







# Value of pharmacy services for common illness symptoms covered by universal coverage at drugstore compared to outpatient services at a hospital in Thailand

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## ABSTRACT

**Background:** Drug stores is an option that people can receive health care services for their common illnesses. This is the first study aims to estimate cost savings for 16 common illness symptoms to the Thailand's health system.

**Method:** This study gathered retrospective secondary data from several studies and surveyed the median cost of medicines. Cost savings of care provided by pharmacists at drug stores in comparison to out-patient department (OPD) services at hospitals were quantified using cost of illness approach.


**Results:** The average number of hospital visits for treatment for 16 common illness symptoms was 2,356 visits per month. The estimation of the cost savings per visit from three perspectives, including government, patient, and societal, at tertiary care hospitals were 12.7–19.4, 12.7–25.6, and 18.9–25.6 USD, and at secondary care hospitals were 6.0–12.7, 6.0–18.9, and 12.2–18.9 USD. Every \$1 reimbursed at drug stores will save additional costs in Thailand's health system, ranging from \$0.04 to \$0.24 and \$0.02 to \$0.16 at tertiary care hospitals and secondary hospitals, respectively.

**Conclusion:** Pharmacy services for 16 common illness symptoms can clearly save costs.

**KEYWORDS** Common illness; cost; drug store; OTC; pharmacy

## Introduction

Common illnesses are those less severe and less complicated conditions such as common cold, muscle pain, diarrhoea, constipation, and rash. They affect

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people in most of their daily lives. Receiving services at drug stores is an option for people to take care of themselves initially. Those with common illness may not need to see a doctor at the hospital to get prescription medicines or undergo special diagnostic tests (Value of OTC Medicines to the U.S. Healthcare System, 2019). In the past, dispensing services in private pharmacies in Thailand were not covered by any of the three public health insurance schemes. As a result, patients choose to travel to receive care and get insurance coverage in hospitals' outpatient departments or pay out of pocket at private clinics or pharmacies. Community pharmacists are responsible for dispensing medications for most drugs, including antibiotics. Prescriptions are needed for medicines in the Thai Food and Drug Administration (FDA's) control substance list. Self-medication is common practice in Thailand, and therefore, in most cases, community pharmacists are the first-line health care providers for people with minor ailments or medical consultation. From October 2022, the National Health Security Office (NHSO) started to include pharmacy services for 16 common conditions in the health benefit. Community pharmacists dispense medicines under an essential drug list and receive 180 Baht (approx. \$5) reimbursement per case (National Health Security Office, 2022). The pharmacist needs to register to this project and take 1-day training for drug use and reimbursement programme. People those received pharmacy service will be called to follow-up the symptom at 72 h. If the symptom is not getting better, the pharmacist will advice to refer to the hospital. This strategy is to help patients get health care near their places. Also, it aims to ease the high workload on hospital staff to be able to look after more severe patients.

In addition to relieving GP's workload, medicines received at pharmacies could also contribute to cost savings to the health system. First, costs can be saved due to avoidance of unnecessary clinical visits (Parekh et al., 2020). NHS Scotland reported 400,000 GP visits, and a total budget of £8.4 m per year would be reduced if pharmacists are allowed to prescribe antibiotics within their clinical competency (Mahase, 2022). Second, patients do not have to leave work to see doctors and can save travel and wait time (Khampang et al., 2021). A study of the value of Over-the-counter (OTC) medicine in the U.S. field reported the availability of OTC medicines provides \$146 billion in cost savings to the U.S. healthcare system annually (Value of OTC Medicines to the U.S. Healthcare System, 2019). Each dollar spent on OTC medicines saves more than \$7 for the U.S. healthcare system. OTC medicines provide additional value through expanded access to over 27 million consumers (\$5 billion in potential savings) and productivity savings (\$34 billion).

To our knowledge, this is the first study in Thailand aims to quantity cost savings of care provided by pharmacists at drug stores for 16 symptoms covered by the NHSO in conjunction with the quality assurance and training by the Pharmacy Council in the new Common Illness project at drug stores

(16 common illness symptoms) (National Health Security Office, 2022) in comparison to care provided by outpatient services at hospitals.

## Methods

### *Study design and scope*

This research is retrospective secondary research to estimate cost savings of receiving health care services for 16 common illness symptoms at drug stores compared to outpatient services at hospital. The data from relevant studies were gathered according to cost of illness (COI) approach.

This research did not estimate the total cost and the unit cost of health care services using standard costing analysis. In addition, the cost of referral is not included in the cost analysis of this research due to the limitations of secondary data that this research relies on for data analysis.

### Population and sample

The population of interest in this research is patients with 16 common illness symptoms covered by the NHSO in conjunction with the quality assurance and training by the Pharmacy Council in the new Common Illness project at drug stores (National Health Security Office, 2022) listed in [Table 1](#). The sample in this research was recruited from relevant studies. For health care services utilisation analysis, the patients who were receiving health care services for their common illness symptoms in eight hospitals, sampling based on regional and random sampling based on capacity level and size (Phodha et al., 2023) as shown in [Table 2](#), during 1 January 2018 and 30 September 2021 were included in this study regardless to age. For COI analysis, direct medical costs (DMCs) were gathered from four pharmacy stores in four provinces by purposive sampling. The median cost of medicines used for 16 common illness symptoms was reported in [Table 3](#). The average drug cost per visit for receiving pharmacy service for 16 common illness symptoms at a drug store ranged from 1.01 to 7.72 USD for selecting generic drugs with a low-cost range and the selection of originator drugs with a high drug cost range, respectively. Direct non-medical costs (DNMCs) were gathered from five pharmacy stores by random sampling from those contracted with the five studied hospitals in the cost study of the pilot programme on drug-dispensing services in pharmacies to reduce hospital overcrowding (Phodha et al. (2020).

### Data analysis

This research estimated the cost savings (Value of OTC Medicines to the U.S. Healthcare System, 2019) of 16 common illness symptoms (National Health

**Table 1.** Common illnesses that cover 16 symptoms as announced by the National Health Security Office (NHSO) in conjunction with the Pharmacy Council in the new Common Illness pharmacy project at drug stores (Khampang et al. (2021).

Chief-complain	Symptoms/diseases	ICD-10	
1. Headache	1. Migraine	G43	
	2. Migrain without aura	G430	
	3. Migrain with aura	G431	
	4. Other headache syndromes	G44	
	5. Tension-type headache	G442	
	6. Cluster headache syndrome	G440	
2. Dizziness	7. Dizziness and giddiness	R42	
3. Pain in joint	8. Primary generalised (osteo) arthrosis	M150	
4. Muscle pain	9. Pain in joint	M255	
	10. Low back pain	M545	
	11. Muscle strain	M626	
	12. Myalgia	M791	
5. Fever	13. Acute nasopharyngitis [common cold]	J00	
6. Cough	14. Acute sinusitis	J01	
7. Sore throat	15. Acute pharyngitis	J02	
	16. Acute tonsillitis	J03	
	17. Acute bronchitis	J20	
	18. Allergic rhinitis, unspecified	J304	
	19. Acute upper respiratory infection, unspecified	J069	
	20. Fever, unspecified	R509	
	8. Stomachache	21. Gastro-oesophageal reflux disease	K21
		22. Peptic ulcer, site unspecified	K27
23. Dyspepsia		K30	
24. Other disease of stomach and duodenem		K31	
9. Diarrhoea	25. Bacterial food-borne intoxication, unspecified	A059	
	26. Viral intestinal infection, unspecified	A084	
	27. Diarrhoea and gastroenteritis of presumed infection origin	A09	
10. Constipation	28. Constipation	K590	
	29. Haemorrhoid, unspecified	K649	
11. Dysuria	30. Acute cystitis	N300	
12. Vaginal discharge	31. Candidiasis of vulva and vagina	B373	
	32. Acute vaginitis	N760	
	33. Vaginitis, vulvitis and vulvovaginitis in infectious and parasitic disease	N771	
	13. Skin rash/lesion	34. Herpesviral (herpes simplex) infections	B00
		35. Dermatophytosis	B35
36. Pityriasis vesicolor		B360	
37. Atopic dermatitis		L20	
38. Seborrhoeic dermatitis		L21	
39. Allergic contact dermatitis		L23	
40. Irritant contact dermatitis		L24	
41. Psoriasis		L40	
42. Pityriasis rosea		L42	
43. Urticaria		L50	
44. Rash and other nonspecific skin eruption		R21	
14. Wound	45. Open wound of unspecified body region	T141	
	46. Burn of first degree, body region unspecified	T301	
	47. Other and unspecified superficial injuries of throat	S101	
15. Eye disorder	48. Hordeolum and chalazion	H00	
	48. Inflammation of eyelid	H01	
	50. Conjunctivitis	H10	
16. Ear disorder	51. Otitis externa	H60	
	52. Otitis media, unspecified	H669	
	53. Tinnitus	H931	

**Table 2.** Studied hospitals located across Thailand.

Region <sup>a</sup>	Province	Capacity level <sup>b</sup>	Hospital	Average OP visits per month
S	Song Khla	Central Hospital (A)	Hat Yai Hospital	66,839
N/E	Udon Thani	Central Hospital (A)	Udon Thani Hospital	84,428
E	Ranong	General Hospital (S)	Ranong Hospital	37,890
N	Nan	General Hospital (S)	Nan Hospital	39,890
C	Ayutthaya	General Hospital (M1)	Se-na Hospital	5,856
E	Rayong	General Hospital (M1)	Kleang Hospital	20,839
S	Prachuab Khiri khan	Community Hospital (M2)	Bangsaphan Hospital	15,398
C	Uthai Thani	Community Hospital (F2)	Tabtan Hospital	58,225

<sup>a</sup>N = Northern, N/E = North/Eastern, E = East, S = Southern, C = Central.

<sup>b</sup>A = advance-level, S = standard-level, M = middle-level, F = first-level.

Security Office, 2022) to the Thailand's health system from 3 perspectives: government, patient, and societal perspectives. COI for providing health care services to patients with 16 common illness symptoms was estimated following the guideline of methods for the economic evaluation of health care programmes (Drummond et al., 2015; Riewpaiboon et al., 2021). The first component of COI is DMCs, including pharmacy or hospital services and drug costs per visit. The second component is DNMCs, including travel costs and meal costs. The last component of COI is indirect costs (IDCs), including time cost (time spent travelling and waiting) for receiving health care services. Table 4 summarises cost components by perspectives. Costs, which were retrieved from the previous studies, were converted to monetary value in 2023 by multiplying with the consumer price index (Bureau of Trade and Economic Indices, 2023). All costs of this research were reported in the USD using the exchange rate in August 2023 announced by the Bank of Thailand, 1 USD = 35.2571 THB (Bank of Thailand, 2023).

### Assumptions for cost analysis

1. For the patients in this study, it was the case that the health care services for 16 common illness symptoms at the drugstore were as effective as the outpatient treatment service at the hospital.
2. Patients with 16 common illness symptoms could travel to get service at the drug store or the hospital by themselves without having to be accompanied by a caregiver. Therefore, there is no informal care cost for caregiver.
3. Patients with 16 common illness symptoms did not have to take time off work to rest or recover from their illnesses. Therefore, no productivity is lost during the recovery period, which is included in the IDCs.

**Table 3.** Median cost of medicines used for 16 symptoms common illness (USD).

Symptom	Low-cost range	Cost	High-cost range	Cost
<b>Headache</b>	Paracetamol	0.13	Etoricoxib	3.96
<b>Dizziness</b>	Dimenhydrinate	0.06	Betahistine	0.73
<b>Pain in Joint</b>		0.00		
Osteoarthritis	Diclofenac	0.47		
	Naproxen	0.37	Etoricoxib	3.96
Rhumatoid Arthritis	Naproxen	0.37	Etoricoxib	3.96
Gout	Naproxen	0.37	Etoricoxib	3.96
<b>Muscle pain</b>	Paracetamol	0.13	Etoricoxib	3.96
<b>Fever</b>	Paracetamol	0.13	Etoricoxib	3.96
<b>Cough</b>				
Dry cough	Dextromethorphan	0.11	Levodropropizine	1.86
Wet cough	Bromhexine	0.11	N-Acetylcysteine	1.51
<b>Sore throat</b>				
Viral infection	Andographeolide	0.31		
Bacteria infection	Amoxicillin	0.35	Cefdinir	3.95
<b>Stomachache</b>				
Gastric ulcer	Antacid	1.12	Lansoprazole	20.42
Duodenum ulcer	Omeprazole	0.21	Lansoprazole	20.42
GERDs	Sodium Alginate	0.52	Lansoprazole	20.42
<b>Diarrhoea</b>				
Virus infection	Activated Charcoal	0.92	Smectite	0.38
Bacterial infection	Norfloxacin	0.41	Azithromycin	5.06
<b>Constipation</b>	Senna	0.93	Lactulose	2.10
<b>Dysuria</b>				3.79
Bacterial infection	Norfloxacin	0.34	Levofloxacin	5.11
<b>Vaginal Discharge</b>	<b>(Oral or suppository)</b>			
Fungal infection	Fluconazole/ Clotrimazole Suppo.	2.18		
Bacterials infection	Metronidazole	0.28		
Tricomonas infection	Metronidazole	0.28		
<b>Rash</b>	Chlorpheniramine	0.16	Desloratadine	4.66
Herpes zoster	Acyclovir	1.56		
Herpes simplex	Acyclovir	1.56		
<b>Open Wound</b>	Dicloxacillin	0.41	Amoxicillin/Clavulanic acid	2.93
<b>Eye disorder</b>				
Allergic conjunctivitis	Antazoline/Tretahydrozoline	1.08	Dexamethasone eye drop	3.55
Bacteria conjunctivitis	Polymycin B/Neomycin/ Gramicidin	0.60	Tobramycin eye drop	
<b>Ear disorder</b>				
Otitis media	Amoxicillin	0.35	Amoxicillin/Clavulanic acid	2.93
Otitis Externa	Dicloxacillin	0.41		
Tinnitus	Docusate sodium	1.50		
<b>Average by 16 symptoms</b>		<b>1.01</b>		<b>7.72</b>

4. The Gross National Income (GNI) per capita per year of Thailand in 2021 (Office of the National Economic and Social Development Council, 2022) was employed as the reference value for the time cost of patients with 16 common illness symptoms since the secondary data of time loss was retrieved from the study in 2021 (Khampang et al., 2021).

**Table 4.** Components for cost analysis.

Costs	Sources	Perspectives		
		Government	Patient	Societal
<b>Services at drug store</b>				
<b>(1) DMC</b>				
Drug costs	Survey data from 4 drug stores across Thailand	/	/	/
Pharmacy service costs	Hitap's study			
<b>(2) DNMC</b>				
Transportation costs	Hitap's study		/	/
<b>(3) IDC</b>				
Time costs: travelling home-drug store-home	Hitap's study			/
Time cost: waiting and receiving services at drug store	Hitap's study			
<b>Services at hospital</b>				
<b>(4) DMC</b>				
Drug costs	Hospitals in Trat Province	/	/	/
Other costs: x-ray, lab test, and others	Hospitals in Trat Province			
<b>(5) DNMC</b>				
Transportation costs	Hitap's study		/	/
Meal costs	Hitap's study			
<b>(6) IDC</b>				
Time costs: travelling home-hospital-home	Hitap's study			/
Time cost: waiting and receiving services at hospital	Hitap's study			
<b>Sensitivity analysis of services at hospital</b>				
<b>(7) DMC</b>				
OP cost	TCMC's study			

## Results

### *Health care services utilisation for 16 common illness symptoms*

The average number of visits per month for receiving health care services at eight studied hospitals (Phodha et al., 2023) from 1 January 2019 to 30 September 2021 (45 months) reported in Table 5. The top three highest in average number of visits per month were 533 visits for sore throat, 442 visits for fever, and 394 visits for stomachache.

### *Cost of illness*

The average DMC per visit by symptoms for receiving health care services at the hospital was shown in Table 6(A and B) for secondary care and tertiary care hospital, respectively. Average DMC was ranged from 8.20 to 29.05 USD at secondary care hospitals and 8.79–41.57 USD at tertiary care hospitals. The average COI per visit for receiving health care services was shown in Table 7(A and B) for hospitals and drug stores, respectively. At hospitals, average DMC, DNMC, and IDC were 14.97–21.63 USD, 10.13 USD, and 1.17–

**Table 5.** Average number of visits per month of the 16 symptoms common illness (Phodha et al., 2023).

Chief-complain	OPD	ER	Total
Headache	57	8	65
Dizziness	240	71	311
Pain in joint	0	2	2
Muscle pain	300	12	312
Fever	399	43	442
Cough	0	1	1
Sore throat	456	73	533
Stomachache	339	55	394
Diarrhoea	34	14	48
Constipation	54	9	63
Dysuria	65	7	72
Vaginal discharge	22	1	23
Skin rash/lesion	19	4	23
Wound	17	20	37
Eye disorder	0	0	0
Ear disorder	31	2	33
<b>Total per month per hospital</b>	<b>2,033</b>	<b>323</b>	<b>2,356</b>

2.82 USD, respectively. At drug stores, average DMC, DNMC, and IDC were 2.26–8.97 USD, 3.94 USD, and 0.43–0.64 USD, respectively.

### Cost savings

The estimated cost savings, using COI approach, of 16 common illness symptoms (National Health Security Office, 2022) to the cost of the health system by hospital levels and perspectives were reported in Table 8. At secondary care hospital, the estimated cost savings from (1) government perspective ranged from 6.00 to 12.71 USD per visit and 0.22–0.47 million USD per year, (2) patient perspective was ranged from 12.19 to 18.91 USD per visit and 0.45–0.70 million USD per year, and (3) societal perspective were ranged from 14.37 to 19.64 USD per visit and 0.53–0.73 million USD per year. At tertiary care hospitals, the estimated cost savings from (1) government perspective ranged from 12.66 to 19.37 USD per visit and 0.47–0.72 million USD per year, (2) patient perspective was ranged from 18.85 to 25.57 USD per visit and 0.70–0.94 million USD per year, and (3) societal perspective were ranged from 21.03 to 26.30 USD per visit and 0.78–0.97 million USD per year. Every \$1 USD reimbursed for the treatment of 16 symptoms of common illnesses at drug stores will save additional costs in Thailand's health system, ranging from 0.04 to 0.24 USD and 0.02–0.16 USD at tertiary care hospitals and secondary hospitals, respectively.

### Discussion

This research is the first study in Thailand to estimate the cost savings to health system, using COI approach, of 16 common illness symptoms



**Table 6.** Average DMC per visit for receiving health care services at hospital (USD).

Chief complaint	Drug cost	sd	Other cost	sd	Total DMC	sd
<b>A. At secondary care hospital</b>			Secondary care Hospital			
Headache	1.27	1.44	9.09	13.08	10.37	14.07
Dizziness	1.28	3.57	13.28	19.38	14.56	20.38
Pain in joint	NA	NA	NA	NA	NA	NA
Muscle pain	NA	NA	NA	NA	NA	NA
Fever	1.38	2.00	12.08	18.35	13.46	18.57
Cough	NA	NA	NA	NA	NA	NA
Sore throat	1.19	2.88	19.19	42.39	20.37	43.06
Stomachache	3.06	10.01	10.57	16.69	13.63	19.62
Diarrhoea	2.80	2.56	13.20	20.96	16.00	22.08
Constipation	1.58	1.80	12.51	22.80	14.09	23.62
Dysuria	0.90	1.53	9.88	9.39	10.78	9.66
Vaginal discharge	3.81	12.19	12.77	18.42	16.58	21.32
Skin rash/lesion	1.63	3.34	6.57	9.80	8.20	10.46
Wound	8.20	11.96	20.85	17.63	29.05	19.91
Eye disorder	NA	NA	NA	NA	NA	NA
Ear disorder	2.58	1.23	9.96	20.21	12.54	19.70
<b>Average</b>	<b>2.47</b>	<b>4.54</b>	<b>12.50</b>	<b>19.09</b>	<b>14.97</b>	<b>20.20</b>
<b>B. At tertiary care hospital</b>			Tertiary care hospital			
Headache	7.57	19.83	22.38	48.05	29.95	50.75
Dizziness	5.27	13.35	18.25	44.63	23.52	46.06
Pain in joint	5.04	7.13	36.52	32.04	41.57	24.91
Muscle pain	1.17	6.99	13.78	27.33	14.95	28.36
Fever	1.81	4.24	7.61	12.53	9.42	13.27
Cough	NA	NA	NA	NA	NA	NA
Sore throat	4.60	8.06	10.98	30.17	15.57	30.96
Stomachache	7.51	23.54	17.39	27.42	24.91	35.98
Diarrhoea	1.94	1.44	11.36	17.22	13.30	17.74
Constipation	6.46	11.23	28.71	51.76	35.18	52.96
Dysuria	4.37	17.33	16.33	32.37	20.70	36.77
Vaginal discharge	1.85	4.92	17.58	26.03	19.43	26.70
Skin rash/lesion	2.46	4.54	6.33	8.25	8.79	9.12
Wound	0.80	NA	16.18	NA	16.98	NA
Eye disorder	NA	NA	NA	NA	NA	NA
Ear disorder	10.97	17.78	17.57	107.69	28.55	108.44
<b>Average</b>	<b>4.42</b>	<b>10.80</b>	<b>17.21</b>	<b>35.81</b>	<b>21.63</b>	<b>37.08</b>

**Table 7.** Average COI per visit for receiving health care service (USD).

Cost	Lower range	Upper range
<b>A. At hospital</b>		
DMCs		
Drug costs	2.47 <sup>a</sup>	4.42 <sup>b</sup>
Other costs	12.50 <sup>a</sup>	17.21 <sup>b</sup>
DNMCs	10.13	10.13
IDCs	1.17	2.82
Cost	Lower range	Upper range
<b>B. At drug store</b>		
DMCs		
Drug cost	1.01	7.72
Cost of pharmacy service	1.25	1.25
DNMCs	3.94	3.94
IDCs	0.43	0.64

<sup>a</sup>Secondary care hospital.

<sup>b</sup>Tertiary care hospital.

**Table 8.** Cost savings of 16 symptoms common illnesses to cost of the healthcare system by hospital levels and perspectives (USD).

Total costs	Drug store		Hospital	Cost saving			
	Low range	High range		Low range	High range	Low range	High range
<b>A. Secondary care hospital</b>							
<b>(1) Government perspective</b>							
Visit	2.26	8.97	14.97	6.00	12.71		
Month	6,950.87	27,615.75	46,084.46	18,468.71	39,133.59		
Year	83,410.47	331,388.97	553,013.53	221,624.56	469,603.06		
<b>(2) Patient perspective</b>							
Visit	6.19	12.91	25.10	12.19	18.91		
month	19,070.37	39,735.24	77,276.07	37,540.83	58,205.70		
year	228,844.39	476,822.88	927,312.79	450,489.90	698,468.40		
Total costs	Drug store		Hospital		Cost saving		
	Low range	High range	Low range	High range	Low range	High range	
<b>(3) Societal perspective</b>							
Visit	6.63	13.55	26.27	27.92	14.37	19.64	
Month	20,406.40	41,705.24	80,874.63	85,948.07	44,242.83	60,468.23	
Year	244,876.80	500,462.84	970,495.52	1,031,376.79	530,913.95	725,618.72	
Total costs	Drug store		Hospital		Cost saving		
	Low range	High range	Low range	High range	Low range	High range	
<b>B. Tertiary care hospital</b>							
<b>(1) Government perspective</b>							
Visit	2.26	8.97	21.63	12.66	12.71		
Month	6,950.87	27,615.75	66,591.28	38,975.53	39,133.59		
Year	83,410.47	331,388.97	799,095.38	467,706.41	469,603.06		
<b>(2) Patient perspective</b>							
Visit	6.19	12.91	31.76	18.85	25.57		
Month	19,070.37	39,735.24	97,782.89	58,047.65	78,712.52		
Year	228,844.39	476,822.88	1,173,394.64	696,571.76	944,550.26		
Total costs	Drug store		Hospital		Cost saving		
	Low range	High range	Low range	High range	Low range	High range	
<b>(3) Societal perspective</b>							
Visit	6.63	13.55	32.93	34.58	21.03	26.30	
Month	20,406.40	41,705.24	101,381.45	106,454.89	64,749.65	80,975.05	
Year	244,876.80	500,462.84	1,216,577.38	1,277,458.64	776,995.80	971,700.57	

announced by the NHSO in conjunction with the Pharmacy Council in the new Common Illness pharmacy project at drug stores (National Health Security Office, 2022). This method has been employed in previous studies in the field (Value of OTC Medicines to the U.S. Healthcare System, 2019). Other countries could estimate cost savings of OTC medicines to their health system following our research methodology. Average COI per visit was calculated for receiving health care services at drug stores and various hospital levels from three perspectives: government, patient, and societal. The average DMC at the drug store ranged from 1.01 to 7.72 USD, while at secondary care hospital and tertiary care hospital were 2.47 and 4.42 USD, respectively. There are several factors affect the big difference in average DMC, especially for drug cost, i.e. methods for purchasing drugs by government service agencies and quantity for purchasing medicine per time. Even

though this research did not retrieve the drug cost from the studied hospital. We converted drug price to cost using drug pricing criteria announced by the Comptroller General's Department, Ministry of Finance (2006). Health care services provided at the hospital is more complicated than a drug store. Other health care services at hospital costs include X-ray, blood test, and other diagnostic procedures. This makes the average DMC at hospitals much higher than at drug stores. The DNMC for receiving health care services at drug stores and hospital were 3.94 and 10.13 USD, respectively. In Thailand, the distribution of drug stores in the community is very high compared to hospitals. There is only one hospital located in 1 district. So, the travelling cost to get health care services at a hospital is 2.5 times higher than drug stores. In addition, the time cost due to travelling and waiting to receive health care services at the hospital is also higher than the drug store. The range of estimated IDC at the hospital is 1.83–6.56 times compared to drug stores.

Board Committee of the NHSO endorsed the government action plan of the NHSO 5th edition for 2023–2027 through the Board Committee meeting No. 8/2565 on 1 August 2022 (Board Committee of the National Health Security Office, 2022). The government action plan emphasises on 'CSG' which stands for C = coverage, S = safe financial system, G = good governance, respectively, to reach the slogan of 'Reduced costs with technology, easy access for people, better quality'. One of the strategic plans is to increase access to health care services at drug stores. However, the problem of duplicate medication if patient do the medicines shopping around has been concerned. There was the study to develop a computer software to prevent therapeutic duplicate prescription and to determine its effects in Mahasarakham Hospital (Chaiyasong et al., 2020). The study found that highest duplicate medication rate was found in the gastric secretion inhibitors group (1.04%), followed by antihistamine (0.97%) and NSAIDs (0.62%). These duplicates costed around 19,740–79,591 baht/year. These medication duplicate could be prevented by the developed software significantly and could save the excess health care costs by 8,196–36,720 baht/year.

The audit system of NHSO focuses on checking before paying 100% and has an authentication system, identity, use the same data standards as services, link reimbursement data with the service information system, and pay faster. The NHSO launches a project in four pilot provinces (Hfocus, 2024). Health facilities in these provinces can link their patient data. Doing this, patients are freely receiving care at any different health facilities, no longer need referral letters. This also prevents therapeutic duplicates and shopping around behaviours. According to the strategic of the government action plan of the NHSO, Thai people can access to health care services for 16 common illness symptoms at drug stores that would impact on cost savings to the Thailand's health system.

## Study limitations

There are some limitations in this research, as we relied on secondary data from several studies. Some variables could impact the DMC. The labour cost for illness history review by pharmacists was not available in the reference cost project of a pilot project for patients to receive medicine at pharmacies to reduce crowding in hospitals (Phodha et al., 2020). This may result in the DMC being underestimated. The travelling cost and time cost for receiving health care services impacted the DNMC and the IDC to be overestimated for hospitals in some cases. Finally, the average number of visits per month retrieved by the ICD-10 listed 16 common illness symptoms. Practically, there is variability in recording the ICD-10 by physicians. This could impact the total cost savings reported in this research but could not specify the direction of the impact.

## Future research

To have information for more accurate policy formulation, relevant variables should be collected using the empirical-based costing approach and micro costing. The cost of referring patients from drug store to hospital is also additional.

## Conclusion

It can be concluded that the treatment for 16 symptoms of common illnesses at drug stores can clearly save costs.

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## Disclosure statement

No potential conflict of interest was reported by the author(s).

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## Data availability statement

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

## Ethics approval and consent to participate

This secondary research uses data from previous studies and the Trat Provincial Public Health Office database. Data entry in this research is anonymous and de-identify data. The research protocol was approved by the Ethics Committee of institute for the Development of Human Research Protections (IHRP) COE No. IHRP2024001.

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