



Ministry of Health Malaysia
Pharmaceutical Services Programme

COST-BENEFIT ANALYSIS OF THE MEDICINES PRICE MECHANISM

A collaborative report by
Malaysia Productivity Corporation &
Pharmaceutical Services Programme,
Ministry of Health Malaysia
2020

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TABLE OF CONTENTS

EDITORIAL TEAM	5
PROJECT TEAM.....	6
TABLE OF CONTENTS	8
LIST OF FIGURES.....	9
LIST OF TABLES	10
LIST OF ABBREVIATIONS	11
EXECUTIVE SUMMARY	12
1. OVERVIEW OF MEDICINE PRICE MECHANISM.....	14
1.1 The Issue of Expensive Medicines Prices	14
2. OVERVIEW OF REGULATORY IMPACT ANALYSIS (RIA).....	19
2.1 CBA in the Context of Medicines Price Mechanism	21
3. REGRESSION ANALYSIS	32
4. LIMITATION	33
5. CONCLUSION	34
REFERENCES.....	35

LIST OF FIGURES

Figure 1: Framework of Medicines Price Mechanism	16
Figure 2: The list of identified stakeholders.....	23
Figure 3: Calculation of Net Present Value	28
Figure 4: Aggregated Net Present Value across three scenarios.....	29
Figure 5: Changes in Net Present Value across 114 single product registration holders medicines	30
Figure 6: Price elasticity for single product registration holders medicines	32
Figure 7: Predicted price range after implementing Medicines Price Mechanism	33

LIST OF TABLES

Table 1: List of single product registration holders medicines included in CBA	22
Table 2: List of quantifiable cost.....	24
Table 3: List of quantifiable benefits	25
Table 4: List of unquantifiable costs and benefits.....	26
Table 5: Calculation of present values	27
Table 6: Number of days' wages taken under status quo and Medicines Price Mechanism	31

LIST OF ABBREVIATIONS

APEC	Asia-Pacific Economic Cooperation
ATC	Anatomical Therapeutic Chemical
B40	Bottom 40%
CBA	Cost-Benefit Analysis
CPG	Consumer Price Guide
ERP	External Reference Pricing
GPTP	Good Pharmaceutical Trade Practice
MDTCA	Ministry of Domestic Trade and Consumer Affairs
M40	Middle 40%
MNMP	Malaysian National Medicines Policy
MOH	Ministry of Health
MPC	Malaysian Productivity Corporation
MPM	Medicines Price Mechanism
MyCC	Malaysian Competition Commission
MYR	Malaysian Ringgit
NA	Not Available
NPV	Net Present Value
OECD	Organisation For Economic Co-Operation And Development
OOP	Out-of-Pocket
PSP	Pharmaceutical Services Programme
PRH	Product Registration Holder
PV	Present Value
R&D	Research and Development
RIA	Regulatory Impact Analysis
RP	Retail Price
WHO	World Health Organization
WP	Wholesale Price

EXECUTIVE SUMMARY

Regulatory Impact Analysis (RIA) is a systematic process of identifying and assessing the likely impact of the proposed regulation using a consistent analytical method, such as benefit/cost analysis. The output of RIA is intended to inform policymakers on the efficiency and effectiveness of all the available options and determine the optimal design of the proposed regulation. In undertaking RIA, one of the analytical tools for identifying options is cost-benefit analysis (CBA). It is a method to evaluate proposed regulations compared to existing options according to their aggregated costs and benefits measured in monetary value over a predetermined time.

In preparing RIA for Medicines Price Mechanism (MPM), Pharmaceutical Services Programme (PSP), in collaboration with the Malaysian Productivity Corporation (MPC), has conducted a CBA for implementing MPM. The MPM is proposed as a government intervention against high medicines prices in Malaysia, especially in the private healthcare sector. The MPM is intended to regulate the prices of medicines by setting maximum wholesale and retail prices in the pharmaceutical supply chain. The mechanism is designed to ensure the medicines are sold at affordable and fair prices without compromising the growth of the private health care sector.

The CBA aims to measure the economic impact of implementing the MPM over 15 years on the affected stakeholders, namely the government, consumers, pharmaceutical industry, private healthcare service providers and insurance providers. The CBA methodology was adopted from the methodology illustrated by Boardman et al. (2018). The analysis includes a sample of 114 medicines registered by single product registration holders (PRH) in the Malaysian market. The results revealed that the implementation of MPM, with the value of legal protection, provides long-term cost savings to the government by lowering the Net Present Value (NPV) rate by 67.0% compared to the status quo (without MPM). The positive effect on the affordability of obtaining medicines was observed with a 22.0% reduction of the minimum daily wage required to cover the cost of medicines. The regression analysis also found that the mechanism is unlikely to cause wide variations in the prices of the medicines and drive the single PRHs to lose profits.

In conclusion, implementing the MPM provides long-term cost savings to the government. It also benefits people to obtain medicines at affordable prices while the pharmaceutical industries and private healthcare service providers remain competitive.

1. OVERVIEW OF MEDICINE PRICE MECHANISM

The Medicines Price Mechanism (MPM) is an initiative to achieve the Malaysian National Medicines Policy (MNMP) objectives of promoting the availability of quality, safe and effective medicines at an affordable cost. The MPM also aims to increase the transparency of medicines price information and ensure affordable medicines prices for the people.

1.1 The Issue of Expensive Medicines Prices

Malaysia has a dual healthcare system, divided into public and private sectors. The public health sector is financed through general taxation, while the private sector is funded through personal insurance, employer schemes or self-financing (out-of-pocket, OOP). In 2017, the country's total health expenditure was MYR 57.4 billion, with the private sector contributing 49.0%. Of that amount, 38.0% was contributed by OOP expenditure (Ministry of Health, 2019). Consumers will face financial catastrophe if the OOP exceeds 30.0% of household income (Chua & Cheah, 2012). In Malaysia, the high OOP exceeding 30.0% substantially resulted from high medicines prices in the private sector. High medicines prices increase the cost of living and affect consumers' access to health care services.

High medicines prices in Malaysia is attributed to price discrimination throughout the medicines supply chain, lack of price transparency and absence of government intervention in the pricing of medicines. Price discrimination by pharmaceutical companies in Malaysia has resulted in significant price differences for the same medicines between private healthcare premises (Hassali et al., 2015). According to the survey on medicines prices conducted by Pharmaceutical Services Programme, the median wholesale price in the private sector was two times higher than in the public sector. The same survey also reported that the median percentage mark-up of the retail price of originator medicines in private hospitals (51.0%, range 18.9% - 117.0%) was two times higher than the median percentage mark-up of the retail price of originator medicines in community pharmacies (22.4%, range 8.1% - 71.5%) (Pharmaceutical Services Division, 2018). This causes the retail price for the same medicines to differ between private hospitals and community pharmacies. The study by Hassali et al. (2012) showed that the average selling price at community pharmacies in Penang was between 30.30% to 148.28% higher than in Australia. This situation suggests that people in Malaysia pay more for medicines than in other countries. Currently, the government does not control any selling price for medicines in the Malaysian market. While the prices of medicines

in the public sector are indirectly controlled through government procurement guidelines, the pricing of medicines in the private sector depends entirely on market forces. Each distribution level is free to set its selling price.

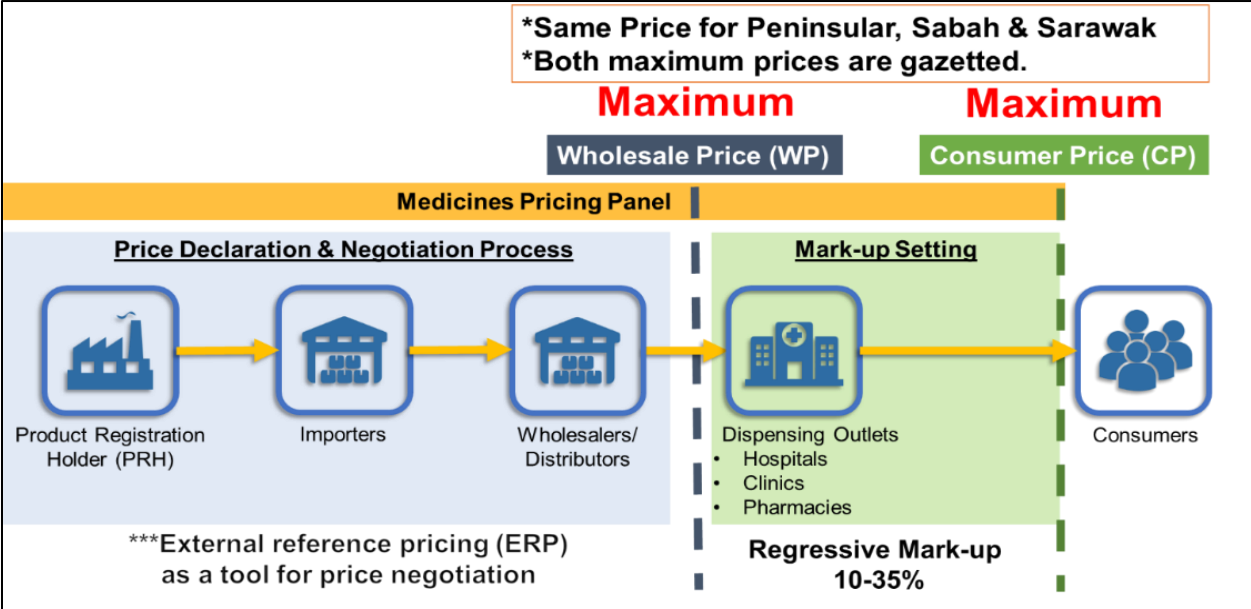
In 2006, the government approved MNMP to increase equity in accessing and using medicines rationally for public health (Pharmaceutical Services Division, 2012). Since then, multiple strategies have been adopted to achieve fair and affordable prices of medicines for Malaysians. In 2015, the Pharmaceutical Services Program (PSP) launched the Consumer Price Guide (CPG) on the PSP's official website, www.pharmacy.gov.my, to guide the public in purchasing medicines in the private sector. The price guide intended to provide information on the availability and suggested retail price of medicines, allowing the public to make informed choices before purchasing. The price details shared in the guide are based on voluntary price reporting by the single PRHs. However, there is a still lack commitment from single PRHs for voluntary price reporting. In 2020, for example, only 11.0% of the single PRHs had provided price information. Furthermore, the prices displayed only serve as a reference. Consequently, no legal action can be taken if there is a difference between the actual retail price and the CPG. Legal provisions are essential as the current administrative order for voluntary price reporting is unable to address such issues with the pricing of the medicine (Pharmaceutical Services Division, 2012, 2015a, 2015b).

Apart from the absence of legal provisions, other factors that influence the failure of the pharmaceutical market (market failure) in Malaysia are information asymmetry and the lack of healthy competition. Price undercutting, market monopolies, bonus offers, discounts, and unfair rebates result in wide price variations for the same medicines across different private healthcare facilities, establishing an unhealthy pharmaceutical market. Following that, the Ministry of Health (MOH) issued guidelines on "Good Pharmaceutical Trade Practice" (GPTP) in 2015, which aimed to streamline trade practices such as price offers, bonuses and discounts, as well as increase the transparency of medicines information (Pharmaceutical Services Division, 2015b). The GPTP is also supported by the Malaysian Competition Commission (MyCC) as it allows healthy price competition between market players. However, it is an administrative order that does not come with the legal authority to ensure the level of compliance with these guidelines.

These strategies have raised awareness of the need for transparency of medicines pricing information for the public. However, the issue of high cost still occurs and is a significant constraint to medicines access, primarily for innovator medicines that are influenced by the monopoly power of patent holders. Consumers still pay significantly different prices for the same medicine at different health premises (Wong et al., 2019). Therefore, this MPM is seen as a critical strategy in addressing the issue of expensive medicines. This will enable the consumers to access the same medicine at an affordable price at any private health facility.

In Malaysia, price control of goods is under the Ministry of Domestic Trade and Consumer Affairs (MDTCA) jurisdiction through legal provisions of Price Control and Anti-Profiteering Act 2011 (Act 723). On the other hand, Pharmaceutical Services Programme, MOH, regulates the management of registration, import approval, licensing and distribution of medicines. Therefore, MPM is proposed to be implemented as a strategic collaboration between MDTCA and MOH under Act 723. The following framework of MPM was designed based on a series of discussions by MOH with MDTCA, MyCC, consumers, pharmaceutical industries, and private healthcare providers (Figure 1).

Figure 1: Framework of Medicines Price Mechanism



The mechanism involves setting maximum prices at two levels of the pharmaceutical supply chain, namely wholesale and consumer prices. It will be an offense should any product subjected to the medicines price regulation is sold higher than the maximum price. The determination of maximum wholesale prices will consider the prices declared by the single PRHs, External Reference Pricing (ERP) and price negotiations. A regressive mark-up tier will be applied to the maximum wholesale price to determine the maximum consumer price. The maximum wholesale and consumer prices will be gazetted and available in the public domain for reference. The respective dispensing outlets will also be required to display their selling prices publicly. The wholesalers and retailers are still free to set prices up to the capped level. This pricing mechanism will allow competition to occur, and consumers may take advantage of the best prices in the market. Notably, the mechanism promotes transparency in medicines prices. It also provides informed choices to consumers in obtaining medicines at the best prices. Consumers may file complaints if medicines are being sold at higher than the gazetted maximum prices and legal actions can be taken against the offender if proven guilty. Such a mechanism provides a legal provision to protect the consumers' rights.

The implementation of MPM is not a new strategy, and it has been practised in many countries such as the European Union, India, South Korea, Australia, South Africa and Canada as recommended by the World Health Organization (WHO) (Kanavos et al., 2017; World Health Organization, 2015). Impact studies have found that medicines prices can be reduced, and sustainable health spending can be maintained (Abdel Rida et al., 2017). On the other hand, some studies showed that medicines price controls can potentially slow the entry of new medicines into the market, especially in low-income countries (Maini & Pammolli, 2017). There are also reports stating that such price controls can reduce allocations for research and development, which in turn impedes innovations (Kanavos, Gross, & Taylor, 2005). However, a study by Light (2009) explained that European countries with control over medicines prices are still leading the effort of new medicines innovation compared to the United States, which adopts a free market for medicines. Thus, the evidence that medicines price control impeding innovation remains debatable and subject to other policies that directly affect the intentions and funding that drives new medicines innovation.

The current design of MPM has considered the need for access to innovative medicines and the importance of pharmaceutical industry growth. These aspects will be continuously monitored throughout the implementation of the MPM. The industry will also benefit from this initiative through the transparency of pricing information, enabling more efficient investment and business planning. In the consumers' interest, MPM needs to be implemented because it can standardise the price of medicines at reasonable rates across all the private healthcare facilities, thereby increasing access to medicines throughout the country.

2. OVERVIEW OF REGULATORY IMPACT ANALYSIS (RIA)

Regulatory Impact Analysis (RIA) is one of the essential tools adopted by the Organisation for Economic Co-operation and Development (OECD) countries and is increasingly applied by Asia-Pacific Economic Cooperation (APEC) countries to review existing and new legislation and regulations. The RIA ensures good governance of the quality and efficiency of regulations that can save hundreds of millions of public and private funding. Furthermore, it helps eradicate corruption through greater transparency while ensuring that policymakers make a well-informed decision in passing the regulation.

There are seven elements of RIA:

- 1) Defining policy problem
- 2) Identifying the policy objective
- 3) Identify option
- 4) Conducting an impact analysis
- 5) Public consultation
- 6) Conclusion and recommendation
- 7) Implementation strategy

PSP has conducted RIA following the seven elements listed above in the policy proposal to implement MPM. There were three options explored to overcome the problem of expensive medicines prices in Malaysia as follows:

Option 1: Existing status (Status Quo)

The status quo is the current situation based on the implementation of CPG and the GPTP which aims to increase the transparency of medicines price information to guide the public and reduce the price gap between private healthcare facilities. CPG is a price guide published in National Pharmacy Portal based on the price information declared voluntarily by the single PRHs, while GPTP is a guideline on trading practices in the pharmaceutical supply chain to ensure transparency and allow medicines to be sold at an affordable price for consumers.

Option 2: Non-Regulatory Option

Improvements to Option 1 with the expansion of the sharing of retail/consumer price information and the voluntary display of the sale price of medicines to the public by health service providers.

Option 3 (Regulatory Option): MPM under the Price Control and Anti-Profiteering Act 2011

This regulatory option involves the implementation of MPM by using legal provisions under the Act 723 which is supervised by the MDTCA. The strategy to be used is maximum pricing at the level of wholesalers and health service providers through international price comparisons and price negotiations at the wholesale level, and control of price mark-up by using several tiers (regressive mark-up) at the healthcare service providers level. Under Act 723, healthcare service providers must display the selling price of all price-controlled medicines to the public.

Through multiple engagements with stakeholders, literature review and multiple criteria decision analysis, it was noted that regulatory option implementing MPM offers optimal positive impacts on all the stakeholders. Nevertheless, stakeholders especially pharmaceutical industries and private healthcare associations recommended PSP conduct CBA as an additional feature of RIA.

CBA is a method of assessing policies or regulations that quantifies the value of all consequences to all members of society in monetary terms. The CBA helps social decision-making and improves allocative efficiency, ensuring that the cost spent is worth its benefits or gains more.

2.1 CBA in the Context of Medicines Price Mechanism

The objective of CBA in this context is to project the economic impact of the MPM in the short, medium and long run in monetary value and to compare the impact with status quo. The CBA analysis was conducted based on the following steps adopted from standard international practice (Boardman et al. 2018):

- 1) Define the objectives and project scope (stakeholders)
- 2) Identify the project options
- 3) Identify all quantified costs and benefits
- 4) Identify all unquantified costs and benefits
- 5) Estimate the monetary value of each cost and benefit
- 6) Discount them to obtain the present value (PV) of costs and benefits
- 7) Compare the PV of total costs versus PV of total benefits (Net Present Value, NPV)
- 8) Undertake sensitivity tests
- 9) Identify preferred action taking unquantified costs and benefits into account
- 10) Prepare a report

The study is complemented with two sets of regression analyses: panel data regression and quantile regression. The panel data regression aims to identify the price elasticity of demand for medicine, while the quantile regression predicts the corresponding quantity under the new price mechanism.

Step 1: Define the objectives and project scope for CBA.

The primary objective of the CBA in the context of MPM is to prove that the MPM will improve status quo. Thus, the analysis is focused on calculating the cost and benefits of status quo and MPM in monetary value and then compares the net value between those two options. There are two ways CBA analysis can be conducted either micro-level or macro-level analysis. The micro-level analysis measures the cost and benefits based on the price of medicines that is subject to MPM. The macro-level analysis measures the cost and benefits based on the price of all medicines registered in Malaysia, overall healthcare-related costs and health outcomes. The current CBA was conducted based on micro-level analysis due to data availability and easier to project the price of medicines post-implementation of MPM. The findings of micro-level analysis can be used then to infer the impact at macro-level. The scope of analysis was 114 medicines sampled from 1300 medicines subject to MPM. These were sampled from 1300

single PRHs medicines that matched with availability of price declared voluntarily by single PRHs and availability of private healthcare provider's price. Table 1 below shows the list of medicines that have been included in this study.

Table 1: List of single product registration holders medicines included in CBA

No	ATC Level 1	Number of Products
1	Antineoplastic And Immunomodulating Agents	35
2	Nervous System	18
3	Sensory Organs	16
4	Respiratory System	8
5	Blood And Blood Forming Organs	8
6	Alimentary Tract And Metabolism	8
7	Musculo-Skeletal System	6
8	Cardiovascular System	5
9	Antiinfectives For Systemic Use	4
10	Various	2
11	Genito Urinary System And Sex Hormones	2
12	Systemic Hormonal Preparations, Excl. Sex Hormones And Insulins	1
13	Antiparasitic Products, Insecticides And Repellents	1
Grand Total		114

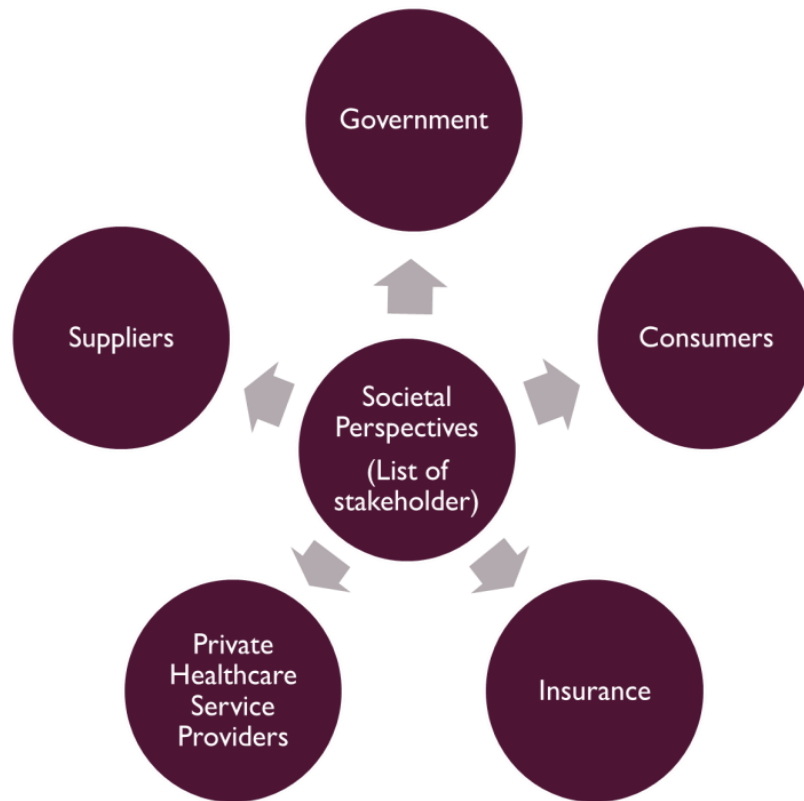
ATC = Anatomical Therapeutic Chemical (ATC) Classification System

Then, stakeholders were identified to narrow the list of costs and benefits of status quo and MPM that will affect these stakeholders. There were five stakeholders identified in this study (Figure 2):

- Government
- Consumers
- Suppliers
- Insurance companies
- Private healthcare service providers

Other stakeholders such as health tourists are omitted as they have less standing in our analysis.

Figure 2: The list of identified stakeholders



Step 2: Identify the project options.

Two options were chosen: 1) Status Quo and 2) MPM. The status quo reflects the current situation where medicines prices are not regulated and depend on market forces, and MPM is a regulatory option in which medicines prices are regulated following the mechanism in Figure 1.

Step 3: Identify all quantified costs and benefits.

As shown in Table 2 and 3, the following were the identified quantifiable costs and benefits of each stakeholder under those two different options. The list was prepared based on the literature review and engagements with stakeholders upon preparing RIA.

Table 2: List of quantifiable cost

No.	Perspective	Description of Costs	
		Status Quo	Medicines Price Mechanism
1	Government	<ul style="list-style-type: none"> WP recommended by single PRHs 	<ul style="list-style-type: none"> Proposed WP estimated from benchmark ERP Cost of enforcement – estimated by additional working hours for pharmacy enforcement officers Cost of developing a database to manage price data- based on historical cost Cost of gazettelement Cost of training and awareness campaign
2	Consumers	<ul style="list-style-type: none"> RP recommended by single PRHs Daily wages spent on medicine per pack per year 	<ul style="list-style-type: none"> Proposed RP recommended by single PRHs Daily wages spent on medicine per pack per year
3	Insurance Providers	<ul style="list-style-type: none"> RP recommended by single PRHs 	<ul style="list-style-type: none"> RP is estimated by applying the proposed mark-up on the benchmark ERP price
4	Suppliers	<ul style="list-style-type: none"> Cost of product registration 	<ul style="list-style-type: none"> Cost of product registration The administrative cost for price revision and changing marketing strategies
5	Private Healthcare Providers	Not applicable	<ul style="list-style-type: none"> The administrative cost for price revision and changing marketing strategies

ERP = External Reference Pricing; PRH = Product Registration Holder; RP = Retail Price; WP = Wholesale price

Table 3: List of quantifiable benefits

No.	Perspective	Description of Benefits	
		Status Quo	Medicines Price Mechanism
1	Government	Not applicable	<ul style="list-style-type: none"> • Cost savings in WP
2	Consumers	Not applicable	<ul style="list-style-type: none"> • Cost savings in RP • Cost savings in daily wages spent on medicine per year • Cost savings through price transparency • Cost savings through minimising price variation • Legal protection
3	Insurance Providers	Not applicable	<ul style="list-style-type: none"> • Cost savings in retail price
4	Suppliers	<ul style="list-style-type: none"> • Revenue earned based on WP recommended by single PRHs 	<ul style="list-style-type: none"> • Revenue earned based on WP benchmarking through ERP
5	Private Healthcare Providers	<ul style="list-style-type: none"> • Revenue earned based on RP recommended by single PRHs 	<ul style="list-style-type: none"> • Revenue earned based on RP after applying the proposed mark-up on the WP benchmarked with ERP

ERP = External Reference Pricing; PRH = Product Registration Holder; RP = Retail Price; WP = Wholesale price

Step 4: Identify all unquantified costs and benefits.

In CBA, it is essential that the intangible and unquantifiable items are still being listed, so the decision-makers are well aware of the limitation of this model. Some of the mentioned unquantifiable items are listed in Table 4, and these items can be included in the existing data upon availability.

Table 4: List of unquantifiable costs and benefits

Perspective	Costs		Benefits		Remark
	Status Quo	Medicines Price Mechanism	Status Quo	Medicines Price Mechanism	
Government Consumers	<ul style="list-style-type: none"> • Cost of access to high priced medicines • The burden of the government to support free medicine supply to B40 & M40 	<ul style="list-style-type: none"> • Added cost on service and other medicines 	Not applicable	<ul style="list-style-type: none"> • Increase societal welfare by narrowing the distribution (shared prosperity) • Sustainability 	Intangible costs & limitations in projecting market response to mechanism
Insurance Providers	<ul style="list-style-type: none"> • Cost of reimbursing high priced medicines 	<ul style="list-style-type: none"> • Added cost on service and other medicines 	Not applicable	<ul style="list-style-type: none"> • Cost savings through maximum limit in reimbursing for medicines 	Not applicable
Suppliers & Healthcare Providers	Not applicable	<ul style="list-style-type: none"> • Delay the launching of new medicines • Less foreign investment • Clinical trials • Job employment • Gross National Income • Medical Tourism 	<ul style="list-style-type: none"> • Early launching of new medicines • A free, unregulated market attracts foreign investment 	<ul style="list-style-type: none"> • Preparing the healthcare industry for national healthcare reform 	Limitations in placing the available monetary value of these components in the existing framework

B40 = Bottom 40%; M40 = Middle 40%;

Step 5: Estimate the monetary values of each cost and benefit.

Here, we estimated the monetary values of the quantifiable costs and benefits based on data derived from multiple sources including directly retrieved from the relevant stakeholders, manually calculated based on a standard formula and price databases.

Step 6: Discounting to get the present value of benefits and present value of costs.

The critical calculation component in CBA is discounting. Discounting represents the conversion of value received in a future period to equivalent value received in the present. The objective of discounting is because of the time value of money. For example, MYR 1.00 today in 2019 is not the same value as MYR 1.00 in 2025. In 2019, a bottle of mineral water can be bought for MYR 1.00, but in 2025, MYR 1.50 will be needed for a bottle of mineral water. As the time value of money is affected by inflation, we need to discount the future monetary value to find the equivalent amount in the present. In the present analysis, the discount rate used was 3.0%, estimated based on average lending rate in Malaysia in 2020 (Central Bank of Malaysia, 2020).

For example, based on Table 5, the project returned MYR 1000 in 2020. At a 3.0% discount rate, what is the equivalent value today (or better known as the Present Value of MYR 1000)? What is the present value of MYR 1000 in 2021? What is the present value of MYR 1000 in 2024?

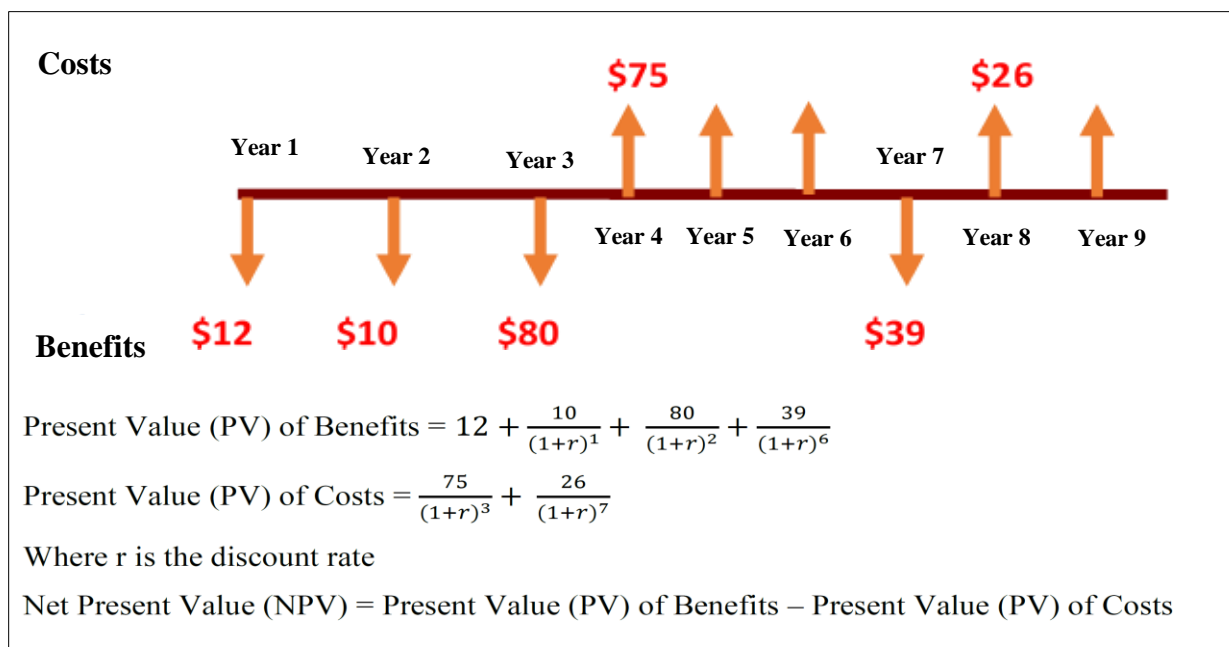
Table 5: Calculation of present values

Year	2020	2021	2022	2023	2024
*r		3%	3%	3%	3%
Formula		$\frac{\text{MYR 1000}}{(1+r)^1}$	$\frac{\text{MYR 1000}}{(1+r)^2}$	$\frac{\text{MYR 1000}}{(1+r)^3}$	$\frac{\text{MYR 1000}}{(1+r)^4}$
Present Value (MYR)	1000	970.87	942.60	915.14	888.49

**r = discount rate; MYR = Malaysian Ringgit*

Once we have established how to discount the monetary value, the summation will give us the present value. For example, the following timeline shows the monetary value of the benefits and costs from Year 1 to Year 9 (Figure 3).

Figure 3: Calculation of Net Present Value



Step 7: Compare the NPV of each option.

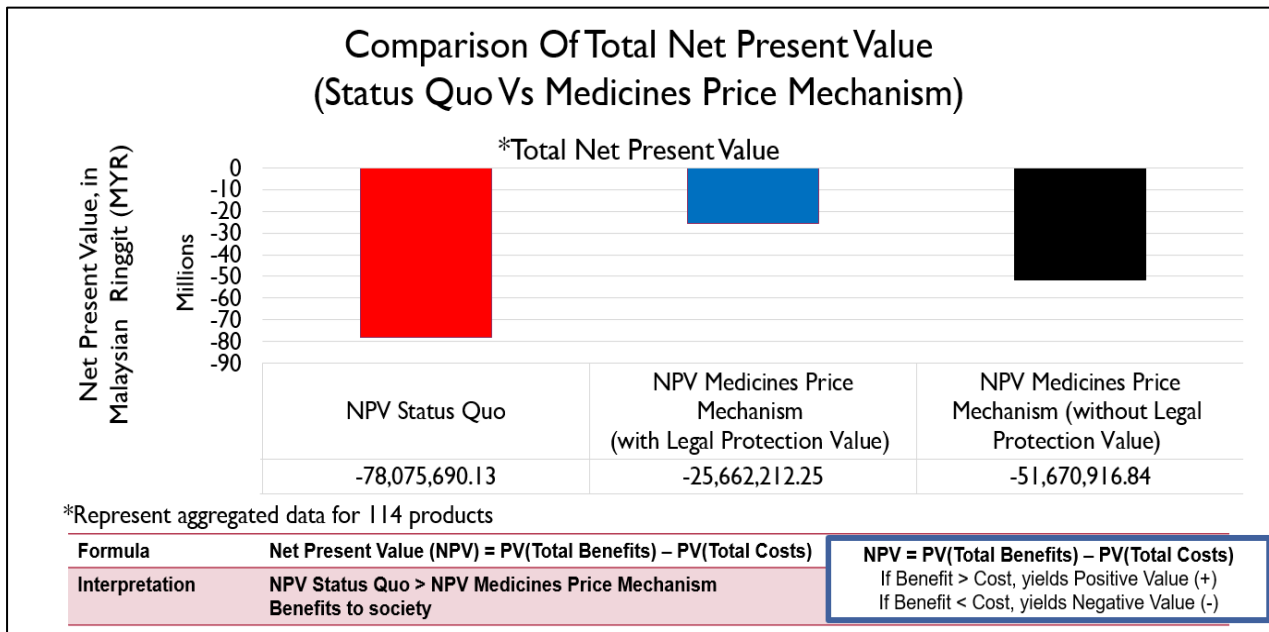
Net Present Value (NPV) is defined as the difference between the present value of the benefits and the present value of the costs. If the NPV of a single prospective option is positive that option should be accepted (NPV > 0). However, if the NPV of a single prospective option is negative, that option should be rejected because the costs are more than the benefits (PV < 0). If the NPV of a prospective option is zero, it should probably be rejected as it generates precisely the expected return (NPV=0).

The option with the highest NPV will be chosen if there is an array of options to be considered. In the current analysis, we weighed the status quo option of no price mechanism versus an alternative option, which is the imposition of the MPM. The MPM option was further scrutinised by considering the value of legal protection. The legal protection value represents the penalty on private healthcare providers or pharmacies that fail to adhere to the MPM. Regardless of the

medicine price, the value of legal protection is fixed at MYR 15,000. For example, if the medicine price is gazetted MYR 100.00 under the MPM and the consumers are charged MYR 120.00, the sellers will face an MYR 15,000 penalty. Thus, the consumers are protected from being charged excessive prices, which translates into benefits for the consumers under the MPM.

In Figure 4, the aggregated NPV across 114 medicines in our CBA was -MYR 78,075,690. Under the alternative scenario where legal protection value is included was -MYR 25,662,212 and without legal protection value, the NPV is -MYR 51,670,916. The NPVs were negatives, indicating that society's costs still outweigh its benefits.

Figure 4: Aggregated Net Present Value across three scenarios



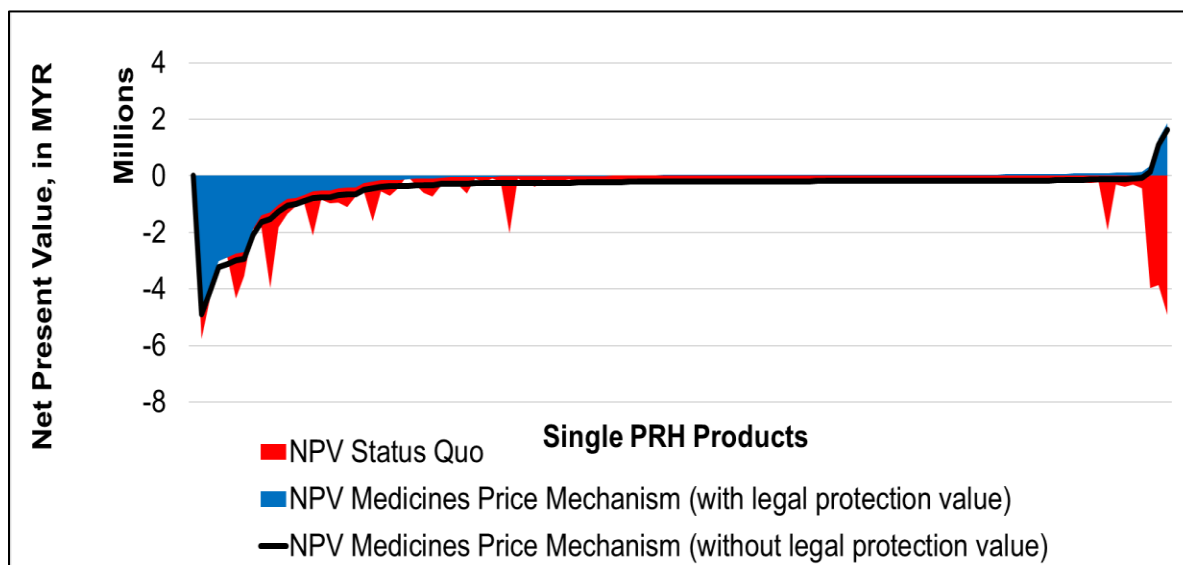
NPV = Net Present Value; PV = Present Value

The costs under the status quo, including the foregone salary resulting from buying the medicines at their current price, are solely borne by the government and consumers, while the benefits are solely the revenues earned by suppliers and providers. Under the current price mechanism, the costs are significantly higher than the benefits and in the long run, this gap will have negative implications for society. Therefore, it is unsustainable, and an intervention is needed.

By implementing MPM, with or without legal protection value, the NPV has markedly decreased while still being negative. This indicated an improvement in the distributional gap between those who bear the costs and those who reap the benefits.

Figure 5 shows how the NPV can change from negative to positive as we included more medicines in our analysis. However, the status quo still shows the most negative NPV compared to the two alternative scenarios.

Figure 5: Changes in Net Present Value across 114 single product registration holders medicines



MYR = Malaysian Ringgit; NPV = Net Present Value; PRH = Product Registration Holder

The analysis also measured the medicine affordability, adapted from the methodology recommended by World Health Organization & Health Action International (2008). In general, affordability can be calculated by the number of days' wages required to purchase selected courses of treatment for common acute and chronic conditions (World Health Organization & Health Action International, 2008). Treatment costs are generally considered affordable when patients only spend one days' wage or less (for a full course of treatment for an acute condition or a 30-day supply of medicines for chronic diseases) (World Health Organization & Health Action International, 2008). In the current analysis, medicine affordability was estimated by considering the number of working days (days' wages) of the minimum-paid private employee that enable him/her to purchase per pack of selected medicines. The minimum wage of private employees was MYR 1200 in 2020 based on Minimum Wages Order 2020, which translates to the daily wage of MYR 40.00 per day (assuming 30 working days). It was found that an employee with a minimum wage of MYR 1200 will take 85,638 days to purchase all the 114 medicines in the status quo. With the implementation of MPM, it would have taken about 66,994 days of his salary to purchase the same amount of medicines (Table 6). This shows a significant saving in his salary days under the MPM.

Table 6: Number of days' wages taken under status quo and Medicines Price Mechanism

Number of single PRHs medicines	Number of days' wages per year* required to procure per pack of listed single PRHs medicines		Percentage of reduction in the number of days' wages per year
	Status Quo	MPM	
114			22.0%
	85,638.27	66,994.23	

<p>*Number of days' wages per year = $\frac{\text{Total cost of medicines per month} \times 12 \text{ months}}{\text{(MYR 40)}}$</p> <p>#Minimum wage per month (MYR 1200) / 30 days</p>

MPM = Medicines Price Mechanism; MYR = Malaysian Ringgit; PRH = Product Registration Holder

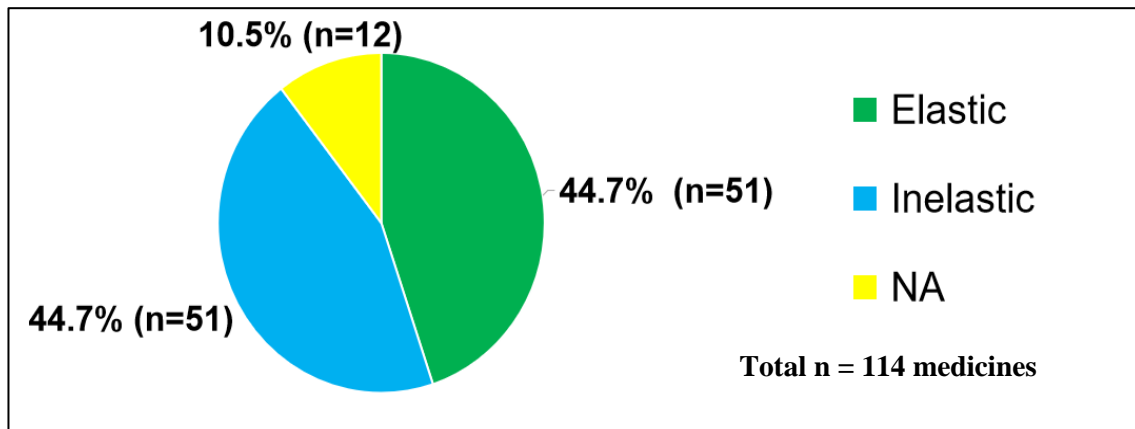
Step 8: A sensitivity analysis.

A sensitivity analysis was conducted by varying the interest rates and different prices of medicines under the MPM. The NPV was still negative but showed a significant improvement under the alternative compared to the status quo.

3. REGRESSION ANALYSIS

The analysis included panel data regression to identify price elasticity among the single PRHs medicines. Price elasticity indicates the responsiveness of quantity demanded or supplied due to price changes. The regression analysis found that the price of 44.7% of medicines was elastic, that there are substantial changes in the quantity of medicines sold whenever there is a change in the price (Figure 6). Another 44.7% of medicines were inelastic, and the quantity sold does not change with the price of medicines. The elasticity of the remaining medicines was incalculable due to limited price-quantity data. Some medicines could be possibly elastic due to the availability of equivalent options in the market, while inelastic medicines are usually the only options available, or the usage is limited to a specific population. Thus, MPM is expected to have mixed effects on the sales of medicines depending on the nature of price elasticity of the respective medicines. The pharmaceutical industries and private healthcare providers will remain at liberty to employ efficient business strategies to keep the price of medicines competitive and gain appropriate profits.

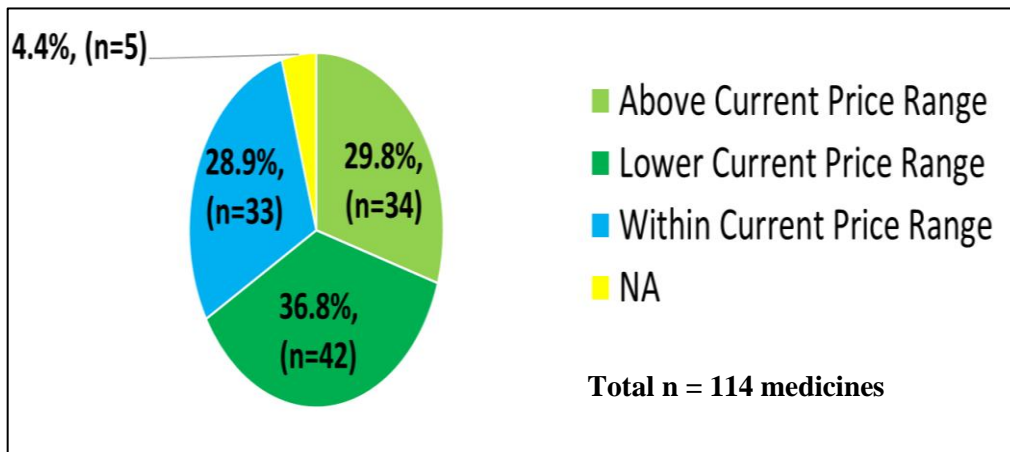
Figure 6: Price elasticity for single product registration holders medicines



NA = Not Available

The quantile regression was run to forecast the price after implementing MPM. It was found that 29.8% of the medicines are expected to rise above the current price range, while 28.9% of medicines will have a price reduction (Figure 7). Around 36.8% of medicines price will remain within the current price range. Thus, it is unlikely that the MPM will cause an immense shift in the pricing of medicines, causing loss to product manufacturers or private healthcare providers selling those medicines.

Figure 7: Predicted price range after implementing Medicines Price Mechanism



NA = NOT AVAILABLE

4. LIMITATION

The analysis was based on hypothetical new prices derived from applying ERP principles and regressive mark-up implied in the MPM framework. However, determining a new regulated price is complex in real-life settings and may require negotiations with the single PRHs. The prices of medicines are subject to multiple factors, including the entry of new medicines for the same therapeutic group and the availability of raw materials, which will usually be considered in price negotiations. Thus, the actual quantum of price reduction may vary accordingly.

5. CONCLUSION

The CBA study on MPM shows an improved NPV under the MPM (with and without legal protection values) compared to the status quo. The decrease in negative values indicates a narrowing of the distributional gap between the stakeholders bearing the costs versus the stakeholders bearing the benefits. Furthermore, the number of salary days forgone by an employee to purchase medicines earning a minimum wage of MYR 1200 is reduced under the MPM compared to the status quo. The MPM is unlikely to cause substantial changes in the elasticity of medicines as the usage of medicines depends on prescriber preferences and the availability of other treatment options. The regression analysis implies that the single PRHs and private health care providers would be able to equalise their profit sufficiently through the MPM.

However, we have to admit that many unquantifiable costs and benefits were not included due to a lack of data. A more comprehensive and insightful CBA can be conducted once the stakeholders have provided relevant data.

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