 to 2018

Branded medicine name	price difference
Be-Tabs_Prednisone 5 mg Tablets 1000	33.00%
Doctrim 240 mg/5 ml Suspension 50	35.50%
Austell_Co-Amoxiclav 375 mg Tablets 15	46.00%
Ilvitrim_Suspension 240 mg/5 ml Suspension 50	56.50%
Doctrim 240 mg/5 ml Suspension 100	64.20%
Ventimax 100 mcg Inhaler 200	77.20%
Asthavent_Ecohaler 100 mcg Inhaler 200	79.70%
Clomax 10 mg Tablets 500	81.00%
Mylan_Diclofenac 25 mg Tablets 500	92.70%
Ilvitrim_Suspension 240 mg/5 ml Suspension 100	96.80%
Sandoz_Co-amoxycylav 375 mg Tablets 15	108.90%
Bio-Captopril 25 mg Tablets 60	150.60%
Beceze 50 mcg Inhaler 200	153.20%
Beclate 50 mcg Inhaler 200	196.40%
Bio-Glibenclamide 5 mg Tablets 100	201.00%
Cifran 500 mg Tablets 10	213.80%
Biotech_Ciprofloxacin 500 mg Tablets 10	226.70%
Zidomat 100 mg Tablets 100	230.20%
Mylan_Metformin 500 mg Tablets 500	252.30%
Profloxin 500 mg Tablets 10	288.00%
Epanutin 100 mg Capsules 100	297.60%
Adco-Allopurinol 300 mg Tablets 30	361.90%
Prolax 20 mg Capsules 28	379.40%
Acitab_200_DT 200 mg Tablets 25	507.50%
Lovire 200 mg Tablets 25	540.90%
Degranol 200 mg Tablets 100	558.80%
Gulf_Amitriptyline 25 mg Tablets 500	576.00%
Valium 5 mg Tablets 100	581.60%
Phenergan 25 mg Tablets 100	588.60%
Trepiline 25 mg Tablets 100	604.60%
Adco-Loperamide 2 mg Tablets 6	630.90%
Ridaq 25 mg Tablets 500	666.10%
Bio-Atenolol 50 mg Tablets 30	702.30%
Ritalin 10 mg Tablets 30	771.80%
Cipla_Loperamide 2 mg Tablets 8	896.50%
Ciplazar 50 mg Tablets 30	1319.50%
Adco-Loperamide 2 mg Tablets 300	1964.70%

Table 4 is the percentage price difference between the SEP and tender medicine prices for the period 2014–2018. The medicines are represented in their branded medicine name and the price difference is represented as a percentage.

sectors.<sup>[13]</sup> Furthermore, the criteria for medicine selection for the EML was also identified as not being a completely transparent process.<sup>[34]</sup> The tender process also has little coordination with regards to tender issuance and the registration of products, which leads to some items being excluded from tenders, further weakening competition.<sup>[9]</sup> Therefore to maintain better competition among the drug companies, a better tender process needs to be developed to make it simpler for drug companies to participate in tenders.<sup>[9]</sup>

The tender process follows several selection criteria steps before concluding with a contract that is negotiated and agreed upon. Each contract contains all the details about the tender including the price, the duration of the contract, and even a section on price review rules.<sup>[22]</sup> The price review section stipulates the conditions that will mandate a price change-which is mostly related to foreign exchange fluctuations.<sup>[22]</sup> Foreign exchange rates affect the tender price especially when the medicine active ingredient is sourced internationally. This could be the reason for the sporadic price increases seen for the tender system in this study (see Figure 4). The graph showed irregular price increases for the tender system while the SEP system

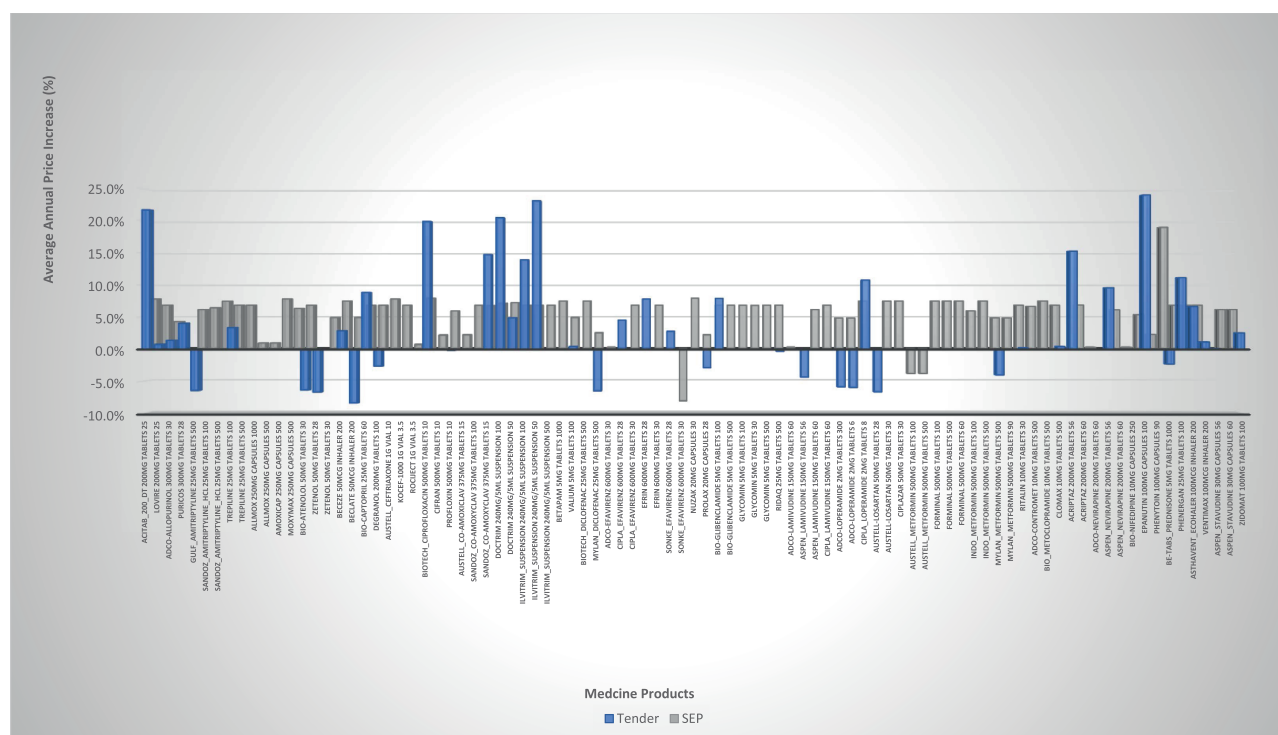
showed a steadier average price growth. The SEP system can account for the regular price increases as it is regulated by an annual price increase which is based on the CPI. Therefore, the private sector can account for the price increases seen because it is regulated tightly as compared to the public sector, which is not.

The medicine price increases in the private system are capped thus providing an advantage. Before the SEP system was implemented, the price increases were much higher. In the Moodley and Suleman study, it was identified that there was an immediate decline in medicine prices after the implementation of the SEP system.<sup>[2]</sup> The yearly increases continued after the SEP regulation, however, the value by which it increased was regulated thus providing an overall decrease in medicine price in the private sector. This provided an advantage to the patients in the private sector as they were paying less in comparison to before the implementation of the SEP. However, in comparison to the prices available in the public sector, the private sector prices are vastly more. This study calculated an average price difference of 395.47% between SEP and tender prices. Similarly, the price difference explored in the Wouters *et al.* study showed a 511% price difference for atorvastatin in 2009.<sup>[9]</sup> This indicates that the yearly price increases have improved in the private sector but the price differences between the public and private sectors have not seen a significant change.

While the tender system shows lower prices than the SEP system, it does face some limitations. These include an over or undersupply of medicines due to poor annual demand forecast estimations.<sup>[9]</sup> Oversupply of medicines could lead to budget exhaustions,<sup>[35]</sup> while the undersupply of medicines lead to medicine shortages.<sup>[9, 35]</sup> While budget exhaustions have serious implications, medicine shortages are a more common problem experienced in SA and other countries such as Netherlands<sup>[19]</sup> and New Zealand.<sup>[36]</sup> A study conducted by Modisakeng *et al.* reviewed the medicine shortage problems in SA and concluded that the main challenges were in the procurement process.<sup>[33]</sup> There are several adjustments to the tender structural approach<sup>[37]</sup> that can improve medicine shortages such as a split tender system. In SA, the split tender approach is utilized thus limiting the occurrence and impact of medicine shortages.<sup>[9]</sup> This approach is adopted to assist with volume issues especially when the needed product is of high importance such as first-line ARV drugs.<sup>[9]</sup> This was the reason for several branded names being listed for one medicine active ingredient in this study (see Supplementary Appendix A, Tables 2 and 3).

It is noted that both tender and SEP systems have advantages and disadvantages. One downside of the SEP system is that there are additional costs applied to the SEP of a medicine in the form a dispensing fee (which a pharmacy may or may not apply).<sup>[38]</sup> The price differences observed in this study excluded the dispensing fees, which are governed by procedures that are weak and complex,<sup>[38]</sup> thus requiring further transparency and policy review.<sup>[5]</sup> The tender system does wage a professional fee that is accounted for in pharmacy personal salaries, however as dispensing fees in the private sector is optional and dependent on the pharmacy, it is not a guaranteed paid fee. The dispensing fee is added to the medicine cost that the patient will then incur.

This study focused on establishing the differences between the price system in the private and public sectors. However, during the study, an underlying commonality was identified. Both the private and the public sectors underwent regulation changes to improve transparency, but complete transparency in these systems has not yet been achieved and should be improved. It is also recommended that as medicine procurement volume is a contributing factor in relation to price, and was not explored in this study, it should be further investigated.



**Figure 4** Average annual price increase from 2014 to 2018 for the list of medicines. Figure 4 shows the average annual price increases (in percentage) for each pricing system (tender and SEP) from 2014–2018, for specific branded medicines.

### Limitations

The medicines selected in the study were based on the WHO/HAI survey list<sup>[13]</sup> and did not include all medicines that are on the tender. Generalizations for all medicines on the tender system therefore could not be made. The medicine list used in the study included mostly generic branded medicines (according to the tender awards) which show 'lower-priced medicines' when compared to originator brands (higher medicine prices). Medicine prices were 'low' in the study however it does not indicate that prices are generally low in SA but rather that the chosen list contained more 'lower costing' medicines, which could bias the cost representations in this study. In the private sector the logistics fee is included as part of the SEP however, the logistics fee for medicines in the public sector were not reviewed in this study and should therefore be considered in future studies. The use of a larger dataset and inferential statistics would have strengthened the findings of this study.

### Conclusion

The trends depicted in the study showed that each price system does show some advantages and disadvantages. Varying price differences across both sectors is associated with a lack of transparency in establishing medicine prices. Therefore, to move towards a better-unified healthcare system (NHI), the underlying shortcomings in the current systems must be corrected. Policymakers need to ensure that a transparent system adheres throughout the medicine price processes in order to improve medicine price systems and healthcare in SA.

### Supplementary Material

Supplementary data are available at *Journal of Pharmaceutical Health Services Research* online.

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### Conflict of Interest

None declared.

### Data availability

Data available on request by email to [tarryngovender72@gmail.com](mailto:tarryngovender72@gmail.com).

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