Social Welfare and Provision of Informal Care: A Case Study Using Economic Valuation to Determine Monetary Compensation in Thailand

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Abstract This study evaluates informal care for disabled stroke survivors in Thailand. It applies the proxy good method to determine monetary value of the care. Market prices of labor similar to informal care activities were used in the cost calculation. Data were collected by means of interviews conducted during 2006. The sample consisted of 101 disabled persons who had suffered a stroke at least six months prior to the interview, and had a functional status score of less than 95 as measured by the Barthel Index. Average monthly time spent on informal care was 94.6 hours. Time spent for household activities of daily living (HDL), health care activities (HCA), activities of daily living (ADL) and instrumental activities of daily living (IADL) was 29, 24, 38 and 3 hours/month, respectively. The average monthly monetary value of informal care was US$136 (at 2010 prices). Variations of the market price of labor caused changes in the cost of approximately 50% (both increase and decrease). Severity of disability and urban area had significant effects on the cost. The informal care value was less than that found using the opportunity cost method of calculation. It was much more than the current welfare payment for disabled people (500 Thai baht, or approximately US$16 per month). The findings should be considered as inputs for revision of welfare payment for people with disabilities, particularly those who are also elderly.

Key words: *social welfare, informal care, economic valuation, stroke, disabled person, proxy good method*

บทคัดย่อ **สวัสดิการสังคมและการดูแลสุขภาพอย่างไม่เป็นทางการ: กรณีศึกษาการใช้การประเมินค่าทางเศรษฐศาสตร์ในการกำหนดเงินค่าชดเชยในประเทศไทย**

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**สถาบันวิจัยระบบสาธารณสุข, †โรงพยาบาลหนองกี่ จังหวัดบุรีรัมย์, ‡มูลนิธิสาธารณสุขแห่งอินเดีย ประเทศอินเดีย, §คณะเภสัชศาสตร์ มหาวิทยาลัยมหิดล*

การศึกษานี้ประเมินการดูแลอย่างไม่เป็นทางการแก่คนพิการอันเนื่องมาจากโรคหลอดเลือดสมองในประเทศไทย โดยการใช้วิธีสินค้าตัวแทนในการประเมินมูลค่าเป็นตัวเงินของการดูแล ซึ่งใช้ราคาตลาดของแรงงานที่ใกล้เคียงกับกิจกรรมการดูแลในการคำนวณต้นทุน ทำการเก็บข้อมูลโดยการสัมภาษณ์ในปี ๒๕๔๙ จำนวน ๑๐๑ ราย ซึ่งป่วยเป็นโรคหลอดเลือดสมองมาแล้วอย่างน้อย ๖ เดือน และมีคะแนนสถานะการทำงานวัดโดยดัชนีบาร์เธล น้อยกว่า ๙๕ การศึกษาพบว่าเวลาการดูแลอย่างไม่เป็นทางการเฉลี่ยเดือนละ ๙๔.๖ ชั่วโมง โดยจำแนกเป็นกิจกรรมในครัวเรือน ๒๙ ชั่วโมง การดูแลสุขภาพ ๒๔ ชั่วโมง กิจวัตรประจำวัน ๓๘ ชั่วโมง และกิจกรรมนอกบ้าน ๓ ชั่วโมง แปลงเป็นมูลค่าเงินเดือนละ ๑๓๖ เหรียญสหรัฐ หรือ ๔,๒๕๐ บาท (ที่มูลค่าของปี ๒๕๕๓) การผันแปรของค่าจ้างแรงงาน ส่งผลให้ต้นทุนเปลี่ยนแปลงไปร้อยละ ๕๐ (ทั้งเพิ่มขึ้นและลดลง) ปัจจัยที่ส่งผลต่อต้นทุนอย่างมีนัยสำคัญทางสถิติได้แก่ ความรุนแรงของความพิการและการอยู่ในเมือง ต้นทุนที่ประเมินโดยวิธีสินค้าตัวแทนนี้ มีมูลค่าน้อยกว่าวิธีต้นทุนค่าเสียโอกาสของผู้ดูแล แต่มีมูลค่ามากกว่าเงินสวัสดิการคนพิการ (เดือนละ ๕๐๐ บาท หรือ ๑๖ US$) ผลการศึกษาครั้งนี้ควรจะนำไปใช้เป็นข้อมูลในการพิจารณาทบทวนอัตราเงินสวัสดิการคนพิการ โดยเฉพาะคนพิการที่เป็นผู้สูงอายุ

คำสำคัญ: *สวัสดิการสังคม การดูแลอย่างไม่เป็นทางการ การประเมินค่าทางเศรษฐศาสตร์ โรคหลอดเลือดสมอง คนพิการ วิธีสินค้าตัวแทน*

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Introduction

Disability is an umbrella term, covering impairment, activity limitation, and participation restriction. Impairment is a problem in body function or structure; activity limitation is a difficulty encountered by an individual in executing a task or action; while participation restriction is a problem experienced by an individual in involvement in life situations. Thus disability is a complex phenomenon, reflecting an interaction between features of a person's body and features of the society in which he or she lives.[1] Currently, around 10% of the world's total population, or roughly 650 million people, live with a disability.[2] In Asian countries, for instance, disability surveys showed a disability rate of 15% in Cambodia (1999), 5% in China (1987), 2.13% in India (2001 census), 5.1% in Japan (2002), and 2.9% in the Philippines (2002). Although most countries reported disability rates well below 10%, these rates were likely underestimated.[3]

In Thailand, a recent survey was conducted by the National Statistics Office in 2007. The study population covered all age groups. Disability was broadly defined as having difficulties or health problems for more than six months (resulting in, for instance, problems in seeing, hearing, communication, walking, or psychological control), or having problems in daily activities (e.g. eating, taking a bath, toileting), or having an impairment (e.g. blindness, deafness, paralysis, autism, mental problems). It was found that there were approximately 1.9 million disabled people (2.9% of the population). This was an increase from 1.7% in 2002. Ninety-six percent of people having difficulties or health problems had caregivers; 92% of the caregivers required financial welfare.[4]

The Thai Constitution states that the disabled have the right to utilize welfare services, facilities, and state assistance, and that access to such assistance and welfare must be arranged for the handicapped. In regard to health security, the National Health Security Act B.E. 2545 (2002) and the Social Security and Compensation Fund Act B.E. 2534 (1991) contain principles that clearly cover disability and rehabilitation of capability to a certain extent.[5] According to the Promotion and Development of the Quality of Life of Disabled Persons Act B.E. 2550 (2007), disabled persons are individuals who face limitations in conducting their daily routine or in social participation, due to impairments or other obstacles. The act divides disability into six types: 1) sight handicap; 2) disability in hearing or communication of meaning; 3) mobility or physical handicap; 4) mental or behavioral disability or being autistic; 5) disability in intelligence; and 6) learning handicap.[5]

The Thai government provides care for people with disabilities (PWD) in two forms: health care and social welfare (Fig. 1). The Ministry of Public Health is responsible for arranging health care services for disabled people through a referral network of regional, provincial and district hospitals, including sub-district health centers. The costs of care incurred in hospitals and health centers would be reimbursed by any of three national health insurance schemes, i.e. the Civil Servant Medical Benefit Scheme (for government officials), the Social Security Scheme (for private workers), and the Universal Health Coverage Scheme (for the rest of the population). In addition to

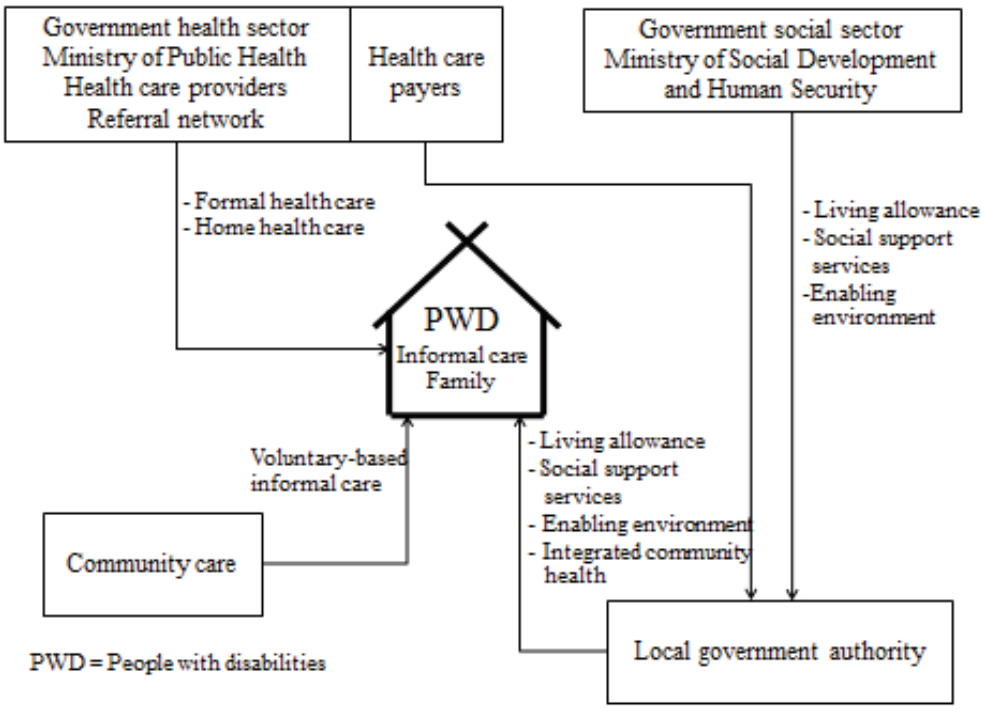

Figure 1 Disability care system in Thailand

institutional care, community health care is promoted through the primary health care concept. The community health fund has been developed through decentralization of the National Health Security Office to local government authorities. This fund provides initiatives for community health care.[6] By this mechanism, voluntary community-based health and social care have been practiced in some rural areas. In addition to care provided by health professionals, informal care provided by family members or neighbors is also pivotal. Caregivers spend a substantial amount of time in providing care to disabled people in Thailand.[7-9]

On the other hand, the Ministry of Social Development and Human Security is responsible for supporting local government authorities by providing living allowances, local support services, and an enabling environment. The local governments in turn provide those facilities to the disabled and their families. According to the Rehabilitation of Disabled Persons Act B.E. 2534 (1991), disabled persons receive a living allowance of 500 baht (approximately US$16) per month from the government. The payment mechanism is decentralized to the local governmental authorities so that additional allowances could be arranged locally. This allowance was renamed as a "disability pension" by the Persons with Disabilities Quality of Life Promotion Act B.E. 2550 (2007). This implies that all legally disabled people have the right to receive 500 baht per month. This amount is based on availability of the funds, and does not require that any empirical evidence be provided. The payment aims to improve the quality of life of people with disabilities. In addition to daily living expenses, the

quality of life of disabled people depends heavily on informal care. Therefore, a crucial and unanswered question is how to develop social welfare policy that acknowledges the needs of people with disabilities and their informal caregivers. Economic valuation of informal care might be a guide for investment in both the development of the health care system and the social welfare of disabled persons and informal caregivers. This paper aims to provide empirical evidence for a more sensible planning of the social welfare system.

Methods

Study design

Opportunity cost and proxy good methods are used to valuate informal care. The opportunity cost method measures and values the time and tasks that an informal caregiver gives up in order to provide informal care. The proxy good method values the time spent for informal care based on the wage rate of close substitutes in the labor market, e.g. professional caregivers or household workers.[10] A valuation of informal care by employing the opportunity cost method has been published in a previous study.[9] The present study employs the proxy good method.

Study sample

Our study sample consisted of stroke patients and their caregivers at Sirindhorn National Medical Rehabilitation Center (SNMRC) and Buriram Hospital. SNMRC was selected as it is the only national center for medical rehabilitation located in central Thailand. It is a tertiary hospital with 48 patient beds. Buriram Hospital is a 590-bed regional hospital, one of 25 regional hospitals in Thailand. Buriram is in the northeast, which is the poorest area of Thailand. The study hospitals were selected because of their size, level of service, volume of stroke patients, and their key locations in the central and northeastern regions, and because the administrators permitted us to access their data.

Informal caregivers were approached through disabled stroke survivors who were registered at the study hospitals during the period from January 1, 2001, to December 31, 2005. The retrospective study period was extended to five years to include enough respondents. Interviews were conducted at least six months after a stroke attack, because disability is normally determined six months after a stroke.[11-14]

All informal caregivers of stroke survivors with the following characteristics were included in the study:

- Stroke survivors with a diagnosis of code I60-I69 (cerebrovascular diseases) or G81 (hemiplegia), as classified by the International Classification of Diseases, 10th Revision (ICD-10) (World Health Organization, 1992).
- Stroke survivors who had a stroke at least six months prior.
- Stroke survivors having a functional status of not more than 95 out of 100, as measured by the Barthel Index.[15,16]

Data collection and management

Data collection began with stroke survivor selection. Face-to-face interviews were conducted at the study sites if the survivors came to the study sites during the interview period. Alternatively, the

interviews were conducted at the survivors' homes. Interviews were conducted during August-October 2006.

Time measurement methods

The first piece of information necessary for the valuation of informal care using the proxy good method is the amount of time spent on informal care. Methods for measurement of informal care time are elaborated upon in the study by van den Berg and Spauwen.[17] Informal care time was measured using the recall method. It was classified as household activities of daily living (HDL; e.g. cooking, cleaning the house, and gardening), activities of daily living (ADL; e.g. eating, grooming, dressing, bathing, and toileting), and instrumental activities of daily living (IADL; e.g. preparing meal, using telephone, washing clothes).[10] An extra category, namely health care activity (HCA; e.g. preparing medication, doing rehabilitation), was added, as this was thought to be an important category within the Thai context.[9]

Monetary valuation methods

The proxy good method values informal care time by the wage rate of close substitutes in the labor market, e.g. professional caregivers or household workers. Wage rates from a national survey in 2003 were used in the calculation.[18] The consumer price index[19] was applied to adjust average wages to the study year. According to the Labor Protection Act B.E. 2541[20], working time per week cannot exceed 48 h. Based on this, a total working time per month of 192 hours (using a simply calculation of 48 hours multiplied by 4 weeks) was used to calculate the hourly wage rate. Selected wage rates that were matched with informal care activities are as follows:

- Health and social work wage rates (183 baht/day and 55 baht/day for Bangkok and Buriram province, respectively) were used for both health care activities (HCA) and activities of daily living (ADL).
- Household worker wage rates (157 baht/day and 127 baht/day for Bangkok and Buriram province, respectively) were used for both household activities of daily living (HDL) and instrumental activities of daily living (IADL).

Total costs were calculated in Thai baht (THB) at 2006 prices, then adjusted by the consumer price index to 2010 prices (2006 = 97.8, 2010 = 108.0).[21] Finally, they were converted to US dollars (US$1 = 31.69 THB).[22]

Statistical analysis

Statistical analyses were performed using SPSS version 16. Cost comparisons between groups were analyzed by Mann-Whitney, Kruskal-Wallis[23] or Jonckheere-Terpstra tests.[24] Results were considered statistically significant when *P* value was less than 0.05. One-way sensitivity analysis was performed using minimum and maximum wages of professional caregivers. To explore factors affecting the values, multiple regression analysis (enter method) was employed to analyze the relationship between cost of informal care and predictor variables.[23] Model assumptions and tests were also performed.[25]

Ethics

The research protocol was approved by the Institutional Review Board of Mahidol University, and

it conforms to the provisions of the Declaration of Helsinki. Written informed consent was obtained from all respondents who participated in this study.

Results

Response rate and characteristics of stroke survivors and informal caregivers have been published elsewhere.[9,26] In brief, most stroke survivors were male (52.5%), with a mean age of 66 years. A majority was either mildly (33%) or moderately (29%) disabled. In terms of family, more than half were part of an extended family, which is defined as more than two generations living together: i.e. grandparents, parents and children/grandchildren. The average household of a disabled person consisted of 4.6 family members. The average age of caregivers was 46 years; most of them were female (61%), and either sons/daughters (39%) or spouses (36%) of the disabled persons. More than half (55%) were employed persons, followed by unemployed/housewife (22%), pensioners (18%), and students (5%). Forty-two percent of the stroke survivors had more than one caregiver. Characteristics of major caregivers (one caregiver per stroke survivor) are described in Table 1. Table 2 shows the time

Table 1 Characteristics of stroke survivors and informal caregivers

Characteristics		**Stroke survivors (%) N = 100***
Level of disability**		
Mildly disabled		33
Moderately disabled		29
Severely disabled		17
Very severely disabled		21
Residential area		
Rural		40
Urban		60
	All caregivers (%) N = 149	**Major caregivers (%) N = 100**
Gender of caregiver; female	61	76
Age of caregiver	Mean = 46 years	Mean = 51 years
Experience in caring of caregiver	20	21
Occupation of caregivers		
Unemployed/housewife	22	27
Agriculture	22	21
Employee or labor	6	6
Student	5	1
Government or state enterprise, or company officer	13	6
Self-employed	14	15
Retired	18	24

*One stroke survivor who had no caregiver was excluded.

**Barthel Index scoring is 0, 5, 10 and 15. A total score of 100 indicates independent, 75-95 mildly disabled, 50-70 moderately disabled, 25-45 severely disabled, and 0-20 very severely disabled.

Table 2 Informal care time (hours) and monetary value (US$ at 2010 prices) per activity per month

Type of Activities	Buriram (N = 48)			Bangkok (N = 52)			Total (N = 100)		
	Mean	Median	Inter-quartile range	Mean	Median	Inter-quartile range	Mean	Median	Inter-quartile range
Informal care time (hour/month)									
HDL	44.7	22.2	0.0 - 75.0	14.9	0.0	0.0 - 15.7	29.2	0.0	0.0 - 39.6
HCA	7.9	4.8	1.0 - 9.2	39.2	11.0	5.0 - 38.2	24.2	7.8	3.0 - 20.5
ADL	37.1	18.4	4.7 - 48.6	39.1	23.5	10.6 - 46.9	38.1	22.0	9.6 - 47.4
IADL	2.5	0.0	0.0 - 1.0	3.5	0.3	0.0 - 4.0	3.0	0.1	0.0 - 2.9
Total*	92.2	80.5	32.2 - 104.9	96.7	68.2	29.0 - 133.2	94.5	71.6	30.3 - 112.5
Monetary cost (USD/month) (at 2010 prices)									
HDL	27.17	13.46	0.00 - 45.54	13.00	0.00	0.00 - 12.50	19.80	0.00	0.00 - 29.88
HCA	6.43	3.85	0.81 - 7.36	93.28	27.82	10.58 - 80.85	51.59	9.34	3.24 - 30.59
ADL	30.02	14.89	3.98 - 38.64	92.27	50.26	27.62 - 107.37	62.39	33.35	8.00 - 68.76
IADL	1.51	0.00	0.00 - 0.61	3.01	0.28	0.00 - 3.00	2.29	0.03	0.00 - 2.36
Total**	65.13	79.96	24.36 - 74.80	201.57	90.25	56.93 - 272.89	136.08	69.32	38.20 - 139.07

*Difference in total time in Buriram and Bangkok was not statistically significant (p = 0.264) (Mann-Whitney test)

*Difference in total time among types of activities was statistically significant (p = 0.000) (Kruskal-Wallis test)

**Difference in total cost for Buriram and Bangkok was statistically significant (p = 0.000) (Mann-Whitney test)

**Difference in total cost among types of activities was statistically significant (p = 0.000) (Kruskal-Wallis test)

Table 3 Comparison of informal care values according to disability level and setting (US$ at 2010 prices)

Severity of disability	Buriram (N = 48)			Bangkok (N = 52)			Total (N = 100)*		
	Mean (number)	Median	Inter-quartile range	Mean (number)	Median	Inter-quartile range	Mean (number)	Median	Inter-quartile range
Mildly disabled	37.28 (14)	27.24	9.47 - 53.72	78.34 (19)	74.21	37.60 - 104.69	60.92 (33)	55.10	20.64 - 79.06
Moderately disabled	54.52 (9)	40.60	13.78 - 59.55	216.68 (20)	158.52	81.95 - 317.00	166.36 (29)	86.38	53.31 - 255.60
Severely disabled	66.68 (10)	68.48	34.49 - 90.97	339.59 (7)	83.88	55.88 - 297.09	179.05 (17)	71.38	54.23 - 97.64
Very severely disabled	96.46 (15)	70.97	60.73 - 116.11	380.39 (6)	385.35	132.15 - 519.61	177.58 (21)	74.69	60.37 - 218.14

*Differences in total cost at different disability levels were statistically significant (p = 0.012) (Jonckheere-Terpstra test)

Table 4 Effect of wage on the replacement cost (US$ at 2010 prices)

Cost	Base case	Minimum rate		Maximum rate	
		Cost	Variation (%)	Cost	Variation (%)
Total	15,176.74	7,359.36	-51.51	22,576.81	48.76
Mean	151.77	73.59	-51.51	225.77	48.76
Standard deviation	230.70	79.00	-65.76	265.71	15.17
95% CI for mean (lower bound)	105.99	57.92	-45.36	173.05	63.26
95% CI for mean (upper bound)	197.54	89.27	-54.81	278.49	40.98
Median	77.31	53.88	-30.30	131.77	70.44

Table 5 Multiple regression model of the replacement cost

	Unstandardized coefficients			95% confidence interval for B	
	B	Std. error	Sig.	Lower bound	Upper bound
(Constant)	3.013	0.240	0.000	2.537	3.489
Level of disability					
(Reference = mildly disabled)					
Moderately disabled	0.859	0.258	0.001	0.347	1.371
Severely disabled	0.656	0.302	0.032	0.056	1.256
Very severely disabled	1.159	0.287	0.000	0.589	1.729
Residential area					
(Reference = rural area)					
Urban residential area	1.024	0.223	0.000	0.580	1.467
Occupation of caregivers					
(Reference = unemployed)					
Students	-2.697	1.011	0.009	-4.705	-0.689
Employed in private/public sector	0.514	0.451	0.257	-0.381	1.410
Self employed	0.416	0.299	0.168	-0.178	1.011
Retired	-0.266	0.252	0.293	-0.766	0.233

Adjusted R^2 = 0.331, probability value of F statistics < 0.001

spent on different informal care tasks. The overall average time spent on providing informal care was 95 h/month, a large part of which consisted of ADL tasks (38 h per month).

When comparing Buriram and Bangkok, the total average time spent on informal care was similar (92 h and 97 h, respectively). But the pattern of the informal care provided was quite different. For Buriram, most of the time was devoted to HDL (45 h per month), followed by ADL (37 h per month); but only 8 h per month was spent on HCA. In Bangkok, on the other hand, time was spent equally for ADL and HCA (39 h each), and only 15 h per month was spent for HDL. The overall monetary value of informal care was estimated as US$136 per month (at 2010 prices) (Table 2). However, it was much higher in Bangkok compared to Buriram (US$202 versus US$65). The value increases with the severity level of disability (Table 3).

The effect of market wages of professional caregivers on the values of informal care was also explored (Table 4). Market wage rates varied throughout the country. Minimum and maximum rates were used in the re-analyses. For health and social work, the minimum and maximum wages were US$126.30/month and US$443.30/month, respectively. For household work, the minimum wage was US$79.80/month and the maximum was US$142.30/month.[18] Sensitivity analysis resulted in a decrease of 51.5% and an increase of 48.8% in the minimum and maximum results, respectively. The potential explanatory variables included in regression analysis are shown in Table 1; only major caregivers were included. Dummy variables were created when explanatory variables were qualitative variables. Assessing normality of the dependent variable is a pre-analysis procedure. The replacement cost as the dependent variable was not normally distributed. Therefore, a natural logarithmic transformation was undertaken, resulting in an approximately normal distribution. The assumptions of the model were tested for homoscedasticity, multicollinearity, influential observations and outliers.[25] Table 5 presents the fitted explanatory model with adjusted R2 = 0.331, probability-value of F statistics < 0.001. This means that 33% of the variation of replacement cost could be predicted by the variables entered in the model. Significant predictor variables are different levels of disabilities, geography, and occupation of caregivers.

Discussion and conclusion

There are various methods of evaluating informal care, resulting in different costs.[27] This study applied both opportunity cost method and proxy good method. Findings based on the opportunity cost method were published previously.[9] It was found that the cost from the proxy good method used in this report was lower than that of the opportunity cost method (US$136 vs. US$162, respectively). This finding, however, was contrary to the results of a study on stroke survivors in Australia.[28] Our study and that of Dewey et al.[28] employed a similar method of differentiated wages specific for the type of care activity. The reason that the cost from the proxy good method was less than that obtained from the opportunity cost method was because of the different rates of labor time that were used. Thai household workers usually live with their employers, who provide meals

and accommodations. Due to limitations of estimation, the wage rate used in this study did not include those costs; therefore it was relatively lower than the actual rate. Replacement cost or proxy good method is less well known than the opportunity cost method. However, it has also been used in other studies, e.g. a study among disabled elderly people in France[29], and a study among older persons in the United States during their final year of life.[30] Given Thailand context as a middle-income country without much familiarity with opportunity costs, the proxy good method might be an appropriate policy option.

The present study showed that the average monthly informal care time at each study site was similar, with an overall total average of 95.4 hours per month. This might be due to the limited number of family members (an average of four persons per family) and time available to devote to caregiving. The striking difference in informal care patterns between the Buriram site (representing rural areas) and Bangkok (representing urban areas) is interesting, and might reflect limitations in health care performance in regard to rehabilitation, particularly in rural areas. Less time spent for ADL and HCA in Buriram might result from a lack of knowledge and skills among informal caregivers, a situation which is compounded by a lack of rehabilitation services and health-support activities offered by health care providers. Therefore HDL tasks, which require less professional knowledge and hence can be performed by lay caregivers, are predominant. In Bangkok, however, there seems to be more rehabilitation care available, but only for outpatient services or outreach (home-based) care which requires a significant contribution by family caregivers. This corresponds with the monetary value of informal care at each site. The more that rehabilitation care is unavailable or ineffective, the greater the burden of informal care is on the family. For very severely disabled survivors, the support of community social services and additional family subsidies might be needed. Based on the proportion of time spent on health care and other activities, this evidence can be applied for allocation of welfare subsidies for health care and living allowances.

For generalization of the result, a multiple regression model was developed to predict the cost of informal care. The significant explanatory variables were found to be: characteristics of disabled persons (level of disability), caregiver characteristics (occupation), and community type. For example, different disability levels have an effect on informal care time; an informal caregiver spent a longer time when the disability level was more severe. Regarding residential area, caregiving time and wage rate in the urban area were higher than those in the rural area. Informal care was also dependent on the occupation of caregivers. Students provided less care than housewives or unemployed caregivers. This model indicated that the care provided was based on need (disability level) and the availability of caregivers. The welfare rate can be differentiated appropriately for various needs.

This study has some limitations. Time use data were collected using the recall method, whereas a diary is considered the gold standard. However, van den Berg and Spauwen[10] conducted a comparison of both methods and recommended that whether or not the benefits of increasing precision of using the

diary instead of the recall method out-weigh the additional costs was debatable, it depended on the research objectives. In this study, the recall method was used while the accuracy of measured informal care time was acceptable. The reason was the samples were only stroke patient who had long-term permanent disability. So, it assumed that their given informal care was fixed and indifferent pattern which was easily recalled. In terms of monetary valuing of time loss, we calculated by using cost per hour from 4 weeks per month instead of 4.33 weeks per month (from 52 weeks per year). It might result in slightly over estimation on the costs of informal care per month.

Informal care has been accepted as part of a health and welfare system.[31,32] However, studies including the cost of informal care and the welfare system have been infrequently explored.[33] One study in the UK conducted a cost analysis of arthritis for the purpose of adjusting medical welfare benefits.[34] Actually, welfare benefits for informal care have an effect on health care expenditures. A previous study on stroke survivors demonstrated that a distribution of cost occurs between health care providers and social welfare providers.[35] In the case of Thailand, disabilities have been given an important place in national health policy. Fairness in Access to Health Services by the Disabled was one of the agreed Resolutions in the Third Thailand National Health Assembly in 2010. The discrepancies in rehabilitation's benefits package and payment mechanisms among the three major health security schemes were addressed.[5] Economic values of informal care might be a guide for investment plans in both health care and social system development concerning the health and quality of life of disabled stroke survivors and family caregivers. Currently, the government pays approximately US$16 (500 Baht) per month directly to disabled persons. This amount of money serves to partly meet the needs of daily survival, but not to subsidize the costs of informal care needed. The results of this study could therefore give empirical support for a more sensible planning of the social welfare system.

In conclusion, we found that the cost of informal care was much higher than the current social welfare payment. To improve the quality of life of people with disabilities, the welfare payment amount should be reconsidered. The findings of this study could serve as evidence for revision of welfare benefits for people with disabilities, particularly those who are also elderly.

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