

Analysis of e-catalogue drug prices in the era of Universal Health Coverage in the Indonesian pharmaceutical industry

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Abstract

Context: Since the implementation of the Universal Health Coverage (UHC) policy in Indonesia, the drug procurement system has changed to using the e-catalogue system. The impact of this policy change on the pharmaceutical industry in Indonesia is unclear and has not been widely studied.

Objectives: This study analyzes the impact of the UHC policy on drug pricing by the pharmaceutical industry in Indonesia.

Methods: This study collects data from 3 pharmaceutical industries that won the e-catalogue drug tender. Data on drug prices produced by these 3 industries in 2013 were taken from the Drug Price Ceiling List, while drug prices in 2015 and 2018 were obtained from the e-catalogue drug list. The drug price data is compared from year to year to see the trend of change and the magnitude of the change. Data were analyzed using a price index calculation adapted from the concept of Median Price Ratio (MRP) calculation to compare drug prices in 2013 with drug prices per each region in 2015 and 2018 in the Microsoft Excel Office application as a measuring tool.

Results: There was a change in drug prices from the era before UHC (in 2013) and after the UHC era (in 2015 and 2018). There are drugs that have increased in price and some have decreased in price. The price increase ranged from 0.01–6.15 in 2015 and 0.01–6.46 in 2018. The price decrease ranged between 0.04–0.75 in 2015 and 0.01–0.83 in 2018.

Conclusion: Drug prices from before the UHC era (2013 and 2015) to after UHC (in 2018) experienced a change in the form of an increase or decrease in price.

Keywords

UHC, drug prices, e-catalogue, pharmaceutical industry

Introduction

The Universal Health Coverage (UHC) is a government program contained in the National Social Protection System (SJSN) program. According to Law Number 40

of 2004 concerning the National Social Security System (SJSN), the health insurance benefits that patients get include drugs. The supply of drugs to fulfill this SJSN has been regulated in the National Formulary (Fornas)

which is a guideline for health services in procuring the necessary medicines which are guaranteed quality, safe, and at affordable prices. According to Presidential Regulation (Perpres) No. 157 of 2014, the UHC program implements an e-catalogue system in drug procurement. Changes in the old drug procurement system into an e-catalogue to reduce the occurrence of mark ups or drug price inflation (Rock 2009). E-catalogue is an information management system that connects the government LKPP, Ministry of Health (Ministry of Health), POM Agency, producers (drug manufacturers, distributors) and users (hospitals, health centers) in the UHC drug procurement process (Dwiaji et al. 2016).

Drug prices in the UHC era decreased. These efforts were made to implement a system of quality control and cost control as a form of social protection in the health sector to ensure the fulfillment of basic health needs that are appropriate for the community (Ministry of Health 2014). The decrease in drug prices is adjusted to the e-catalogue system which is set to be low price, meaning that the price of drugs is determined at a low price. The determination of drug prices in the e-catalogue involves two parties, the Ministry of Health and LKPP, in the form of Self Estimated Prices (HPS) (Ariati 2017). Industries that offer drug prices above HPS cannot win the e-catalogue drug auction. In winning the tender for the production of e-Catalogue medicines, the entire pharmaceutical industry competed to lower the selling price of the medicines needed. This price competition system is an effective method to reduce drug prices (Moon et al. 2011).

The implementation of UHC with BPJS health insurance focuses on the use of generic drugs. This is in accordance with the Regulation of the Minister of Health of the Republic of Indonesia No. HK.02. 02/MENKES/068/2010 in which government-owned health facilities are required to provide generic drugs for the needs of outpatients and inpatients. This regulation also causes a shift in the use of drugs in the community from using branded drugs to generic drugs. As shown in the research conducted by Permata et al (2020), at Fatmawati Hospital there was an increase in the procurement of branded generic and generic medicines sold through e-catalogue. Research conducted in Europe shows that competition for generic drugs has an impact on decreasing drug prices (Puig-Junoy 2010). In Anggriani's research (2019) at the Islamic Hospital in Jakarta Cempaka Putih, the largest and largest decline in e-catalogue drugs occurred in patent and generic drugs by 82.36%. In fulfilling the demand for generic drugs, the pharmaceutical industry is also making changes by increasing the production of generic drugs and reducing the production of branded drugs (Anggraini 2019).

Facts related to the impact of UHC implementation are shown by research conducted by Anggriani (2019), namely a significant decrease in drug prices at the Jakarta Islamic Hospital (RS) Cempaka Putih with a decrease of more than 80%. Meanwhile, according to research conducted by Dewi et al (2015) it was found the fact that there was a difference in the cost of pharmacies in

DIY depending on the type of collaboration between the pharmacy and BPJS health and primary health facilities. Based on these studies, the impact of implementing UHC in hospitals and pharmacies is quite significant. Meanwhile, not much research has been done regarding the impact of UHC implementation on the pharmaceutical industry. This study aims to determine the impact of implementing this UHC policy on the pharmaceutical industry in Indonesia, particularly related to changes in the pricing of e-catalogue drugs in the period before and after the UHC era.

Material and methods

Research design

This research was conducted using a quantitative method which was presented descriptively. Retrospective data collection of drug prices from the 2013 DPHO obtained from Askes Ltd was then compared with 2015 and 2018 e-catalogue drug price data accessed from LKPP documentation. The price data of the drugs selected as samples are e-catalogue drugs which were won by the auction tender by each pharmaceutical industry that was the subject of the research. The drugs compared are drugs that have names, indications, strengths and dosage forms that were won in 2013, 2015 and 2018 by each industry. Data on e-catalogue drug prices in 2015 and 2018 consists of five different price data representing each region based on the Ministry of Health's policy which stipulates the difference in e-catalogue drug prices into five regions in Indonesia. The research subjects are two state-owned pharmaceutical industries (A Ltd and C Ltd) and one private pharmaceutical industry (B Ltd).

Data analysis

Data analysis uses mathematical calculations by comparing drug prices in 2013 with drug prices per each region in 2015 and 2018 using Microsoft Excel Office as a measuring tool. The calculation uses the formula: Price index = (drug price after UHC - drug price before UHC) / drug price before UHC. The calculation using this price index adapts the concept of calculating the Median Price Ratio (MRP) which is referenced by Management Sciences for Health (MSH) and recommended by WHO. MRP itself is an average price index that is used to see drug prices in developing countries and then compare them with international standard drug prices. The price index according to the MRP if the value is less than 1, it is considered that the price is efficient (Kristina et al. 2020). This study adapts the conclusions of the MRP calculation. If the price index is positive less than 1, it means that there is an increase in drug prices from 2013 to 2015 and/or 2018 but is still at an efficient price. Then if the price index shows a negative sign of less than 1, it means that there is a price decline that is still efficient from the previous year.

Ethical clearance

Ethical Clearance approval was obtained from the Ethics Commission Team of the Faculty of Medicine, Public Health, and Nursing (FK-KMK) Universitas Gadjah Mada with the approval number KE/FK/0216/EC/2020 for research at A Ltd, KE/FK/0299/EC/ 2020 for research at B Ltd, and KE/FK/0455/EC/2020 for research at C Ltd. Before an indicator is assessed, experts fill out an informed consent form containing information about the filling procedure, the importance of expert involvement, and the course of the study. Informed consent was further signed by each expert as evidence of consent and voluntary involvement in the study.

Results

Drug price trend

The results of the selection of drug price data from the 2013 DPHO from Askes Ltd and the 2015 and 2018 e-catalogues obtained from LKPP show that there are 28 drug items from the three pharmaceutical industries as research samples to which the price differences will be

compared. The data for the 28 drug items have different types of drugs. In A Ltd there are 15 drug items consisting of 8 drug items from B Ltd, and 5 drug items from C Ltd. In A Ltd 15 drug items consist of 3 generic INN (International Nonproprietary Name) drugs and 12 branded generic drugs. At B Ltd, all 8 drug items are branded generic drugs. At C Ltd, all 5 drug items are generic drugs.

Analysis of drug price trends in this study is needed before performing mathematical calculations using the drug price index. Price trend analysis is intended to help see market trends, in order to participate in analyzing drug prices after the implementation of the e-catalogue program. (Anggriani 2019). This drug price trend analysis was carried out in the period before the implementation of the e-catalogue program (2013) and after the implementation of the e-catalogue program (2015 and 2018) or in the UHC era to see changes in drug prices. The word "data" is plural, not singular.

Fig. 1 shows A Ltd there are 8 drug items that have increased and 7 items have decreased in 2015 and 2018. B Ltd in 2015 there were 4 drug items that decreased and 4 drug items increased, while in 2018 there were 5 items drugs increased and 3 drugs decreased (Fig. 2). C Ltd there are drug items that have increased by 2 items, while there are 3 drug

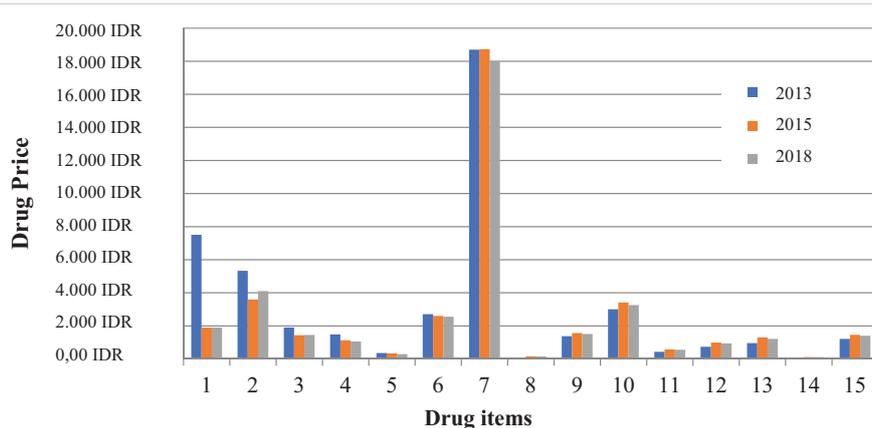


Figure 1. Drug Price Trend e-Catalogue A Ltd. **Note:** 1) azithromycin; 2) metronidazole; 3) betamethasone valerate; 4) theophylline; 5) verapamil; 6) ketoconazole; 7) fluconazole; 8) hydrochlorothiazide; 9) glyceryl trinitrate; 10) miconazole nitrate; 11) codeine tablets 10 mg; 12) codeine tablets 15 mg; 13) codeine tablets 20 mg; 14) ascorbic acid; 15) morphine (HCl)

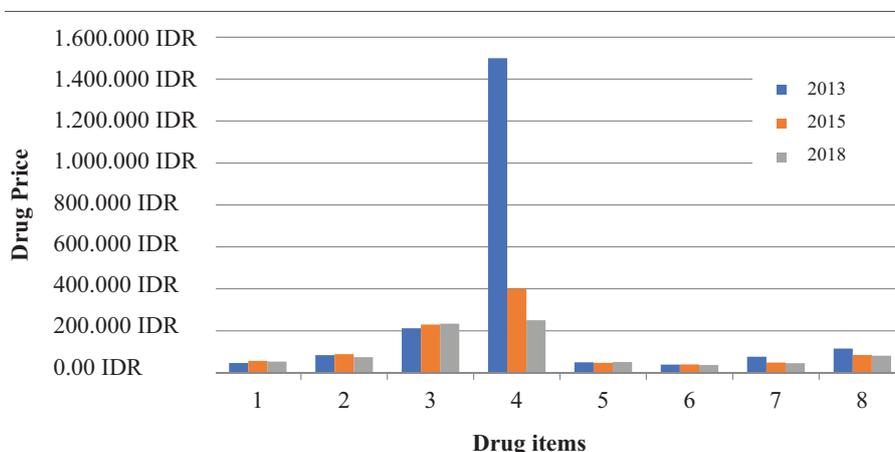


Figure 2. Drug Price Trend e-Catalogue B Ltd. **Note:** 1) aminofuscin L600; 2) liver aminofuscin; 3) clinimix combination; 4) rectax oxaliplatin; 5) trifofuscin 500; 6) tutofuscin ops; 7) vincristine kalbe vial 1 mL; 8) vincristine kalbe vial 2 mL

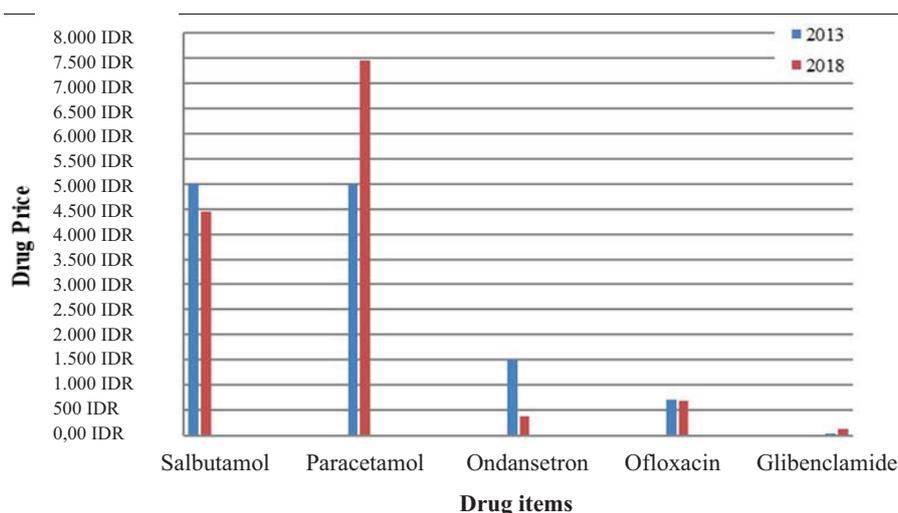


Figure 3. Drug Price Trend e-Catalogue C Ltd.

items that have decreased in price from 2013 to 2018 (Fig. 3). Based on these results, it can be seen that there is a change in the price of e-catalogue drugs which tends to increase.

Differences in drug prices before and after the UHC Era at A Ltd

The drug price index in 2013 against 2015 and 2018 can be seen in Tables 1, 2. The number of drug items that experienced changes in the price index in the five regions was different in 2015 and 2018. In 2015 and 2018, the number of drug items that experienced The decrease was the least in regions III and V and the most in regions.

There are differences in the range of the price index in 2015 and 2018. The range of the index of decline and increase in the price of e-catalogue drugs for each region is different, as can be seen in Tables 1, 2. The range of the index for decreasing drug prices is smaller when compared to the range of drug prices. which has increased. This is due to drug items that experienced a greater price increase than those that experienced a decrease.

The average drug that has increased in the data sample is a drug item that has an efficient increase. This is because the index number is less than 1. Drug items that experienced an efficient price increase in 2015 were 7 and in 2018 there were 8 drug items. For example, a drug that has increased quite efficiently is glyceryl trinitrate 2.5 mg. This drug in region I in 2015 was 0.09 more expensive and continued to increase in each region until region V was 0.37 more expensive than in 2013.

Differences in drug prices before and after the UHC Era at B Ltd

The drug price index of B Ltd e-catalogue can be seen in Tables 3, 4. The drug price index in 2015 and 2018 experienced changes in drug prices. The number of drug items that experienced a decrease or increase in 2015 was the same for each region. In region I to region V, there are 4 items of drugs that have decreased in price and 4 items of drugs that have increased in price. Whereas in 2018, in regions I and II there were 5 drug items that experienced

Table 1. Drug Price Index A Ltd 2015.

No.	Drug Names	Drug Price Index 2015				
		Region I	Region II	Region III	Region IV	Region V
1.	Azithromycin tablet 500 mg	-0,75	-0,75	-0,75	-0,75	-0,75
2.	Metronidazole (vagizol) ovule 500 mg	-0,23	-0,19	-0,11	-0,08	-0,04
3.	Betamethasone valerate cream 0,1%	-0,24	-0,24	-0,24	-0,24	-0,24
4.	Theophyllin tablet SR 300 mg	-0,29	-0,25	-0,22	-0,18	-0,22
5.	Verapamil HCl tablet/caps 80 mg	-0,18	-0,18	-0,12	-0,16	-0,05
6.	Ketoconazole cream 2% tube @ 10 g	-0,06	-0,06	0,01	-0,04	0,09
7.	Fluconazole tablet/caps 150 mg (G)	-0,04	0,01	0,11	0,16	0,20
8.	Hydrochlorothiazide tablet 25 mg	4,73	5,00	5,58	5,88	6,15
9.	Glyceryl trinitrate 2,5 mg	0,09	0,15	0,26	0,31	0,37
10.	Miconazole nitrate cream 2% tube @10 g	0,08	0,14	0,25	0,30	0,35
11.	Codeine tablet/caps 10 mg	0,29	0,35	0,47	0,54	0,61
12.	Codeine tablet/caps 15 mg	0,28	0,35	0,48	0,54	0,60
13.	Codeine tablet/caps 20 mg	0,27	0,34	0,46	0,52	0,59
14.	Ascorbic acid (vitamin C) tablet 50 mg	3,00	3,19	3,62	3,81	4,00
15.	Morphine (HCl) tablet 10 mg (G)	0,16	0,22	0,34	0,39	0,45
	Price increase index range	0,08–4,73	0,01–5,00	0,01–3,62	0,16–5,88	0,09–6,15
	Price decrease index range	0,04–0,75	0,06–0,75	0,11–0,75	0,04–0,75	0,04–0,75

Table 2. Drug Price Index A Ltd 2018.

No.	Drug Names	Drug Price Index 2018				
		Region I	Region II	Region III	Region IV	Region V
1.	Azithromycin tablet 500 mg	-0,75	-0,75	-0,75	-0,75	-0,75
2.	Metronidazole (vagizol) ovule 500 mg	-0,33	-0,33	-0,33	-0,33	-0,33
3.	Betamethasone valerate cream 0,1%	-0,25	-0,25	-0,20	-0,23	-0,15
4.	Theophyllin tablet SR 300 mg	-0,24	-0,20	-0,12	-0,09	-0,05
5.	Verapamil HCl tablet/caps 80 mg	-0,05	0,00	0,09	0,14	0,19
6.	Ketoconazole cream 2% tube @ 10 g	-0,04	-0,04	0,03	0,03	0,11
7.	Fluconazole tablet/caps 150 mg (G)	0,00	0,05	0,15	0,20	0,25
8.	Hydrochlorothiazide tablet 25 mg	4,96	5,27	5,85	6,15	6,46
9.	Glyceryl trinitrate 2,5 mg	0,14	0,20	0,31	0,37	0,42
10.	Miconazole nitrate cream 2% tube @10 g	0,14	0,20	0,31	0,37	0,42
11.	Codeine tablet/caps 10 mg	0,34	0,31	0,54	0,60	0,60
12.	Codeine tablet/caps 15 mg	0,36	0,42	0,56	0,63	0,70
13.	Codeine tablet/caps 20 mg	0,37	0,43	0,57	0,64	0,71
14.	Ascorbic acid (vitamin C) tablet 50 mg	3,04	3,23	3,62	3,85	4,04
15.	Morphine (HCl) tablet 10 mg (G)	0,21	0,27	0,39	0,45	0,51
Price increase index range		0,14–4,96	0,05–5,27	0,03–5,85	0,20–6,15	0,11–6,46
Price decrease index range		0,04–0,75	0,04–0,75	0,12–0,75	0,03–0,75	0,05–0,75

a decrease in price and 3 drug items experienced an increase. Region III, IV and V there are 3 drug items that experienced a decrease and 5 drug items that experienced an increase in price.

The index range of B Ltd drug price increase in 2015 and 2018 is greater than the index range of decreasing drug price index. The range of the drug price index that experienced an increase was 0.05–0.73 in 2015 and 0.06–0.83 in 2018. This shows that at B Ltd there was an increase in drug prices but still efficient.

Table 3. Drug Price Index B Ltd 2015.

No.	Drug Names	Drug Price Index 2015				
		Region I	Region II	Region III	Region IV	Region V
1.	Aminofuscin L 600	0,22	0,22	0,22	0,22	0,22
2.	Aminofuscin Liver	0,05	0,05	0,05	0,05	0,05
3.	Clinimix Combination	0,09	0,09	0,09	0,09	0,09
4.	Rexta Oxaliplatin	-0,73	-0,73	-0,73	-0,73	-0,73
5.	Triofuscin 500	-0,05	-0,05	-0,05	-0,05	-0,05
6.	Tutofuscin OPS	0,01	0,01	0,01	0,01	0,01
7.	Vincristine Kalbe vial 1 mL	-0,37	-0,37	-0,37	-0,37	-0,37
8.	Vincristine Kalbe vial 2 mL	-0,23	-0,23	-0,23	-0,23	-0,23
Price increase index range		0,01–0,22	0,01–0,22	0,01–0,22	0,01–0,22	0,01–0,22
Price decrease index range		0,05–0,73	0,05–0,73	0,05–0,73	0,05–0,73	0,05–0,73

Table 4. Drug Price Index B Ltd 2018.

No.	Drug Names	Drug Price Index 2018				
		Region I	Region II	Region III	Region IV	Region V
1.	Aminofuscin L 600	0,12	0,20	0,38	0,37	0,43
2.	Aminofuscin Liver	-0,11	-0,07	0,06	0,06	0,11
3.	Clinimix Combination	0,11	0,16	0,25	0,25	0,25
4.	Rexta Oxaliplatin	-0,83	-0,83	-0,83	-0,83	-0,83
5.	Triofuscin 500	0,04	0,09	0,23	0,23	0,30
6.	Tutofuscin OPS	-0,06	-0,01	0,06	0,06	0,06
7.	Vincristine Kalbe vial 1 mL	-0,40	-0,40	-0,40	-0,40	-0,40
8.	Vincristine Kalbe vial 2 mL	-0,30	-0,30	-0,30	-0,30	-0,30
Price increase index range		0,04–0,12	0,09–0,20	0,06–0,38	0,06–0,37	0,06–0,43
Price decrease index range		0,06–0,83	0,01–0,83	0,30–0,83	0,30–0,83	0,30–0,83

Differences in drug prices before and after the UHC Era at C Ltd

The index of changes in the price of C Ltd e-catalogue drugs can be seen in Table 5. The results of the analysis of the e-catalogue drug price index won by C Ltd show that there are 2 types of drugs that have decreased in prices in all regions. In addition, there are 2 types of drugs that have increased prices in 5 regions. There are special differences in Ofloxacin 400 mg tablet/film caplet, where the price decreased in 2 regions, namely region I and II, while in region III, IV, and V the drug price increased.

The price reduction range for this drug is between 0.08 to 0.77. This shows that there has been a decrease in the price of medicines, but they are still considered efficient. The price increase occurred in the index range of 0.01–1.87. This figure shows that there was an increase in inefficient drug prices from 2013 to 2018. This inefficient drug price increase occurred in Glibenclamide 5 mg tablets/caplets/capsules because the price index value was greater than 1.

Discussion

The e-catalog drugs are the responsibility of the pharmaceutical industry that won the tender, meaning that the industry produces the national e-catalog drug needs to be produced. The fulfillment of these needs is produced nationally, but the price of e-catalogue drugs in each region has a different price. This is due to the distribution costs to each district and city of destination which are not the same, depending on the distance traveled (Muhaemin 2015). The distribution of distribution areas in Indonesia is divided into 5 regions, in accordance with the provisions of the Ministry of Health. Therefore, there are differences in drug prices for the same item in each region.

The range of the different e-catalog drug price indexes for each region in 2015 and 2018 can be seen in

Table 5. Drug Price Index C Ltd 2013 and 2018.

No.	Drug Names	Drug Price Index 2018				
		Region I	Region II	Region III	Region IV	Region V
1.	Salbutamol sulfate syr 2 mg/5 mL	-0,11	-0,11	-0,11	-0,11	-0,11
2.	Paracetamol drop 100 mg/mL fls @15mL (60mg/0,6mL)	0,40	0,33	0,53	0,53	0,66
3.	Glibenclamide tablet/caps/caplet 5 mg	1,40	1,29	1,63	1,63	1,87
4.	Ondansetron hydrochloride/ Ondansetron HCl dihydrate / Ondansetron tablet/caps/caplet 8 mg	-0,75	-0,77	-0,73	-0,73	-0,71
5.	Ofloxacin tablet/film coated caplet 400 mg	-0,08	-0,12	0,01	0,01	0,10
Price increase index range		0,40–1,40	0,33–1,29	0,01–1,63	0,01–1,63	0,10–1,87
Price decrease index range		0,08–0,75	0,11–0,77	0,11–0,73	0,11–0,73	0,11–0,71

Tables 1–5. The index for decreasing drug prices is smaller when compared to the range for increasing drug prices. This is due to drug items that experienced a greater price increase than those that experienced a decrease. This result contradicts the research conducted by Talluri et al (2006) where e-procurement systems such as the use of e-catalogue have the advantage of reducing drug prices to a lower level. Evaluation of drug spending data at the District/City Offices in Central Java shows that medicines purchased with e-catalogue also show potential cost savings of up to 19.1% (Kusmini et al. 2016). In a study conducted by Suliantoro, et al in 2016 it was concluded that the use of e-catalogue in Indonesia was able to reduce prices and costs by up to 10%.

Data on the results of the comparison of drug price samples before and after the UHC era in Table 4, it can be seen that there are differences in drug prices in each region in 2015 and 2018. There are differences in drug prices at A Ltd in each region, but exceptions for drug items in 2015 In 2015 there were two items that were the same for all regions, azithromycin tab 500 mg and betametasone valerate cream 0.1% and in 2018 there were two items of the same drug, namely in each region the same, namely azithromycin tab 500 mg and metronidazole (vagizol) ovule 500 mg. In 2015 at B Ltd, the price of 8 drug items in all regions had the same price, while in 2018 there were 3 drug items with the same price in all regions, namely rexta oxaliplatin, vincristine kalbe vial 1 mL, and vincristine Kalbe vial 2 mL. The price of C Ltd drugs in regions III and IV remains the same, but in other regions the prices are different. This is because the distance between companies and regions III and IV is relatively the same, so distribution costs are also considered the same. Especially for the syrup salbutamol 2 mg/5 mL produced by C Ltd in 2018, the price of the drug for each region remains the same. This is because the price submitted at the auction has taken into account production costs, distribution costs as well as the company's profit margin. Ernawati's research (2019) showed more tablet preparations effect on increasing production compared to injectable preparations. Thing this is due to the manufacture of -level tablets more technology and production difficulties easy compared to process injection manufacture where there are provisions details that must be met are compared with the tablet preparation process.

The prices for the 2015 and 2018 drug samples are different for each region, but to see the price trend, an average drug price from all regions is carried out. This

average price is to represent price differences in different regions and can describe the trend of changing drug prices. The bar chart in Figs 1–3 illustrates the increase and decrease in the price of each type of drug sample. This trend description can make it easier to analyze which drugs are experiencing price changes and how big the changes are.

Changes in drug prices from the era before UHC in 2013 and after UHC in 2015 and 2018 were caused by the existence of a public drug production auction mechanism organized by the Ministry of Health with the assistance of LKPP. This is also in accordance with research conducted by Verghese, et al in 2019 which showed that the auction system was able to reduce drug prices on the market in several countries in Asia. The decline in drug prices also occurred in Belgium, which implemented an auction system for the drug simvastatin (Dylst and Simoens 2010). Prior to the opening of the drug auction, LKPP has determined HPS which is the reference price for the participating pharmaceutical industries. The government uses the direct pricing method through the determination of HPS conducted by the Ministry of Health (Oktaviani and Baroroh 2015). If the price submitted by the pharmaceutical industry exceeds HPS, the bid will be automatically rejected. Indirectly, HPS is getting cheaper every year because HPS is determined based on drug prices in the previous year. In the following year, if you want to win the e-catalogue drug auction tender, you must be able to offer a cheaper price than the winner of the drug tender in the previous year. For several drug items, the HPS determination mechanism is able to reduce the cost of drugs set by the pharmaceutical industry. This is in accordance with the conditions in Turkey and Greece which also use direct drug pricing policies, the prices of drugs used for the reimbursement system are drugs that have the lowest prices so that drug prices are cheap (Atikeler and Ozcelikay 2016).

Contrast occurs in the data obtained in Tables 1–5 where there are several drugs whose prices have increased. The increase in drug prices that occurred in the pharmaceutical industry of A, B and C Ltd's was due to considerations of production costs, distribution, retention, taxes, and other costs during the auction process and price negotiations between drug providers and the government. In the conventional drug ordering process before the existence of this e-catalogue, these costs were costs determined by Pharmaceutical Wholesalers (PBF) who became suppliers for the pharmaceutical industry, especially distribution costs (Wasir et al. 2019). However, because in this e-catalogue

system all costs have been calculated into one. The type of state-owned company will be more affected by regulations compared to private companies. This matter because state-owned companies must fulfill the need for generic drugs to public sector medical needs. Procurement of drugs through e-procurement, Drug prices are regulated very tightly so that with the response regulation in the form of: reducing the number of production is an option for state-owned pharmaceutical companies (Ernawati 2019).

The increase in drug prices is also due to changes in the exchange rate (exchange rate) that affect inflation each year. Changes in the exchange rate can affect supply inflation through the price of goods directly (direct pass-through effect). As a result, the high rate of inflation is mainly related to the price of goods that have a high import content as a result of the exchange rate crisis (Suseno et al. 2009). The relative inflation rate experienced by a country is also a factor that affects the amount of a country's currency exchange rate (Madura 2006).

Depreciation of the domestic currency causes foreign currencies to become more expensive, this means that the relative value of the domestic currency declines (Manurung 2016). Companies that import raw materials from abroad such as the pharmaceutical industry in Indonesia will experience difficulties when the rupiah exchange rate decreases (depreciation). This depreciation has resulted in an increase in the debt of industries that import. This means that imported raw materials are more expensive. Phenomenon and behavior of pharmaceutical manufacturers as an economic agent this must be attention for regulators in carrying out supervision. Effective supervision is supervision as well take into account the efficiency of use existing resources. regulations that prepared is expected to still be able to guarantee availability of drugs on the market for meet consumer needs in particular in health services. In the process preparation of regulations, public consultations carried out should involve all relevant stakeholders and consider behavioral aspects economy (Ernawati 2019).

The drastic price drop remains must be wary of because it has an impact on the availability of drugs and drug quality. The decrease in drug prices will impact on profit reduction for the pharmaceutical industry, which can resulting in reduced interest in producing drugs (Sood 2019). Several types pharmaceutical preparations do not get enough orders a lot, so the lack of buyers causes the price of generic drugs in the e-catalogue to increase. in Europe, drug voids are generally caused by price mismatches and barriers in

auction process (Dias 2012; Bogaert 2015). Drug policy changes including procurement system policies can affect drug prices. Without drug price policy will cause high and unaffordable prices either by individuals and governments (Ball 2011).

This study provides practical implications, including: 1) The government needs to control prices through price control regulations because companies are mainly on drugs with higher prices. The proposal to control drug prices must have strong political and public support. Thus, this regulation has a high chance of success. 2) Government should engage strategically with pharmaceutical industries to move them to a more positive attitude. 3) The government should avoid backtracking on the policy as this would represent a critical weakness for other stakeholders. It is important to strengthen continuous monitoring of changes in the price and structure of drug consumption related to policies, ensuring the accessibility and rationality of drugs for patients.

This study has several limitations, including: the research was conducted with using the observation period relatively short, namely in 2013, 2015, 2016, therefore that the number of samples use is still very limited. The study used 3 companies that were used as research subject.

Conclusion

Drug prices from before the UHC era (2013 and 2015) to after UHC (in 2018) ten to decrease. The difference in the price of e-catalogue drugs is in the form of price increases and decreases from 2013 to 2015 and 2018.

Conflict of interest

The authors declare there is not conflict of interest with the data contained in the manuscript.

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References

- Anggriani Y, Purwanggana A, Restinia M (2019) Clinical outcomes among type 2 diabetes mellitus patients: before and after universal health coverage in indonesia. *Asian Journal of Pharmaceutical and Clinical Research* 10(5): e156. <https://doi.org/10.22159/ajpcr.2017.v10i5.17136>
- Ariati N (2017) Tata Kelola Obat di Era Sistem Jaminan Kesehatan Nasional (UHC). *Jurnal Integritas* 3(1): 231–243. <https://doi.org/10.32697/integritas.v3i2.109>
- Atikeler EK, dan Ozcelikayz G (2016) Comparison of pharmaceutical pricing and reimbursement systems in Turkey and certain EU countries. *Springer Plus* 5: e1876. <https://doi.org/10.1186/s40064-016-3455-z>
- Ball D (2011) Pharmaceutical Pricing Policies and Intervention. Working Paper 3: The Regulation of Mark-up in the Pharmaceutical Supply Chain. WHO/HAI Project on Medicine Prices and Availability

- Working Paper 66. <http://www.haiweb.org/medicineprices/24072012/CompetitionFinalMay2011.pdf> [Accessed 3 April 2020]
- Bank Indonesia (2018) Kurs referensi jakarta interbank spot dollar rate (jisdor) usd – idr. <https://www.bi.go.id/id/moneter/informasi-kurs/referensi-jisdor/Default.aspx> [Diakses 1 Mei 2020]
- Bogaert P, Bochenek T, Prokop A, Pilc A (2015) A qualitative approach to a better understanding of the problems underlying drug shortages, as viewed from belgian, french and the european union's perspectives. *PLoS ONE* 10(5): e0125691. <https://doi.org/10.1371/journal.pone.0125691>
- Dias V (2012) MDS-3: Managing access to medicines and health technologies, management sciences for health.
- Dwijaji A, Sarnianto P, Thabrany H, Syarifudin M (2016) Evaluasi pengadaan obat publik pada uhc berdasarkan data e-catalogue tahun 2014–2015. *Jurnal Ekonomi Kesehatan Indonesia* 1(1): 39–53. <https://doi.org/10.7454/eki.v1i1.1933>
- Dylst P, dan Simoens S (2010) Generic medicine pricing policies in europe: current statues and impact. *Pharmaceuticals* 3: 471–481. <https://doi.org/10.3390/ph3030471>
- Ernawati D (2019) Dampak regulasi obat-obat tertentu terhadap respon industri farmasi di indonesia. *Jurnal Kebijakan Ekonomi* 15(1): 8.
- Kristina SA, Aditama H, Endarti D, Widayanti AW (2020) Evaluating accessibility of essential medicines in indonesia: a survey on availability and prices in public and private health sectors. *International Journal of Pharmaceutical Research* 12(2): 693–694. <https://doi.org/10.1016/j.vhri.2020.07.204>
- Kusmini S, Suryawati S (2016) Evaluasi pelaksanaan e-purchasing obat pada dinas kesehatan kabupaten/kota di jawa tengah tahun 2015. *Jurnal Manajemen dan Pelayanan Farmasi* 6(4): 277–287. <https://doi.org/10.22146/jmpf.357>
- Madura J (2006) *International corporate finance keuangan perusahaan internasional*, Salemba Empat, Jakarta.
- Manurung R (2016) Pengaruh inflasi, suku bunga, dan kurs terhadap indeks harga saham gabungan pada bursa efek Indonesia. *Jurnal Ekonomiy* 19(4): 148–156.
- Ministry of Health (2014) Peraturan menteri kesehatan republik indonesia nomor 63 tahun 2014 tentang pengadaan obat berdasarkan katalog elektronik (e-catalogue). Departemen Kesehatan Republik Indonesia, Jakarta.
- Moon S, Jambert E, Childs M, von Schoen-Angerer T (2011) A win-win solution?: A critical analysis of tiered pricing to improve access to medicines in developing countries. *Globalization and Health* 7: e39. <https://doi.org/10.1186/1744-8603-7-39>
- Muhaemin EA (2015) Drugs policy challenger in emerging markets indonesia, educational forum international society for pharmacoconomics and outcomes research (ISPOR), 18th, Milan, 9 November 2015.
- Oktaviani A, dan Baroroh F (2015) Studi pengelolaan obat sebelum dan sesudah UHC di Puskesmas Jetis Kota Yogyakarta. *Pharmaciana* 5(1): 85–91. <https://doi.org/10.12928/pharmaciana.v5i1.2290>
- Permata S, Anggriani Y, Lesilolo MS (2020) Analisis dampak kebijakan e-catalogue terhadap profil pengadaan obat di instalasi farmasi rsup fatmawati, pharmacy. *Jurnal Farmasi Indonesia (Pharmaceutical Journal of Indonesia)* 17(1): 1–12. <https://doi.org/10.30595/pharmacy.v17i1.4682>
- Puig-Junoy J (2010) Impact of european pharmaceutical price and regulation on generic price competition: a review. *Pharmacoconomics* 28(8): 649–663. <https://doi.org/10.2165/11535360-000000000-00000>
- Rock (2009) *Indonesia health sector review: policy note series, policy note pharm.*
- Sood N, Vries H De, Gutierrez I, Lakdawalla D, Goldman D (2009) The effect of regulation on pharmaceutical revenues: experience in nineteen countries. *Health Aff* 28(1): 1–24. <https://doi.org/10.7249/RP1381>
- Suliantoro H, Permatasari ES, dan Naniek UH (2016) Using e-catalog system to reduce cost in procurement of drugs. *Jurnal Teknik Industri* 11(2): 123–128. <https://doi.org/10.14710/jati.11.2.123-128>
- Suseno, Astiyah S (2009) *Bank Indonesia*, 37. Pusat Pendidikan dan Studi Kebanksentralan, Jakarta.
- Talluri A, Chung W, Narasimhan R (2006) An optimisation model for phased supplier integration into e-procurement systems. *IIE Transactions* 38: 389–399. <https://doi.org/10.1080/07408170500306554>
- Verghese NR, Barrenetxea J, Bhargava Y, Agrawal S, dan Finkelstein AF (2019) Government pharmaceutical pricing strategies in the Asia-Pacific region: an overview, *Journal of Market Access & Health Policy* 7: 1–9. <https://doi.org/10.1080/20016689.2019.1601060>
- Wasir R, Sylvi I, Makady A, Maarten P, Goettsch W, Buskens E, dan Feenstra T (2019) Use of medicine pricing and reimbursement policies for universal health coverage in Indonesia. *PLoS ONE* 14(2): e0212328. <https://doi.org/10.1371/journal.pone.0212328>