

## RESEARCH PAPER

## Values of leftover drugs in households: preliminary study in 5 major Thai cities

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**Keywords**

in-home drug storage  
leftover drugs  
drug values  
household drug survey

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**Abstract**

An investigation on items, types, sources and values of drugs found in households distributed in 5 major cities in 4 regions of Thailand: Bangkok, Chiang Mai, Khon Kaen, Mahasarakham and Songkla. A structured questionnaire was developed for use while surveying 357 households during January and March 2011. Sixty-six percent of the total drugs were routinely used while 25% being in-home storage and 9% being rarely or unused. The majority of the drugs was obtained from public hospitals (64%) or private hospitals (8%) or drug stores (23%) that were paid under reimbursable schemes. The highest cost among the routine drug group was dyslipidaemic drugs (36%), whereas that among the in-home storage drugs being antacids (28%) and that among the unused drugs being NSAIDs (22%). Expired and deteriorated drugs were found to be 3.7 and 2.0%, respectively. Thus, minimal household storage of drugs may reduce drug waste, minimize national drug expenses and avoid hazards due to deteriorated drugs.

**Introduction**

Socio-economic status is a key attribute household decision on health care. An increase in drug expenditures profoundly affect the access to health care of individual households. The success of Thai Universal Health Care (UHC)

policy in 2002 has resulted in 2012, a 99.9% universal coverage among Thai citizens although other health care schemes are also implemented (National Health Security Office, 2012). In 2007, Thai National Health Act

established a foundation for social participation in health systems based on primary health care and overall coverage (Wongpoowarak *et al*, 2011). Ambitious challenges remain to empower community self-awareness in health and medical uses. In this light, Thai Pharmacy Council launched a strategy to effectively manage drugs prescribed or purchased for household uses (The Pharmacy Council of Thailand, 2010). Often, leftover medicines in households may introduce hazards as a result of drug degradation, misunderstanding or misuses (Persson *et al*, 2009). It is well defined that there is a lack in knowledge on management of leftover medicines (Hamamsy, 2011). Leftover medicines have been reported to be 3-20% of the total drugs brought into households by all means. Unused or rarely medicines in respiratory systems have also been reported to be up to 20% and could introduce other serious problems in New Zealand (Braund, 2009). A study reveals an increase in return rates of unused medicines to hospitals due to environmental awareness of drug disposition misconduct (Ekedahl, 2006).

There are several competitive schemes for Thai citizens to claim for medical treatment including drug expenditures when accessing to their registered hospitals (Supachutikul, 1995). Three major schemes are Civil Servant Medical Benefit Scheme (CSMBS), a fringe benefit to government employees and dependents to compensate low public salary; Social Security Scheme, a tripartite contribution scheme by the employer, the employee and the government ensures health security for formal sector employees. In 2001, Thai citizens who are not covered by the government officers or social security schemes are now covered by Thai Universal Coverage (UC) (Health Insurance System Research Office, 2012). The mix of these coverage schemes creates competitive medical

claimed benefits including dispensed drugs into households. To evaluate the medical schemes or access and medicines found in households should provide informative elements of types of medicine being used, stored or unused, including the prescribers or accessibility and cost. It should provide critical and valuable ideas on leftover medicine management.

## Methods

Data collection was conducted by using a structured interview for this pilot descriptive study. The structured questionnaire was developed through thorough discussions among researchers from 5 selective schools of pharmacy in Thailand. This was intended to obtain heterogeneity and distribution of the economic and educational levels of the study population. One school of pharmacy joined the study is situated in Bangkok, representing the capital city. The other 4 researchers are distributed in the regional cities, i.e. one in Chiang Mai situated in the North of Thailand, one in Hat Yai situated in the South and two in Khon Kaen and Mahasarakham in the Northeast by which with the majority of the Thai habitats. The questionnaire consisted of 2 parts, the description of the responder and a blank sheet to fill in list of left over medicine, to evaluate the drug items found in each household, the medical scheme of the members of each household, types of drugs and reasons to store the drugs. Selection of household was based on convenience sampling and household voluntary. One member of each voluntary household was interviewed as the representative of that household, generally the parents or others, aged around 20-60 years old. Data were collected by trained assistants prior to interview and informed that the survey was to be terminated if the 'house informant' or appropriate substitute was absent. The interviews were

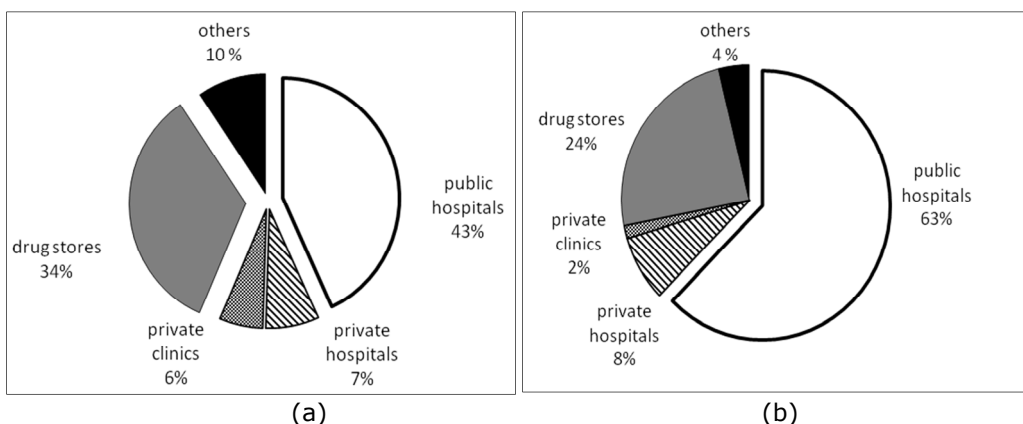
conducted during January till March 2011.

Direct structured survey after the interview in order to gather information on drugs available in the household was carried out by asking the respondents to show the medicine they had at home, the storage conditions, the expiry dates, medicine left from past treatment, adequacy of labeling, etc. The interviewers recorded the information by themselves. The values or cost of the drugs were calculated based on the reference prices sold at Ramathibodhi Hospital, Bangkok, Thailand, in 2011.

**Results and Discussion**

In total, 357 households were interviewed and surveyed, 46% in

Bangkok and 54% in upcountry. There were 2,208 drug items found in these households when interviewing. Figure 1 (a) shows 952 items (43%) of these drug items were dispensed by public hospitals, 750 items (34%) from drug stores, 163 items (8%) from private hospitals and 210 items (10%) from others. The values of these drugs were slightly different from the items as shown in Figure 1 (b). In these households, the survey could identify a total drug value of 217,984 THB (63%) dispensed by public hospitals, 84,419 THB (24%) obtained from drug stores, 27,593 THB (8%) from private hospitals and 13,526 THB (4%). In average, public hospitals dispensed the highest drug value per item, followed by private hospitals, drug stores.



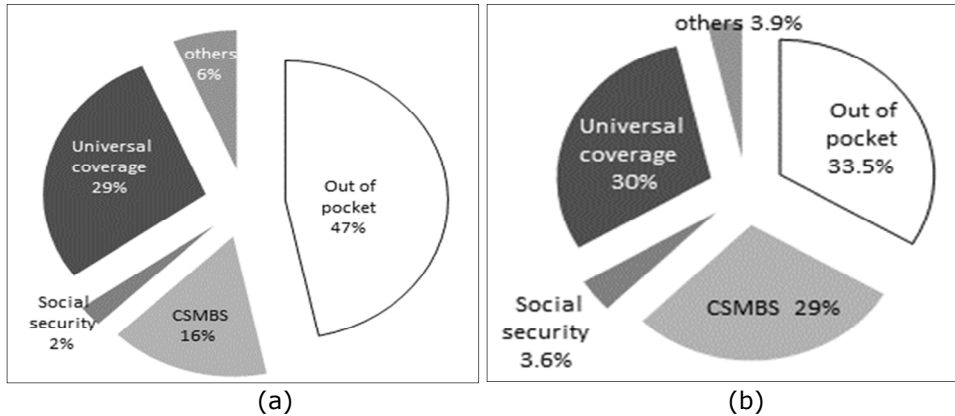
**Figure 1** Percentage of items (a) and expenses (b) of the drugs found in household surveys, sorted by dispensing sites of the drugs

The items of drugs found in this household survey were sorted by types of payment as shown in Figure 2(a) and the values were shown in Figure 2(b). Approximately 33% of these drugs (116,999 THB or about 3,900 USD) were paid by themselves, while the majority was paid for by the available reimbursable schemes, these include 30% (104,668 THB or about 3,500 USD) by the Universal Health Coverage

(UHC), 29% (101,013 THB or about 3,400 USD) by the Civil Servant Medical Benefit Scheme (CSMBS), 3.9% (13,770 THB or about 460 USD) by the Social Security Scheme and 3.6% (12,486 THB or about 420 USD) by the other insurance schemes, as shown in Figure 3. It is noted that the drug values paid for by the reimbursable schemes were the highest. A total value of drugs in all of the households of

348,935 THB (about 12,000 USD) accounts for 698 THB (about 25 USD) per household. Among these, 66% (230,291 THB or about 7,700 USD) was defined as routine-use or regular drugs, for chronic diseases such as

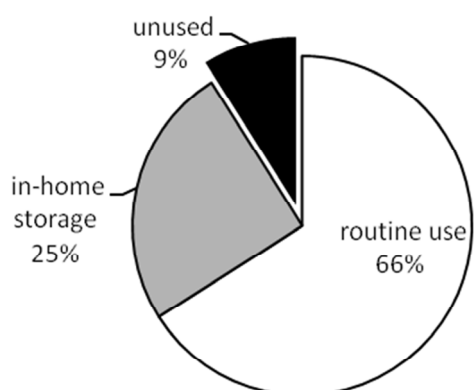
hypertension, diabetes and etc., 25% (85,721 THB or 2,900 USD) for in-home storage, and 9% (32,924 THB or about 1,100 USD) as rarely or unused drugs as shown in Figure 3 and detailed in Table and Figure 4.



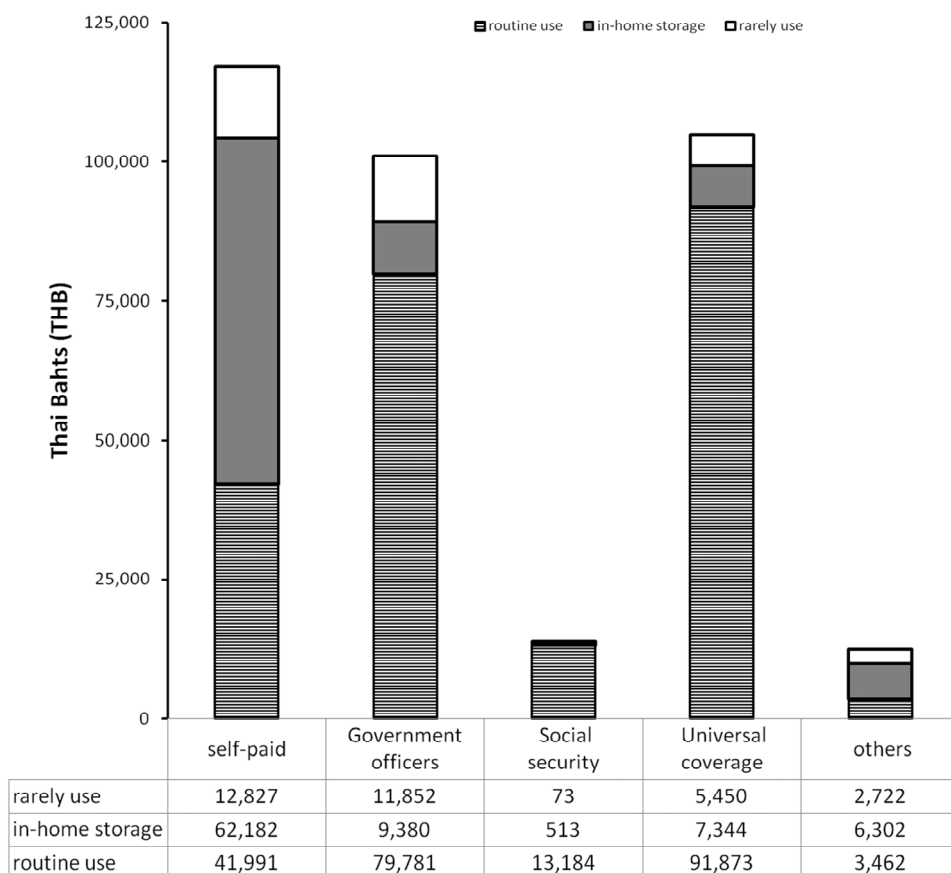
**Figure 2** Percentage of items (a) and expenses (b) of drugs found in household surveys, sorted by sources of payment

**Table 1** Items (units) and cost of the drugs found in 500-household surveys, sorted by use intentions and sources of payment

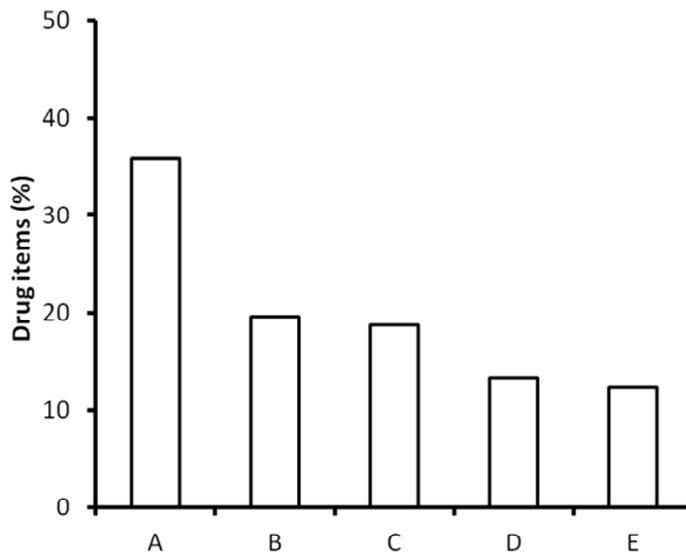
Use intention	Payment	Items		Cost		Unit cost (THB)
		Unit	%	THB	%	
Routine or regular use	Out of pocket	223	24.3	41,991	18.2	188
	CSMBs	211	23.0	79,781	34.6	378
	Social security	32	3.5	13,184	5.7	412
	Universal coverage	426	46.4	91,873	39.9	216
	others	26	2.8	3,462	1.5	133
	<b>total</b>	<b>918</b>	<b>100.0</b>	<b>230,291</b>	<b>100.0</b>	<b>251</b>
In home use	Out of pocket	628	70.3	62,182	72.5	99
	CSMBs	81	9.1	9,380	10.9	116
	Social security	14	1.6	513	0.6	37
	Universal coverage	108	12.1	7,344	8.6	68
	others	62	6.9	6,302	7.4	102
	<b>total</b>	<b>893</b>	<b>100.0</b>	<b>85,721</b>	<b>100.0</b>	<b>96</b>
Rarely or unused	Out of pocket	180	45.3	12,827	39.0	71
	CSMBs	59	14.9	11,852	36.0	201
	Social security	8	2.0	73	0.2	9
	Universal coverage	97	24.4	5,450	16.6	56
	others	53	13.4	2,722	8.3	51
	<b>total</b>	<b>397</b>	<b>100.0</b>	<b>32,924</b>	<b>100.0</b>	<b>83</b>
Total	Out of pocket	1031	46.7	116,999	33.5	113
	CSMBs	351	15.9	101,013	29.0	288
	Social security	54	2.4	13,770	3.9	255
	Universal coverage	631	28.6	104,668	30.0	166
	others	141	6.4	12,486	3.6	89
	<b>Total</b>	<b>2208</b>	<b>100.0</b>	<b>48,935</b>	<b>100.0</b>	<b>158</b>



**Figure 3** Use intentions of drugs found in household surveys



**Figure 4** Sources of payment of drugs found in 500-household surveys categorized into self-paid, and paid by Civil Servant Medical, Social Security, universal health coverage (UHC) schemes and others



**Figure 5** Categories of drug items (%) found in household surveys: A = non-opioid analgesics and antipyretics, B = antacids, antireflux agents and antiulcerants, C = non-steroidal anti-inflammatory drugs, D = antihistamine and antiallergics and E = antidiabetic drugs

Figure 5 categorizes the total of 2,208 drug items found in household surveys into 5 groups of the mostly found drugs. These were 343 non-opioid analgesics and antipyretic drugs, 188 antacids, antireflux agents and antiulcerants, 180 non-steroidal anti-inflammatory drugs (NSAIDs), 127 antihistamine and antiallergic and 119 antidiabetic drugs. Different categories provide different 5-most found drugs. Categorized by the cost of drugs, dyslipidaemic drugs were found to be the highest, accounting for 83,229 THB (about 2,780 USD), followed by anticoagulants or antiplatelets or fibrinolytic drugs (17,807 THB or about 600 USD), antiasthmatic or COPD drugs 11,894 THB (about 400 USD), antidiabetic agents 11,322 THB (about 380 USD) and NSAIDs 8,649 THB (about 290 USD). Items of drugs which

were categorized by routine use were analgesic and antipyretic (274 units), 102 antacids or antireflux or antiulcerants, 75 antihistamine or anti-allergic, 69 NSAIDs and 64 cough/cold drugs. Top 5 of the most values of in-home storage drugs were antacids, antireflux or antiulcerants (23,776 THB, about 800 USD), cough or cold preparations (16,884 THB, about 570 USD), non-opioid analgesics or antipyretics (11,815 THB, about 400 USD), anti-histamines or antiallergics (5,928 THB, about 200 USD) and NSAIDs (2,870 THB, about 100 USD).

Top 5 of the most found rarely or unused drugs, classified as leftover medicines, were NSAIDs (49 items), penicillins (38 items), GIT regulators, antiflatulents (36 items). However, the values of these leftover medicines found

in the surveys were ranked from highest, as follows: NSAIDs 7,173 THB (240 USD), GIT regulators 3,607 THB (130 USD), muscle relaxants 2,073 THB (70 USD), penicillin 1,929 THB (65 USD) and dyslipidaemic agents 1,679 THB (56 USD).

It was interesting to find 82 items (3.7%) and 45 items (2.0%) of drugs which were already expired and deteriorated, accounting for 8,245 (about 280 USD) and 4,645 THB (160 USD), respectively.

Chronic diseases, such as hypertension and diabetes were the mostly found among the drug users in this study survey. Public hospitals including health centers and health promotion community hospitals are the most accessible sites of these patients. The majority of the study population in this survey was those who were covered by Thai UHC in which the drug values found were approximately the same as those covered by Civil Servant Medical Benefit Scheme (CMBS). Values of rarely or unused drugs in households of those who were covered by reimbursable schemes tended to be the highest. In-home storage items of drugs in self-paid group were the highest. This shows a tendency that some of those under the reimbursable schemes may encounter drug compliance problems, resulting in highest unused drug values. Drug stores have shown to be the sources of in-home storage and perhaps a consequence of unused drugs may follow. However, rarely or unused drugs remain high percentage in this survey and suggest further considerations on rationale use of drugs. NSAIDs has shown to be the most found in-home storage drug, and could become unused drugs in the future. Dyslipidaemic drugs were found to be the highest drug values found as left-over medicine. Leftover medicines are shown to be about 9% in this household survey could introduce other

serious consequences to the environment and health. This study pointed out a challenge to strengthen primary health care and community participation in drug use concerns.

### **Acknowledgements**

Thai Health Promotion Foundation is thanked for this financial support.

### **References**

- Braund R, Gn G and Matthews R. Investigating unused medications in New Zealand. *Pharm World Sci.* 2009; 31:664–669.
- Ekedahl A. Reasons why medicines are returned to Swedish pharmacies unused. *Pharm World Sci.* 2006;28: 352–358
- Health Insurance System Research Office. Thailand's Universal Coverage Scheme: Achievements and Challenges. An independent assessment of the first 10 years (2001-2010). Nonthaburi: Thailand. 2012; 11.
- Hamamsy M. Unused medications: How cost and How disposal of in Cairo, Egypt. *IJPSR.* 2011;2:21-27.
- National Health Security Office. Annual Report (1<sup>st</sup> edition). Bangkok, Thailand. 2012;14.
- Wongpoowarak P, Kanjanakiritamrong J and Wongpoowarak W. Document for Conference: Unused Medicines. 12<sup>th</sup> HA national Forum, 15-18 March 2011 Bangkok: Impact Arena Convention Center. 2011.
- Persson M, Sabelström E and Gunnarsson B. Handling of unused prescription drug knowledge, behaviour and attitude among Swedish people. *Environ Int.* 2009; 35:771-774.
- The Pharmacy Council of Thailand. Sara-Pun-Ya: About Unused Medi-

cin. Pharmacy Week Forum. 2010;  
1:79-84

Supachutikul A. Health Insurance  
Systems in Thailand: Chapter 2  
Situation Analysis on Health  
Insurance and Future Development.  
Nonthaburi, Thailand: 1995; 29.