

ตัวแปรที่สัมพันธ์ต่อค่าใช้จ่ายด้านยาของโรงพยาบาลส่งเสริมสุขภาพตำบล อ.วัฒนานคร จ.สระแก้ว

Factors Correlated with Drug Expenditures of Sub-district Health Promoting Hospitals in Wattana Nakhon District, Sa Kaeo Province

นิพนธ์ต้นฉบับ

Original Article

สุธิมา เกิดทอง¹ และ นิลวรรณ อยู่วัฒน^{2*}

¹ ฝ่ายเภสัชกรรม โรงพยาบาลวัฒนานคร อ.วัฒนานคร จ.สระแก้ว 27160

² ภาควิชาเภสัชกรรมปฏิบัติ คณะเภสัชศาสตร์ มหาวิทยาลัยนครสวรรค์ อ.เมือง จ.พิษณุโลก 65000

* Corresponding author: nilawanu@nu.ac.th

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Suthima Gerdthong¹ and Nilawan Upakdee^{2*}

¹ Pharmacy Department, Wattana Nakhon Hospital, Wattanakorn, Sa Kaeo, 27160 Thailand

² Department of Pharmacy Practice, Faculty of Pharmaceutical Sciences, Naresuan University, Phitsanulok, 65000 Thailand

* Corresponding author: nilawanu@nu.ac.th

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บทคัดย่อ

วัตถุประสงค์: เพื่อวิเคราะห์ปัจจัยที่อาจสัมพันธ์กับค่าใช้จ่ายด้านยาโรงพยาบาลส่งเสริมสุขภาพตำบล (รพ.สต.) **วิธีการศึกษา:** เป็นการศึกษาเชิงวิเคราะห์ เก็บข้อมูลประชาชนทุกรายที่มีรับบริการที่ รพ.สต. ทั้ง 21 แห่ง ใน อ.วัฒนานคร จ.สระแก้ว ในปีงบประมาณ 2558 – 2561 วิเคราะห์ความสัมพันธ์ตัวแปรต้นทั้งหมด (กลุ่มอายุ เพศ ประเภทบริการ ขนาดของ รพ.สต. จำนวนเจ้าหน้าที่ผู้ให้บริการ ระยะทางความห่างไกล การมีบริการขนส่งสาธารณะ และกลุ่มของโรค) และตัวแปรตาม (ค่าใช้จ่ายด้านยา) โดยการวิเคราะห์สหสัมพันธ์โดยวิธีของเพียร์สัน และสเปียร์แมน ตามความเหมาะสม ทดสอบความสัมพันธ์ของตัวแปรตามกับตัวแปรต้นทั้งหมดร่วมกันโดยโมเดลเชิงเส้น (generalized linear model) **ผลการศึกษา:** พบตัวแปรต้นที่สัมพันธ์กับค่าใช้จ่ายด้านยาอย่างมีนัยสำคัญทางสถิติคือ กลุ่มอายุ เพศ ประเภทบริการ ขนาดของ รพ.สต. จำนวนเจ้าหน้าที่ผู้ให้บริการ ระยะทางความห่างไกล และการมีบริการขนส่งสาธารณะ ยกเว้นกลุ่มของโรค (P -value < 0.001) สรุป: ตัวแปรต้นที่พบความสัมพันธ์กับค่าใช้จ่ายด้านยา สามารถนำมาปรับใช้ในการพยากรณ์การจัดสรรงบประมาณยาได้

คำสำคัญ: ค่าใช้จ่ายด้านยา, การจัดสรรงบประมาณ, งบประมาณยา, โรงพยาบาลส่งเสริมสุขภาพตำบล

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Abstract

Objective: To determine factors potentially correlated with drug expenditure of sub-district health promoting hospitals (SDHPHs). **Methods:** In this analytic study, all patients receiving service at all 21 SDHPHs in Wattana Nakhon district, Sa Kaeo province were in fiscal year 2015 – 2018 were included. Correlations between independent variables (age group, sex, service type, size of SDHPH, number of healthcare providers, distance of SDHPH from the center hospital, availability of public mass transportation, and disease group) and dependent variable (drug expenditure) were tested using Pearson's and Spearman's method, as appropriate. Generalized linear model was used to test associations between drug expenditure and all independent factors. **Results:** Drug expenditure was significantly associated with age group, sex, service type, size of SDHPH, number of healthcare providers, distance of SDHPH from the center hospital, and availability of public transportation, except disease group (P -value < 0.001). **Conclusion:** The finding of drug expenditure associated with various factors could be used in budget allocation for SDHPHs.

Keywords: drug expenditures, budget allocation, drug budget, sub-district health promoting hospitals

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Introduction

In Thailand, province is a collective form of a number of districts, and a given district consists of a number of sub-district regions. A sub-district is formed by a number of villages. At the sub-district level, sub-district health promoting hospitals (SDHPHs) which are the community-oriented primary healthcare facilities are the frontline healthcare providers emphasizing health promotion, disease prevention, and out-patient treatment for basic treatments and chronic illnesses follow-up such as well-controlled hypertension, diabetes mellitus and hyperlipidemia. SDHPHs within a given district are under the joint oversight of the community hospital of the district and the district health administration office. Together these two agents make jurisdiction on budget

allocation for all SDHPHs in the district. Budget allocation to SDHPHs has been criticized for being ineffective.

It has been known that the annual number of out-patients and expenditures on drugs and medical supplies of SDHPHs were positively correlated with the amount of budget allocated. This suggests that the budget allocated to SDHPHs should be both fixed cost and variable cost that varies by services rendered and/or outcomes obtained. Budget allocation for SDHPHs in a given sub-district is overseen and controlled by the joint oversight of the community hospital of the district and the district health administration office which is known as the District Health Coordinating Committee (DHCC).² More budget for medication expenditure should be allocated to individual SDHPHs based on more services provided.¹ Budget is

allocated proportional to the size of population served by each of all SDHPHs, the number of services rendered, the number of reimbursement, or budget limit³ (e.g., budget limits of 250,000 Baht/year for large-sized SDHPHs and 150,000 Baht/year for small-sized ones).

In Wattana Nakhon district, Sa Kaeo province, budget allocation from the Wattana Nakhon DHCC has been criticized for certain drawbacks. The allocation is not adequately objective and does not link with the inventory management of drugs and medical supplies. The use of inventory management system such as the software Inventory Stock[®] could provide a more reliable, objective evidence for budget allocation. However, since the software is costly and Wattana Nakhon district has no financial support for the system, it has not been used in any SDHPHs in the district. There remains the problem of budget allocation based on unreliable, less objective evidence of actual resource used.

The function of Wattana Nakhon DHCC is overseeing how SDHPHs perform and making a decision on budget allocation to these SDHPHs. The actual act of distribution and inventory control of drugs and medical supplies distributed to SDHPHs is done by Wattana Nakhon Hospital. Pharmacy department at Wattana Nakhon Hospital is responsible for inventory control and budget allocation estimation. For each next fiscal year, budget for drugs and medical supplies for all SDHPHs has been allocated by estimating the number based on the expenditures on drugs from the last fiscal year and the forecasted number of patients for the next fiscal year. From the fiscal years of 2014 to 2017, an annual budget of 3 millions Baht had been planned for all SDHPHs in Wattana Nakhon district. However, the actual budget of 2.56, 2.81, 2.49, and 2.78 millions Baht had been actually allocated, respectively.⁴ The leftover budget had been used to purchase unplanned medical devices. Even though the patients benefit from all of the budget planned, the difference between the budget allocated and budget planned could be viewed as ineffective and unmet budget management. A more effective budget plan for medication expenditure could allow for sufficient and effective healthcare service with no leftover which could be allocated for other needs of the patients.

The disparity of the planned and allocated budget could also be because the annual sum of the amount of drugs and medical supplies distributed to the SDHPHs were not equal to the amount used for the patients. In inventory control, some SDHPHs requested the amount of drugs and medical supplies

from Wattana Nakhon Hospital that were higher than the amount they actually used for their patients. This practice also resulted in the overstock of drugs and medical supplies based on the 2-month reserve criterion and subsequent substantial amount of expired drugs.⁵

Despite the effort of Pharmacy Department of Wattana Nakhon Hospital in estimating the actual expenditures on drugs and medical supplies of all SDHPHs, the problem of ineffective budget allocation for these SDHPHs remains. With the trend of more expenditures on drugs and medical supplies over time and the existing poor estimation on the expenditures, more problems of ineffective budget allocation could be expected. To achieve a better budget allocation in the future, the number of expenditures on drugs and medical supplies might not be sufficient for fiscal budget estimation. Certain factors might have played a crucial role in the number of the expenditures and are worth understanding. Such understanding could potentially help achieve a more effective budget allocation. This study aimed to determine the associations between drug expenditure and various factors including age group, sex, service type, size of SDHPH, number of healthcare providers, distance of SDHPH from the center hospital, availability of public mass transportation, and disease group of all SDHPHs in Wattana Nakhon district. Drugs and medical supplies to all of these SDHPHs were supplied and distributed by Wattana Nakhon Hospital which acts as their distributor.

Drug expenditure budget is an operating budget which varies by the number of services provided.¹ Based on literature and reports, a number of factors potentially associated with drug expenditure budget included the number of patients receiving services^{6,7}, age groups of the population served^{8,9}, patient gender⁹, disease groups⁹, the number of healthcare providers⁶ and the distance of the facility from the capital city.¹⁰ In this present study, certain additional factors with a potential effect on the expenditure of drug and medical supplies were proposed as follows. For the health service factor, different types of healthcare services need different kinds and numbers of drugs and medical supplies. For the provider factor, size of SDHPHs could determine the number of patients the SDHPH serves. For environment factor, the distance from individual SDHPHs to Wattana Nakhon Hospital as their distribution and control center could affect the expenditure as suggested by the study of Peiro (2016) which revealed that the distance from the capitol was correlated with

the expenditures at the primary care facilities.¹⁰ In addition to the distance from Wattana Nakhon Hospital, mode/availability of public mass transportation from each SDHPH to the SDHPH could affect the preference of the patient to receive care from the SDHPH.

Methods

In this correlational analytic study, all patients with all insurance schemes receiving services at each of all 21 SDHPHs in Wattana Nakhon district were included in the study. To be eligible, these patients had to have been recorded in the electronic medical profile system of these SDHPHs between October 2014 to September 2018 (i.e., fiscal years of 2015 to 2018). Those whose services were recorded in hardcopy medical records, but not in electronic medical profile system were also included. However, those who received service but were not recorded either in the hardcopy or electronic medical profile system, they could not be included. Those with incomplete data of study variables were excluded.

In this study, drug expenditures as dependent variable was hypothesized to be associated with certain independent variables including demographic variables (age groups and gender), the extent of service rendered (i.e., the number patients for OPD service), clinical factors (disease groups and type of services), provider factors (size of SDHPHs and the number of providers at the SDHPH), and environment factor (the distance of SDHPH to Wattana Nakhon Hospital and mode/availability of public mass transportation from each SDHPH to Wattana Nakhon Hospital). Drug expenditure was defined as cost of drugs and medical supplies per capita the SDHPHs used for the patient care and services including health promotion, treatment, disease prevention and rehabilitation. The drug expenditures included only those recorded in the electronic medical profile system of these SDHPHs between October 2014 to September 2018 (i.e., fiscal years of 2015 to 2018).

Research instruments

The data collection form was used to collect demographic characteristics of patients and SDHPHs, service factors, clinical factors, and expenditure. This data collection form was developed based on the standard structured files of medical and health data and referral of the Ministry of Public Health

of Thailand¹¹ and from data from the electronic medical profile system of these SDHPHs. The data collection form was examined for content validity by 3 independent experts, specifically, one expert in information technology, and two experts with at least 3 years of primary care pharmacy practice experience. Content validity was found with Item-Objective Congruence Index (IOC) of 0.5 or higher.

For data collection of patient care and services at each SDHPH, demographic characteristics (age and gender), service and clinical factors were collected. Age was categorized into 9 groups specifically < 3 years, 3 – 10, 11 – 20, 21 – 30, 31 – 40, 41 – 50, 51 – 60, 61 – 70, and more than 70 years old.¹² For factor of service provided, the number of patients receiving out-patient at the SDHPH was recorded. For clinical factors, disease groups and types of services were collected. For disease groups, based on the service profile of Hospital Accreditation of Wattana Nakhon Hospital in 2018¹³, there were trauma group and non-trauma group (chronic diseases and acute illnesses). For types of services, four types included health promotion, treatment, disease prevention and rehabilitation.¹⁴ Drug expenditures were based on the actual drugs dispensed and medical supplies used for patient care and services during the study period. The expenditure was calculated as per capita value.

For characteristics of SDHPHs, data were obtained from Wattana Nakhon district health administration office. For provider factors, the size of SDHPHs is based on the number of people in the sub-district under the care of the respective SDHPH. However, the size of SDHPHs is modified to be based on the number of patients receiving care at the given SDHPH.¹⁵ Three sizes of SDHPHs were small, medium and large SDHPH in correspondence with < 3,000, 3,000 – 8,000, and > 8,000 patients receiving care per fiscal year, respectively. For the number of healthcare providers, all providers for the services of health promotion, treatment, disease prevention and rehabilitation were included. For environment factors, the distance from the SDHPH to Wattana Nakhon Hospital was defined based on the geographical information system of the Office of the Permanent Secretary of the Ministry of Public Health.¹⁶ SDHPHs could then be categorized into those within and beyond 22.5 kilometers distance from Wattana Nakhon Hospital. For availability of public mass transportation from each SDHPH to Wattana Nakhon Hospital, three categorized were defined including no

public mass transportation available, one-round transportation per day, and two-rounds transportation per day.

Ethical consideration

The study protocol was approved by the Ethics Committee for Human Study of Naresuan University (approval number: COA No. 704/2018, IRB No. 0820/61; approval date: December 25, 2018).

Data analysis

Data from the electronic medical profile system of these SDHPHs were examined for quality by two aspects. For data completeness, the software program OPPP 2010 was used to examine data from all SDHPHs. Data should be completed for at least 90% of the records and missing data should not be more than 10%. It was found that retrospective data from medical records and those presently collected at the study passed the criteria of complete and missing data. For missing data, multiple imputation method was used to complete the dataset. For data accuracy, missing data were randomly sampled to compare with data in medical records by computer. Rate of error based on $(n + 1)^{1/2}$ where n = number of records of missing data was found to be less than 10%.¹⁷

Results of demographic characteristics of patients and SDHPHs and all study variables were presented by descriptive statistics including frequency with percentage and mean with standard deviation. Univariate correlation analysis of all variables of interval/ratio scale with normal distribution was conducted using Pearson's correlation coefficient, and all variables with nominal or ordinal scales or those of interval/ratio scales with no normal distribution using Spearman's rank correlation coefficient. The correlation between independent variables with a coefficient of less than 0.7 suggests inter-correlation that is not substantial for further linear regression analysis. All independent variables were further simultaneously tested in a generalized linear model (GLM) with gamma distribution and link function of logarithmic transformation.¹⁸ In this GLM, number of patients with OPD visit was used as a scale weight variable. Statistical significance was set at a type I error of 5% or P -value < 0.05. All statistical analyses were conducted using the software program SPSS version 21.

Results

In Wattana Nakhon district, there were 21 SDHPHs where the majority was medium-sized SDHPHs (13 SDHPHs or 61.91%), followed by 6 small-sized (28.57%) and 2 large-sized (9.52%) SDHPHs. The number of healthcare providers ranged from 3 – 5 providers. There were 10 SDHPHs (47.62%) with the distance from Wattana Nakhon Hospital of less than more than 22.5 km and 11 SDHPHs (52.38%) with the distance beyond 22.5 km. Availability of public mass transportation was somewhat limited with 9 of them had no public mass transportation (42.86%), followed by one round of transportation per day (7 SDHPHs or 33.33%) and two rounds per day (5 SDHPHs or 23.81%).

Table 1 Demographic characteristics of patients (N = 80,126).

Characteristics	No. of patients (No. of services)	% by No. of patients
Gender		
Male	39,546 (375,233)	49.35
Female	40,580 (556,346)	50.64
Nationality		
Thai	76,348 (921,271)	95.28
Others	3,778 (10,308)	4.71
Being registered with the SDHPH providing care		
Yes	56,087 (795,077)	69.99
No	24,039 (136,502)	30.00
Age (years)		
< 3	1,789 (19,994)	2.23
3 - 10	7,744 (157,786)	9.66
11 - 20	11,351 (109,678)	14.176
21 - 30	11,204 (53,606)	13.98
31 - 40	11,753 (73,223)	14.67
41 - 50	12,821 (137,697)	16.00
51 - 60	11,352 (160,340)	14.17
61 - 70	6,589 (121,176)	8.22
> 70	5,523 (98,079)	6.89
Payment scheme		
Universal coverage	65,397 (832,526)	81.62
Social security	8,312 (59,951)	10.37
Civil servant benefit	2,639 (28,794)	3.29
Out-of-pocket	3,778 (10,308)	4.71
Type of service		
Treatment	412,894	44.32
Disease prevention	436,365	46.84
Health promotion	50,393	5.41
Rehabilitation	31,927	3.43
Disease group		
Acute, non-trauma	873,616	93.78
Chronic, non-trauma	36,094	3.87
Trauma	21,869	2.35

In terms of patients, a total of 80,126 patients (931,579 services) were served in the fiscal year of 2015 to 2018 in 21 SDHPHs (Table 1). Their average age was 40.31 ± 24.47 years old. About half of them were female (50.64%). The youngest patient was less than 1 years old and the oldest one

was 111 years old. The majority of patients were in their 41 – 50 years of age (16.00%, followed by 31 – 40 years (14.67%). Most of them were under the universal coverage payment scheme (81.62%), with Thai nationality, and registered with the SDHPH they received the care. Most of them received disease prevention service (46.84%), followed by treatment (44.32%). They received the care for general health check-up, screening for diabetes, and care for respiratory tract diseases. Disease group was mostly acute illnesses (93.78%) (Table 1).

Regarding the drug expenditure, these 21 SDHPHs together spent 3,124,932.44 Baht by average per year in the fiscal year of 2015 to 2018. Drug expenditure per one patient was with a minimum of zero baht and a maximum of 5,355.70 Baht with an average of 39 ± 169.98 Baht per patient per year. The majority of patients had a zero Baht of expenditure (35.9%) indicating no use of drugs or medical supplies.

Drug expenditure was significantly correlated with number of patients with OPD visits, type of service, disease group, gender, distance of SDHPH from Wattana Nakhon Hospital, and public mass transportation (correlation coefficients of 0.586, 0.286, 0.088, 0.073, 0.042 and -0.092, respectively) with P -value < 0.01 for all, and with size of SDHPH (correlation coefficient of 0.010) with P -value < 0.05, but not with age group and number of healthcare providers. All independent variables had no substantial correlations with each other (i.e., correlation coefficient of less than 0.7).

Since all independent variables had no substantial correlations with each other in univariate correlation analysis and were suggested to have associations with drug expenditure from literature, all were tested in the GLM analysis. It was found that demographic characteristics (age group and gender), clinical factors (type of service), SDHPH or provider characteristics (size of SDHPHs and number of providers), and environment factors (distance from SDHPH to the Wattana Nakhon Hospital, and availability of public mass transportation), except disease group, together were significantly associated with drug expenditure (P -value < 0.001) (Table 3).

Discussions and Conclusion

Various factors were found to have been associated with drug expenditure in sub-district health promoting hospitals (SDHPHs) in Wattana Nakhon district. Age group was associated with drug expenditure with a trend of drug

expenditure increasing with older patients. This is consistent with the study of Kongseen and colleagues in 2006.⁸ Suksiriserekul suggested that the government should allocate resources according to age distribution.⁹ Female gender was significantly associated with more drug expenditure than male counterpart. This finding was consistent with the work of Suksiriserekul suggesting that resource allocation according to gender by the government could be more effective.⁹ For type of service, rehabilitation was the most costly because a long-term care was needed.

In terms of size of SDHPHs, SDHPHs with the size of 8,000 patients receiving care per year had the lowest drug expenditure compared those with smaller size. This suggests that large-sized SDHPHs served a larger number of people with a large portion of them receiving care that costed no expenses. Hence the less average drug expenditure when compared with those small-sized SDHPHs.

It was found that drug expenditure increased with the number of providers. This finding is consistent with the study of Chalee and colleagues (2012)⁶ which found that the expenditure of drugs and medical supplies was in proportion with the number of providers because of a higher access to more providers. Regarding the distance, SDHPHs that were farther from Wattana Nakhon Hospital (i.e., more than 22.5 km) which was their distributor were more likely to have a higher drug expenditure than those closer to the distributor. This is consistent with the work of Peiro (2016) which showed that healthcare facilities that were far from the capitol city of Spain had higher expenditure for prescribed drugs.¹⁰ This could be because it is more difficult for patients living around SDHPHs with a great distance from the district center to access the center hospital. Therefore, these patients are more likely to receive care at their nearby SDHPH. For availability of public mass transportation, more service of public mass transportation (i.e., more rounds of transportation per day) were more likely to be associated with more drug expenditure at the SDHPH. With a counterintuitive result, more studies are recommended.

We found that disease group was not associate with drug expenditure was considerably conflicting with what have been widely known. This could be because patients with severe diseases which were costly would go to the large hospital, not SDHPHs, for treatment. It was suggested by the previous work that per capita budget should be allocated according to different disease groups.⁹

Table 2 Pearsons' correlations between study variables (N = 80,126).

Factors	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	Y
Age group (X ₁)										
Number of OPD visit (X ₂)	0.100*									
Gender (X ₃) [#]	0.034*	0.151*								
Disease group (X ₄) [#]	-0.190*	0.300*	-0.042*							
Service type (X ₅) [#]	0.136*	0.520*	0.101*	0.200*						
Size of SDHPH (X ₆)	0.024*	-0.023*	0.003	-0.038*	-0.051*					
Number of providers (X ₇)	-0.011*	0.023*	0.013*	-0.040*	0.094*	0.421*				
Distance for center (X ₈)	0.012*	0.072*	-0.016*	0.074*	0.043*	-0.279*	-0.022*			
Public transportation (X ₉) [#]	-0.023*	-0.054*	0.003	0.089*	0.081*	-0.375*	-0.171*	0.388*		
Drug expenditure (Y)	0.000	0.586*	0.073*	0.088*	0.286*	0.010 [†]	0.008	0.042*	-0.092*	

* Correlation is significant at the 0.01 level (2-tailed). † Correlation is significant at the 0.05 level (2-tailed).

[#] Spearman's correlation coefficient.**Table 3** Associations between drug expenditure and various factors by generalized linear model[#] with gamma distribution and link function (N = 80,126).

Factors	Drug expenditure (Baht/person/year)		P-value
	Mean	95% CI	
Age group (years) (X₁)			
< 3 ^{ref}			
3 – 10	28.976	25.417 - 33.694	< 0.001
11 – 20	25.283	22.498 - 28.853	< 0.001
21 – 30	26.187	23.174 - 30.100	< 0.001
31 – 40	28.995	25.417 - 33.745	< 0.001
41 – 50	29.748	26.010 - 34.739	< 0.001
51 – 60	30.573	26.642 - 35.864	< 0.001
61 – 70	30.675	26.719 - 36.005	< 0.001
> 70	30.938	26.919 - 36.367	< 0.001
Gender (X₃)			
Male ^{ref}			
Female	28.409	24.982 - 32.924	< 0.001
Disease group (X₄)			
Chronic, non-trauma ^{ref}			
Acute, non-trauma	28.525	25.733 - 31.996	0.536
Trauma	29.192	26.273 - 32.841	0.427
Type of service (X₅)			
Health promotion ^{ref}			
Treatment	42.943	37.957 - 49.437	< 0.001
Disease prevention	49.009	42.643 - 57.610	< 0.001
Rehabilitation	49.483	43.016 - 58.240	< 0.001
Size of SDHPH (X₆)			
Small ^{ref}			
Medium	34.749	29.771 - 41.725	< 0.001
Large	26.584	23.505 - 30.593	< 0.001
Number of healthcare providers (X₇)			
2 ^{ref}			
3	26.527	23.510 - 30.433	< 0.001
4	26.651	23.600 - 30.608	< 0.001
5	27.559	24.319 - 31.795	< 0.001
Distance of SDHPH to Wattana Nakhon Hospital (X₈)			
Less than 22.5 km ^{ref}			
More than 22.5 km	30.373	26.487 - 35.595	< 0.001
Availability of public mass transportation (X₉)			
None ^{ref}			
One round per day	24.902	22.217 - 28.325	< 0.001
Two rounds per day	26.778	23.696 - 30.782	< 0.001

Note: ref = reference group. CI = confidence interval.

[#] GLM model with number of patients with OPD visit as scale weight variable, P-value < 0.001.

According to the findings, implications for policy on budget allocation of drug expenditure could be as follows. SDHPHs with more elderly population should be provided with more budget. Services using drugs and medical supplies for women include family planning, contraception, cervical cancer screenings. Therefore, SDHPHs with more women population should get more budget. Disease prevention is costly and SDHPHs with the need of more disease prevention should get more budget. These disease prevention services include various disease screening programs. Since it was found that SDHPHs with more 8,000 patients receiving services per year had lower drug expenditure, it could be that a relatively large portion of patients receiving care that needed no or little drug use. More studies on only patients with the use of drugs and medical supplies should be conducted before decision on budget allocation based on the number of patients receiving could be made into policy. SDHPHs with more healthcare provider should given more per capita budget. This is because more providers offer more access to the patients. SDHPHs that are far from Wattana Nakhon Hospital which acts as their drug distributor should be given more budget. This is because SDHPHs in the far area are taking care of people who might have difficulty traveling to the large hospital at the center of the district. Thus these people rely more on SDHPHs in their community. Since it as found that SDHPHs in the communities that had 2 rounds of public mass transportation per day had higher drug expenditure which is somewhat counterintuitive, more studies on this factor should be more conducted before budget allocation based on this factor could be made. Finally, mean drug expenditures with 95% confidence interval for each factor could be used in budget allocation.

The study had certain limitations. This study used mostly retrospective data of resource use. Prospective studies on

resource use should be conducted. Factors under investigation were mostly from previous literature and reports. Future studies should include more factors provided by all actual stakeholders.

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